Public Notice of the
Draft Environmental Impact Report and Public Meetings
on the Natomas Levee Improvement Program
Landside Improvements Project

Date: September 14, 2007
To: Responsible Agencies and Other Interested Parties
From: John Bassett, Director of Engineering, SAFCA

The Sacramento Area Flood Control Agency (SAFCA) is pleased to announce the release for public review and comment of the Draft Environmental Impact Report (DEIR) on the Natomas Levee Improvement Program (NLIP) Landside Improvements Project. The DEIR analyzes the landside components of the NLIP that are proposed for construction in 2008 through 2010, which include: levee raising and seepage remediation, improvements to irrigation and drainage infrastructure, habitat development, and additional actions to meet the Federal Emergency Management Agency (FEMA) requirements—encroachment management and bridge crossing modifications. The DEIR presents a project-level analysis of the 2008 construction components, and a program-level analysis of the 2009–2010 elements. The DEIR was prepared in compliance with the California Environmental Quality Act (CEQA) and the State CEQA Guidelines (California Code of Regulations [CCR Title 14, Section 1500 et seq.]).

Project Location

All project construction activities would take place in Sacramento and Sutter Counties within the Natomas Basin, except for the development of a borrow site on Reclamation District (RD) 1001 land northeast of the basin.

Based on an extensive records search, no known hazardous materials sites are located within the specific sites proposed for project-related excavation; however, one site was identified along the Sacramento River east levee with possible contamination issues. As part of the project, mitigation would be implemented to ensure that contaminants are not present at unacceptable levels on this site near the location of project construction activities. Refer to the DEIR for additional details.

Project Description

The project objectives are to (1) provide at least 100-year flood protection as quickly as possible while laying the groundwork to achieve at least urban standard ("200-year") flood protection over time; (2) use flood control projects in the vicinity of Sacramento International Airport to facilitate changes in the management of Airport lands that reduce hazards to aviation safety; and (3) use flood control projects to enhance habitat values by increasing the extent and connectivity of the lands in Natomas being managed to provide habitat for giant garter snake, Swainson's hawk, and other special-status species.

To meet these project objectives, SAFCA proposes the following project activities:

<u>2008 construction</u>

- Along the 5.3-mile Natomas Cross Canal (NCC) south levee, raise the levee to provide additional freeboard; realign the levee to provide a more stable waterside slope and to reduce the need for removal of waterside vegetation, and construct a seepage cutoff wall in the eastern 4.3 miles (approximately) of the levee to reduce the risk of levee failure due to seepage and stability concerns.

- Along the Sacramento River east levee, construct a raised adjacent setback levee from the NCC to 1,700 feet south of the North Drainage Canal with seepage berms where required to reduce seepage potential, and install woodland plantings.

- Construct a new canal designed to provide drainage and associated giant garter snake habitat ("GGS/Drainage Canal") and relocate the Elkhorn Canal between the North Drainage Canal and Elkhorn Reservoir.

- Recontour the land and create marsh and upland habitat at borrow locations.

2009 and 2010 construction

- Along the Sacramento River east levee south of the limits of the 2008 improvements, construct an adjacent setback levee (raised where needed to provide adequate freeboard) with seepage berms, relief wells, and cutoff walls as required, and install woodland plantings.

- Raise and construct seepage berms along the Pleasant Grove Creek Canal (PGCC) west levee.

- Construct a new GGS/Drainage Canal between Elkhorn Reservoir and the West Drainage Canal, improve the West Drainage Canal, relocate the Riverside Canal and the Elkhorn Canal downstream of Elkhorn Reservoir, and reconstruct the Reclamation District 1000 Pumping Plant No. 2.

- Recontour the land and create marsh and upland habitat at borrow locations.

- Remove encroachments from the water side of the Sacramento River east levee as needed to ensure that the levee can be certified as meeting the minimum requirements of the National Flood Insurance Program and U.S. Army Corps of Engineers design criteria, and address FEMA requirements for the State Route 99/70 bridge crossing of the NCC.

Significant Environmental Impacts

The DEIR identifies impacts of these proposed activities in the following areas that would be reduced to a less-than-significant level with mitigation: geology and soils, hydrology and hydraulics, water quality, fisheries and aquatic resources, terrestrial biological resources, cultural resources, paleontological resources, transportation and circulation, air quality, noise, recreation, visual resources, utilities and service systems, and hazards and hazardous materials.

The following impacts would be reduced with mitigation, but not to a less-than-significant level:

- Conversion of important farmland to nonagricultural uses (direct and cumulative)

- Potential construction impacts on known prehistoric resources, discovery of human remains during construction, and damage to or destruction of previously undiscovered cultural resources (direct and cumulative)
- Temporary increase in traffic on local roadways during construction (direct)

- Effects on air quality with respect to short-term construction emissions: temporary emissions of ROG, NO_X, and PM_{10} (direct and cumulative), and incremental contributions to greenhouse gas emissions (cumulative)

- Generation of short-term construction noise, exposure of sensitive receptors to or generation of excessive groundborne vibration or noise, and exposure of residents to increased traffic noise levels from hauling activity (direct and cumulative)

- Changes in scenic vistas, scenic resources, and existing visual character of the project area (direct and cumulative)

Document Availability

Copies of the DEIR are available for public review at the following locations:

Location	Address
SAFCA	1007 7th Street, 7th Floor Sacramento, CA 95814
Sacramento Central Library	828 I Street Sacramento, CA 95814
Sutter County Library	750 Forbes Avenue Yuba City, CA 95991

The document may also be viewed at SAFCA's website: www.safca.org. Printed or CD copies of the DEIR may be requested from SAFCA by emailing BassettJ@SacCounty.net or calling John Bassett at (916) 874-7606.

Public Comment Period

The public comment period for the DEIR begins on September 14, 2007 and closes on October 29, 2007. Please submit written comments on the DEIR **by 5:00 p.m. on Monday, October 29, 2007** to:

John Bassett/NLIP Landside DEIR Comments
Sacramento Area Flood Control Agency
1007 7th Street, 7th Floor
Sacramento, CA 95814
Fax: (916) 874-8289
BassettJ@SacCounty.net

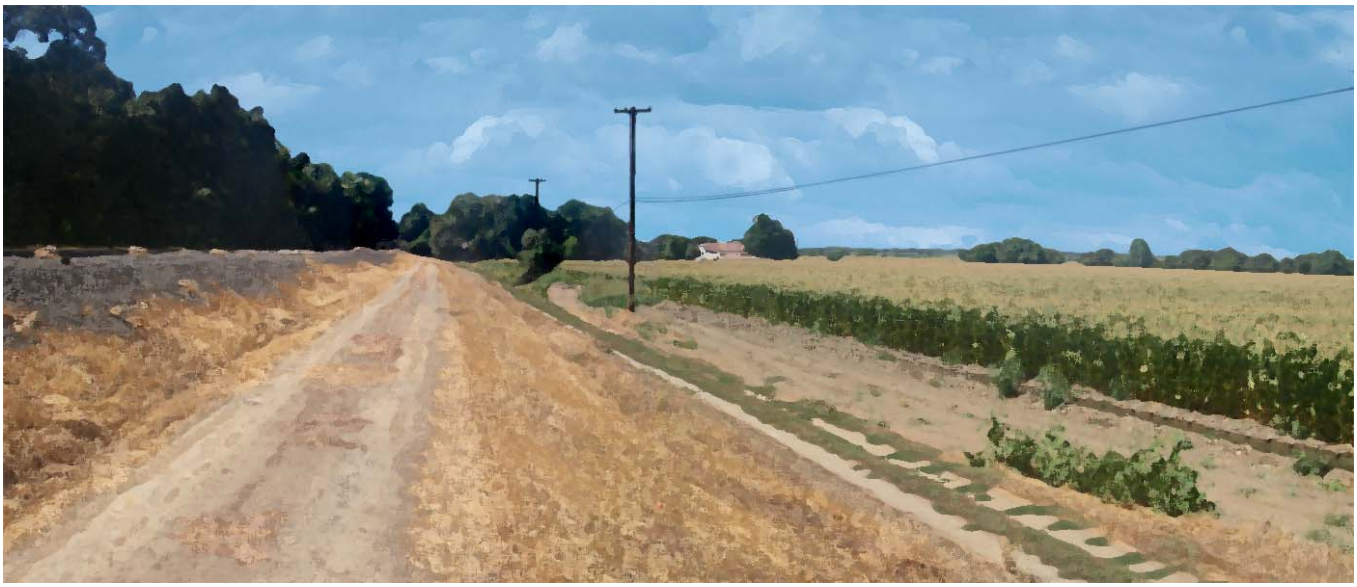
If comments are provided via e-mail, *please include the project title in the subject line, attach comments in MS Word format, and include the commenter's U.S. Postal Service mailing address*.

Public Meetings

SAFCA will hold one or more public meetings during the comment period—including a meeting to be held during the regular October 18, 2007, meeting of the SAFCA Board—at which it will receive input from agencies and the public on the DEIR. All public meetings will be held at the City of Sacramento Council Chambers, 915 I Street, Sacramento, CA 95814.

Draft Environmental Impact Report on the

Natomas Levee Improvement Program
Landside Improvements Project



State Clearinghouse # 2007062016

Prepared for:

SAFCA
Sacramento Area Flood Control Agency

September 2007

EDAW | AECOM

Draft Environmental Impact Report on the

Natomas Levee Improvement Program Landside Improvements Project

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ACRONYMS AND ABBREVIATIONS

µg/L	micrograms per liter
µg/m^3	micrograms per cubic meter
µin/sec	microinch per second
µS/cm	microSiemens per centimeter
AB	Assembly bill
ACHP	Advisory Council on Historic Preservation
ADT	average daily traffic
Airport	Sacramento International Airport
ALUC	airport land use commission
AQAP	air quality attainment plan
AQMD	air quality management district
ARB	California Air Resources Board
ASTM	American Society for Testing and Materials
ATCM	Airborne Toxics Control Measure
BACT	best available control technology
Bank Protection EIR	*Draft Environmental Impact Report on Natomas Levee Improvement Program Bank Protection Project*
basin plan	water quality control plan
Basin Plan	*Water Quality Control Plan for the Sacramento and San Joaquin River Basins*
Bay-Delta	San Francisco Bay/Sacramento–San Joaquin Delta
BMP	best management practice
B.P.	Before Present
ºC	degrees Celsius
CAA	Clean Air Act
CAAA	Clean Air Act Amendments of 1990
CAAQS	California ambient air quality standards
Cal/EPA	California Environmental Protection Agency
Cal/OSHA	California Occupational Safety and Health Administration
Caltrans	California Department of Transportation
CCAA	California Clean Air Act
CCR	California Code of Regulations
CDF	California Department of Forestry and Fire Protection
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CHABA	Committee of Hearing, Bio Acoustics, and Bio Mechanics
City	City of Sacramento
CLUP	*Sacramento International Airport Comprehensive Land Use Plan*
cmbs	centimeters below surface
CNDDB	California Natural Diversity Database
CNEL	community noise equivalent level
CNPS	California Native Plant Society
CO	carbon monoxide

Comprehensive Study	Sacramento and San Joaquin River Basins California Comprehensive Study
CRHR	California Register of Historical Resources
CTR	California Toxics Rule
CWA	Clean Water Act
dB	decibel(s)
dBA	A-weighted decibel(s)
DEIR	draft environmental impact report
Delta	Sacramento–San Joaquin Delta
DFG	California Department of Fish and Game
DOC	dissolved organic carbon
DOT	U.S. Department of Transportation
DSM	deep soil mixing
DTSC	California Department of Toxic Substances Control
DWR	California Department of Water Resources
EDR	Environmental Data Resources, Inc.
EFH	essential fish habitat
EHS	Sutter County Environmental Health Services Department
EIR	environmental impact report
Elkhorn Canal	Elkhorn Main Irrigation Canal
EMD	Sacramento County Environmental Management Department
EPA	U.S. Environmental Protection Agency
ER-L	Effects Range–Low
ER-M	Effects Range–Median
ESA	federal Endangered Species Act
ESU	Evolutionarily Significant Unit
^{o}F	degrees Fahrenheit
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
FBI	Federal Bureau of Investigation
FEIR	final environmental impact report
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIP	Federal Implementation Plan
FMMP	Farmland Mapping and Monitoring Program
FPP	Farmland Protection Program
FPPA	Farmland Protection Policy Act
FR	*Federal Register*
FRAQMD	Feather River Air Quality Management District
FTA	Federal Transit Administration
GGS	giant garter snake
GGS/Drainage Canal	canal designed to provide drainage and associated giant garter snake habitat
GHG	greenhouse gas

HAP	hazardous air pollutant
hp	horsepower
HRA	health risk assessment
H:V	horizontal-to-vertical
I-	interstate highway
in/sec	inches per second
Joint Vision	*North Natomas Joint Vision Plan*
kV	kilovolt(s)
L_{dn}	day-night average noise level
L_{eq}	energy-equivalent noise level
LESA	Land Evaluation and Site Assessment
LAFCo	Sacramento County Local Agency Formation Commission
lb/day	pounds per day
lb/in	pounds per inch
LNWI	Lower Northwest Interceptor
Local Funding EIR	*Environmental Impact Report on Local Funding Mechanisms for Comprehensive Flood Control Improvements for the Sacramento Area*
LOS	level of service
L_X	noise level exceeded X% of a specific period of time
M	(earthquake) magnitude
MACT	maximum available control technology
masl	meters above sea level
mbsl	meters below sea level
MBTA	Migratory Bird Treaty Act
MCL	maximum contaminant level
mg/L	milligrams per liter
mg/m^3	milligrams per cubic meter
MLD	Most Likely Descendant
mm	millimeter(s)
MVA	megavolt ampere(s)
N	nitrogen
NA	not available
NAAQS	national ambient air quality standards
NAHC	Native American Heritage Commission
NBHCP	Natomas Basin Habitat Conservation Plan
NCC	Natomas Cross Canal
NCC Phase 1 Improvements	Natomas Cross Canal South Levee Phase 1 Improvements
NCIC	North Central Information Center
NEIC	Northeast Information Center
NEMDC	Natomas East Main Drainage Canal
NESHAP	national emissions standards for hazardous air pollutants
NFIP	National Flood Insurance Program
NGVD	National Geodetic Vertical Datum
NHPA	National Historic Preservation Act
NLIP	Natomas Levee Improvement Program

NMFS	National Marine Fisheries Service
NMWC	Natomas Central Mutual Water Company
NNCP	North Natomas Community Plan
NO_2	nitrogen dioxide
NOI	notice of intent
NOP	notice of preparation
NO	nitric oxide
NO_X	oxides of nitrogen
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NTR	National Toxics Rule
NTU	nephelometric turbidity unit(s)
OES	Governor's Office of Emergency Services
OPR	Governor's Office of Planning and Research
OSHA	Occupational Safety and Health Administration
P	phosphorus
PA	programmatic agreement
PCB	polychlorinated biphenyl
PGCC	Pleasant Grove Creek Canal
PL	Public Law
PM	particulate matter
$PM_{2.5}$	fine particulate matter with an aerodynamic diameter of 2.5 micrometers or less
PM_{10}	respirable particulate matter with an aerodynamic diameter of 10 micrometers or less
ppm	parts per million
PPV	peak particle velocity
Porter-Cologne Act	Porter-Cologne Water Quality Control Act of 1969
PRC	Public Resources Code
PRG	preliminary remediation goal
RBDD	Red Bluff Diversion Dam
RCRA	Resource Conservation and Recovery Act
RD	Reclamation District
Riverside Canal	Riverside Main Irrigation Canal
RM	River Mile
RMS	root mean square
ROG	reactive organic gases
RWQCB	regional water quality control board
SACOG	Sacramento Area Council of Governments
SAFCA	Sacramento Area Flood Control Agency
SCAS	Sacramento County Airport System
SCB	soil-cement-bentonite
SEIS	supplemental environmental impact statement
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SMAQMD	Sacramento Metropolitan Air Quality Management District
SMARA	Surface Mining and Reclamation Act of 1975

SMF Master Plan	*Sacramento International Airport Master Plan*
SMUD	Sacramento Municipal Utility District
SO_2	sulfur dioxide
SR	State Route
SRA	shaded riverine aquatic
SRFCP	Sacramento River Flood Control Project
SSCI/C	South Sutter County Industrial/Commercial
STP	shovel test pit
SVAB	Sacramento Valley Air Basin
SVP	Society of Vertebrate Paleontology
SWPPP	storm water pollution prevention plan
SWRCB	State Water Resources Control Board
TAC	toxic air contaminant
T-BACT	toxic best available control technology
The Reclamation Board	State of California Reclamation Board
TMDL	total maximum daily load
TNBC	The Natomas Basin Conservancy
TPY	tons per year
TRD	trench remixing deep
UCMP	University of California, Berkeley Museum of Paleontology
UNWI	Upper Northwest Interceptor
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	underground storage tank
VdB	vibration decibels
VMT	vehicle miles traveled
WDR	waste discharge requirement

EXECUTIVE SUMMARY

INTRODUCTION

This draft environmental impact report (DEIR) has been prepared to evaluate the significant environmental effects of the Sacramento Area Flood Control Agency's (SAFCA's) proposed Natomas Levee Improvement Program (NLIP) Landside Improvements Project. The proposed project consists of the landside components of the NLIP that are proposed for construction in 2008 through 2010, which consist of improvements to the levee system in the Natomas Basin and related landscape modifications and drainage and infrastructure improvements. The DEIR presents a project-level analysis of the 2008 construction components and a program-level analysis of the 2009–2010 elements.

This DEIR is tiered from the analysis in SAFCA's *Environmental Impact Report on Local Funding Mechanisms for Comprehensive Flood Control Improvements for the Sacramento Area* (Local Funding EIR) (February 2007). Consistent with State CEQA Guidelines Section 15152, this second-tier EIR incorporates by reference general discussions from the Local Funding EIR as appropriate, and focuses on the significant effects on the environment that were not adequately addressed in that EIR.

This DEIR has been prepared on behalf of SAFCA in accordance with the requirements of the California Environmental Quality Act (CEQA). The DEIR provides the public and responsible and trustee agencies with information about the proposed project and its potentially significant direct, indirect, and cumulative environmental effects.

SUMMARY DESCRIPTION OF THE PROPOSED PROJECT

As stated in the Local Funding EIR, the overall project objectives of SAFCA's flood control improvement program, including the NLIP, are to:

(1) complete the projects necessary to provide 100-year flood protection for developed areas in the major floodplains of the Sacramento metropolitan area (Sacramento) 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.

The specific objectives of the proposed project analyzed in this EIR are to:

(1) provide at least 100-year flood protection as quickly as possible while laying the groundwork to achieve at least "200-year" flood protection over time,

(2) use flood control projects in the vicinity of Sacramento International Airport to facilitate changes in the management of Airport lands that reduce hazards to aviation safety, and

(3) use flood control projects to enhance habitat values by increasing the extent and connectivity of the lands in Natomas being managed to provide habitat for giant garter snake, Swainson's hawk, and other special-status species.

To meet these project objectives, SAFCA proposes the following project activities:

- 2008 construction
  - Along the 5.3-mile Natomas Cross Canal (NCC) south levee, raise the levee to provide additional freeboard; realign the levee to provide a more stable waterside slope and to reduce the need for removal of waterside vegetation, and construct a seepage cutoff wall in the eastern 4.3 miles (approximately) of the levee to reduce the risk of levee failure due to seepage and stability concerns.
  - Along the Sacramento River east levee, construct a raised adjacent setback levee from the NCC to 1,700 feet south of the North Drainage Canal with seepage berms where required to reduce seepage potential, and install woodland plantings.
  - Construct a new canal designed to provide drainage and associated giant garter snake habitat (referred to in this EIR as the "GGS/Drainage Canal"), relocate the Elkhorn Canal between the North Drainage Canal and the Elkhorn Reservoir settling basin ("Elkhorn Reservoir"), and remove a deep culvert from under the levee near the Pumping Plant No. 2 site.
  - Recontour the land and create marsh and upland habitat at borrow locations.
- 2009 and 2010 construction
  - Along the Sacramento River east levee south of the limits of the 2008 improvements, construct an adjacent setback levee (raised where needed to provide adequate freeboard) with seepage berms, relief wells, and cutoff walls as required, and install woodland plantings.
  - Raise and construct seepage berms along the Pleasant Grove Creek Canal (PGCC) west levee.
  - Construct a new GGS/Drainage Canal between Elkhorn Reservoir and the West Drainage Canal, improve the West Drainage Canal, relocate the Riverside Canal and the Elkhorn Canal downstream of Elkhorn Reservoir, and reconstruct the Reclamation District 1000 Pumping Plant No. 2.
  - Recontour the land and create marsh and upland habitat at borrow locations.
  - Remove encroachments from the water side of the Sacramento River east levee as needed to ensure that the levee can be certified as meeting the minimum requirements of the National Flood Insurance Program and U.S. Army Corps of Engineers design criteria, and address Federal Emergency Management Agency requirements for the State Route 99/70 bridge crossing of the NCC.

MAJOR CONCLUSIONS OF THE ENVIRONMENTAL ANALYSIS

SUMMARY OF IMPACTS AND MITIGATION MEASURES

The proposed project could result in significant environmental effects on several resources. The majority of the impacts would be temporary, construction-related effects that would be less than significant or would be reduced to less-than-significant levels through mitigation.

Table ES-1, included at the end of this Executive Summary, summarizes the proposed project's environmental impacts, the level of significance of each impact before mitigation, recommended mitigation measures, and the level of significance of each impact after mitigation.

SIGNIFICANT AND UNAVOIDABLE IMPACTS

The proposed project would result in the following significant and unavoidable impacts:

- Conversion of important farmland to nonagricultural uses (direct and cumulative)
- Potential construction impacts on known prehistoric resources, discovery of human remains during construction, and damage to or destruction of previously undiscovered cultural resources (direct and cumulative)
- Temporary increase in traffic on local roadways during construction (direct)
- Effects on air quality with respect to short-term construction emissions: temporary emissions of ROG, NO_X, and PM_{10} (direct and cumulative), and incremental contributions to greenhouse gas emissions (cumulative)
- Generation of short-term construction noise, exposure of sensitive receptors to or generation of excessive groundborne vibration or noise, and exposure of residents to increased traffic noise levels from hauling activity (direct and cumulative)
- Changes in scenic vistas, scenic resources, and existing visual character of the project area (direct and cumulative)

Where feasible mitigation exists, it has been included to reduce these impacts; however, the mitigation would not be sufficient to reduce the impacts to a less-than-significant level.

AREAS OF CONTROVERSY AND ISSUES TO BE RESOLVED

AREAS OF CONTROVERSY

SAFCA has met with interested resource agencies, stakeholders, and landowners to discuss and resolve any potential areas of controversy associated with the proposed project. Based on these discussions, there are no known areas of controversy associated with the proposed project.

ISSUES TO BE RESOLVED

SAFCA will need to determine whether to approve the proposed project or project alternatives for implementation. The decision will be based on numerous factors besides potential environmental impacts, including the type of financing available, permitting requirements, and implementation schedule.

Regardless of whether the proposed project or alternatives are selected for implementation, detailed design of project features and planning of construction will need to be coordinated with mitigation requirements so that significant impacts are avoided or minimized where practicable. The methods for achieving required mitigation will need to be determined during detailed project design.

PUBLIC INVOLVEMENT AND NEXT STEPS

This DEIR will be used by the SAFCA Board when considering approval of the proposed project.

In accordance with CEQA review requirements, this DEIR is being distributed for public and agency review and comment for a 45-day period, which ends on October 29, 2007. SAFCA will hold one or more public meetings during the comment period—including a meeting to be held during the regular October 18, 2007, meeting of the SAFCA Board—at which it will receive input from agencies and the public on the DEIR. In addition, written

comments from the public, reviewing agencies, and stakeholders will be accepted throughout the public comment period.

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 DEIR. 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. In addition, if the SAFCA Board decides to approve the project but determines that it would have unavoidable environmental effects, the Board will 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 must also adopt a reporting or monitoring program for those measures that it has adopted and incorporated into the project in order to mitigate or avoid significant effects on the environment. Following project approval, a notice of determination documenting the decision will be issued.

Table ES-1
Summary of Impacts and Mitigation Measures

Resource Topic/Impact	Level of Significance before Mitigation	Mitigation Measure	Level of Significance after Mitigation
Agriculture and Land Use			
Impact 3.2-a. Conflicts with Land Use Plans and Policies	Less than significant	No mitigation is required	Less than significant
Impact 3.2-b. Conversion of Important Farmland to Nonagricultural Uses	Significant	Mitigation Measure 3.2-b: Minimize Important Farmland Conversion to the Extent Practicable and Feasible	Significant and unavoidable
Geology and Soils			
Impact 3.3-a. Potential Temporary, Short-Term Construction-Related Erosion	Significant	Mitigation Measure 3.3-a: Implement Standard Best Management Practices (BMPs), Prepare and Implement a Stormwater Pollution Prevention Plan (SWPPP), and Comply with National Pollutant Discharge Elimination System (NPDES) Permit Conditions	Less than significant
Hydrology and Hydraulics			
Impact 3.4-a. Hydraulic Effects of the Proposed Levee Improvements	Less than significant	No mitigation is required	Less than significant
Impact 3.4-b. Alteration of Local Drainage	Significant	Mitigation Measure 3.4-b: Coordinate with Landowners and Drainage Infrastructure Operators, Prepare Drainage Studies as Needed, and Remediate Impacts through Project Design	Less than significant
Water Quality			
Impact 3.5-a. Temporary Effects on Water Quality from Stormwater Runoff, Erosion, and Spills Associated with Construction	Significant	Mitigation Measure 3.5-a: Implement Standard BMPs, Prepare and Implement a SWPPP, and Comply NPDES Permit Conditions	Less than significant
Impact 3.5-b. Effects on Water Quality from Groundwater Discharged by Relief Wells	Significant	Mitigation Measure 3.5-b: Conduct Groundwater Quality Tests, Notify the Central Valley Regional Water Quality Control Board (RWQCB), and Comply with the RWQCB's Waste Discharge Authorization and NPDES Permit	Less than significant
Fisheries and Aquatic Resources			
Impact 3.6-a. Loss of Fish Habitat Through Increased Sedimentation and Turbidity or Releases of Contaminants	Significant	Mitigation Measure 3.6-a: Implement Standard BMPs, Prepare and Implement a SWPPP, and Comply with NPDES Permit Conditions	Less than significant

Table ES-1
Summary of Impacts and Mitigation Measures

Resource Topic/Impact	Level of Significance before Mitigation	Mitigation Measure	Level of Significance after Mitigation
Impact 3.6-b. Loss of Shaded Riverine Aquatic (SRA) Habitat Associated with Levee Improvement Activities	Significant	Mitigation Measure 3.6-b: Restore, Replace, or Rehabilitate Loss of Degraded SRA Habitat Function and Comply with Section 1602 Permit Conditions	Less than significant
Terrestrial Biological Resources			
Impact 3.7-a. Loss of Sensitive Habitats	Significant	Mitigation Measure 3.7-a: Minimize Effects on Sensitive Habitats, Develop a Habitat Management Plan to Ensure Compensation for Unavoidable Adverse Effects, and Comply with Section 404, Section 401, and Section 1602 Permit Processes	Less than significant
Impact 3.7-b. Disturbance and Loss of Special-Status Plant Habitat	Significant	Mitigation Measure 3.7-b: Conduct Focused Surveys for Special-Status Plants, Minimize Effects, Transplant Unavoidable Individual Plants, and Develop Management Plant for Transplanted Populations	Less than significant
Impact 3.7-c. Loss of Potential Habitat for Valley Elderberry Longhorn Beetles	Significant	Mitigation Measure 3.7-c: Minimize Effects on Valley Elderberry Longhorn Beetle, Conduct Focused Surveys, Develop a Management Plan to Ensure Adequate Compensation for Unavoidable Adverse Effects, and Obtain Incidental Take Authorization	Less than significant
Impact 3.7-d. Disturbance and Loss of Giant Garter Snake Habitat	Significant	Mitigation Measure 3.7-d: Minimize the Potential for Direct Loss of Giant Garter Snake Individuals, Develop a Management Plan in Consultation with the U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Game (DFG), and Obtain Incidental Take Authorization	Less than significant
Impact 3.7-e. Disturbance and Loss of Northwestern Pond Turtle Habitat	Significant	Mitigation Measure 3.7-e: Conduct Focused Surveys for Northwestern Pond Turtle and Relocate Turtles	Less than significant
Impact 3.7-f. Loss of Swainson's Hawk Habitat and Potential Disturbance of Nests	Significant	Mitigation Measure 3.7-f: Minimize Potential Impacts on Swainson's Hawk, Monitor Active Nests during Construction, Develop a Management Plan in Consultation with DFG, and Obtain Incidental Take Authorization	Less than significant
Impact 3.7-g. Loss and Potential Disturbance of Habitat for Other Special-Status Birds	Significant	Mitigation Measure 3.7-g: Minimize Potential Impacts on Burrowing Owls and Other Special-Status Bird Species, Monitor Active Nests during Construction, and Relocate Owls as Needed	Less than significant
Impact 3.7-h. Loss and/or Disturbance of Wildlife Corridors	Significant	Mitigation Measure 3.7-h: Implement Mitigation Measure 3.7-d	Less than significant

Table ES-1
Summary of Impacts and Mitigation Measures

Resource Topic/Impact	Level of Significance before Mitigation	Mitigation Measure	Level of Significance after Mitigation
Impact 3.7-i. Consistency with the Natomas Basin Habitat Conservation Plan (NBHCP)	Significant	Mitigation Measure 3.7-i: Ensure that Compliance with Mitigation Requirements of Established NBHCP Reserves is Not Adversely Affected and Implement Mitigation Measures 3.7-a through 3.7-g	Less than significant
Cultural Resources			
Impact 3.8-a. Changes to Elements of Reclamation District (RD) 1000	Significant	Mitigation Measure 3.8-b: Document Alterations Made to Any RD 1000 Contributing Resources and Distribute the Information to the Appropriate Repositories	Less than significant
Impact 3.8-b. Construction Impacts on Other Known Historic-Era Resources	Less than significant	No mitigation is required	Less than significant
Impact 3.8-c. Potential Construction Impacts on Known Prehistoric Resources	Significant	Mitigation Measure 3.8-c(1): Avoid Ground Disturbance Near Known Prehistoric Archaeological Sites CA-Sac-485/H and the Barney Mound to the Extent Feasible, and Conduct Resource Documentation and Data Recovery at CA-Sac-485/H as Needed Mitigation Measure 3.8-c(2): Avoid Ground Disturbance near Known Prehistoric Archaeological Sites CA-Sac-15/H , CA-Sac-16/H, CA-Sac-160/H, CA-Sac-164, and CA-Sac-485/H to the Extent Feasible, and Conduct Resource Documentation and Data Recovery as Needed	Significant and unavoidable
Impact 3.8-d. Damage to or Destruction of Previously Undiscovered Cultural Resources	Significant	Mitigation Measure 3.8-d: Perform Research and/or Surveys, Brief Workers Before Construction, Monitor Construction, Halt Potentially Damaging Activities, Investigate and Avoid Resources to the Extent Feasible, and Conduct Resource Documentation and Data Recovery as Needed	Significant and unavoidable
Impact 3.8-e. Discovery of Human Remains during Construction	Significant	Mitigation Measure 3.8-e: Halt Work Within 50 Feet of the Find, Notify the County Coroner and Most Likely Descendant, and Implement Appropriate Treatment of Remains	Significant and unavoidable
Paleontological Resources			
Impact 3.9-a. Disturbance of Unknown Unique Paleontological Resources during Earthmoving Activities	Significant	Mitigation Measure 3.9-a: Conduct Construction Personnel Training and, if Paleontological Resources Are Found, Cease Work in the Vicinity of the Find and Implement Mitigation in Coordination with a Professional Paleontologist	Less than significant

Table ES-1
Summary of Impacts and Mitigation Measures

Resource Topic/Impact	Level of Significance before Mitigation	Mitigation Measure	Level of Significance after Mitigation
Transportation and Circulation			
Impact 3.10-a. Temporary Increase in Traffic on Local Roadways during Construction	Significant	Mitigation Measure 3.10-a: Prepare and Implement a Traffic Routing Plan for Both Crew Commute Trips to the Work Sites and Construction-Related Truck Trips	Significant and unavoidable
Impact 3.10-b. Temporary Increase in Traffic Hazards on Local Roadways during Construction	Significant	Mitigation Measure 3.10-b: Prepare and Implement a Traffic Safety and Control Plan and Implement Measures to Avoid and Minimize Traffic Hazards on Local Roadways during Construction	Less than significant
Impact 3.10-c. Temporary Effect on Emergency Service Response Times and Access during Construction	Significant	Mitigation Measure 3.10-c: Notify Emergency Service Providers about Project Construction and Maintain Emergency Access or Coordinate Detours with Providers	Less than significant
Air Quality			
Impact 3.11-a. Temporary Emissions of ROG, NO_X, and PM_{10} during Construction	Significant	Mitigation Measure 3.11-a: Implement District-Recommended Control Measures to Minimize Temporary Emissions of ROG, NO_X, and PM_{10} during Construction	Significant and unavoidable
Impact 3.11-b. Long-Term Changes in Emissions of ROG, NO_X, and PM_{10} Associated with Project Implementation	Less than significant	No mitigation is required	Less than significant
Impact 3.11-c. Exposure of Sensitive Receptors to Toxic Air Emissions	Less than significant	No mitigation is required	Less than significant
Noise			
Impact 3.12-a. Generation of Short-Term Construction Noise	Significant	Mitigation Measure 3.12-a: Implement Noise-Reducing Construction Practices, Prepare a Noise Control Plan, and Monitor and Record Construction Noise Near Sensitive Receptors	Significant and unavoidable
Impact 3.12-b. Exposure of Sensitive Receptors to or Generation of Excessive Groundborne Vibration or Noise	Significant	Mitigation Measure 3.12-b: Implement Measures to Avoid Construction-Related Vibration Effects	Significant and unavoidable
Impact 3.12-c. Exposure of Residents to Increased Traffic Noise Levels from Hauling Activity	Significant	Mitigation Measure 3.12-c: Implement Noise-Reduction Measures to Reduce the Effects of Haul Truck Traffic Noise	Significant and unavoidable

Table ES-1
Summary of Impacts and Mitigation Measures

Resource Topic/Impact	Level of Significance before Mitigation	Mitigation Measure	Level of Significance after Mitigation
Impact 3.12-d. Long-Term Increases in Noise	Less than significant	No mitigation is required	Less than significant
Impact 3.12-e. Exposure of Construction Workers to Excessive Noise Levels from Airport Operations	Less than significant	No mitigation is required	Less than significant
Recreation			
Impact 3.13-a. Temporary Changes in Recreational Opportunities during Project Construction Activities	Less than Significant	No mitigation is required	Less than significant
Impact 3.13-b. Permanent Encroachment on Parkland along Garden Highway	Significant	Mitigation Measure 3.13-b: Compensate the City of Sacramento for Encroachments that Cause Permanent Loss of the Recreational Use of Affected Recreational Facilities	Less than significant
Visual Resources			
Impact 3.14-a. Changes in Scenic Vistas, Scenic Resources, and Existing Visual Character of the Project Area	Significant	No mitigation is available	Significant and unavoidable
Impact 3.14-b. Changes in Light and Glare	Less than significant	No mitigation is required	Less than significant
Utilities and Service Systems			
Impact 3.15-a. Potential Temporary Disruption of Irrigation Supply	Significant	Mitigation Measure 3.15-a: Coordinate with Irrigation Water Supply Users Before and During All Irrigation Infrastructure Modifications and Minimize Interruptions of Supply	Less than significant
Impact 3.15-b. Potential Disruption of Utility Service during Construction	Significant	Mitigation Measure 3.15-b: Verify Utility Locations, Coordinate with Utility Providers, Prepare a Response Plan, and Conduct Worker Training with Respect to Accidental Utility Damage	Less than significant
Impact 3.15-c. Increases in Solid Waste Generation	Less than significant	No mitigation is required	Less than significant

Table ES-1
Summary of Impacts and Mitigation Measures

Resource Topic/Impact	Level of Significance before Mitigation	Mitigation Measure	Level of Significance after Mitigation
Hazards and Hazardous Materials			
Impact 3.16-a. Spills of Hazardous Materials during Construction	Less than significant	No mitigation is required	Less than significant
Impact 3.16-b. Exposure to Hazardous Materials Encountered at Project Sites	Significant	Mitigation Measure 3.16-b(1): Ensure that Contaminants Are Not Present at Unacceptable Levels on the Yuki Farms Site Near the Location of Project Construction Activities Mitigation Measure 3.16-b(2): Prepare a Worker Health and Safety Plan, and Implement Appropriate Measures to Minimize Potential Exposure to Unknown Hazardous Materials	Less than significant
Impact 3.16-c. Temporary Aircraft Safety Hazards Resulting from Project Construction Activities within or near the Airport Critical Zone	Significant	Mitigation Measure 3.16-c: Coordinate Work in the Critical Zone with Airport Operations and Restrict Night Lighting within and near the Runway Approaches	Less than significant
Impact 3.16-d. Potential to Result in Higher Frequency of Collisions between Aircraft and Wildlife at Sacramento International Airport	Significant	Mitigation Measure 3.16-d: Implement Measures to Avoid Substantial Increases in Hazardous Wildlife within the Critical Zone or Wildlife Collisions with Aircraft	Less than significant
Impact 3.16-e. Interference with an Adopted Emergency Evacuation Plan	Significant	Mitigation Measure 3.16-e: Notify State and Local Emergency Management Agencies about Project Construction and Coordinate State Route (SR) 99 Detours with These Agencies to Ensure That Any Need for Emergency Use Is Not Significantly Impaired	Less than significant
Impact 3.16-f. Exposure to Wildland Fires	Significant	Mitigation Measure 3.16-f: Prepare and Implement a Fire Management Plan to Minimize Potential for Wildland Fires	Less than significant

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1 INTRODUCTION

1.1 PURPOSE OF THIS DOCUMENT

The California Environmental Quality Act (CEQA) (Public Resources Code [PRC] Section 21000 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 the Natomas Levee Improvement Program (NLIP) Landside Improvements Project, which would consist of improvements to the levee system in the Natomas Basin and related landscape modifications and drainage and infrastructure improvements. SAFCA has determined that the proposed project may have significant effects on the environment. As the lead agency for complying with CEQA, SAFCA 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 project's significant environmental effects. If all the significant effects of the 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. The purpose of an EIR is not to recommend either approval or denial of a 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 project. If the EIR identifies any significant environmental effect of the project as significant and unavoidable, SAFCA may still approve the project if it determines that the social, economic, legal, or other benefits outweigh the project's unavoidable adverse environmental effects.

This draft EIR (DEIR) 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.). The EIR process is described further in Section 1.9, "Public Participation and the EIR Process."

1.2 SUMMARY DESCRIPTION OF THE PROPOSED PROJECT

The proposed project consists of the following components:

- 2008 construction

  - Along the 5.3-mile Natomas Cross Canal (NCC) south levee, raise the levee to provide additional freeboard; realign the levee to provide a more stable waterside slope and to reduce the need for removal of waterside vegetation, and construct a seepage cutoff wall in the eastern 4.3 miles (approximately) of the levee to reduce the risk of levee failure due to seepage and stability concerns.

  - Along the Sacramento River east levee, construct a raised adjacent setback levee from the NCC to 1,700 feet south of the North Drainage Canal with seepage berms where required to reduce seepage potential, and install woodland plantings.

  - Construct a new canal designed to provide drainage and associated giant garter snake habitat (referred to in this EIR as the "GGS/Drainage Canal"), relocate the Elkhorn Canal between the North Drainage Canal and the Elkhorn Reservoir settling basin ("Elkhorn Reservoir"), and remove a deep culvert from under the levee near the Pumping Plant No. 2 site.

  - Recontour the land and create marsh and upland habitat at borrow locations.

- 2009 and 2010 construction

    - Along the Sacramento River east levee south of the limits of the 2008 improvements, construct an adjacent setback levee (raised where needed to provide adequate freeboard) with seepage berms, relief wells, and cutoff walls as required, and install woodland plantings.

    - Raise and construct seepage berms along the Pleasant Grove Creek Canal (PGCC) west levee.

    - Construct a new GGS/Drainage Canal between Elkhorn Reservoir and the West Drainage Canal, improve the West Drainage Canal, relocate the Riverside Canal and the Elkhorn Canal downstream of Elkhorn Reservoir, and reconstruct the Reclamation District 1000 Pumping Plant No. 2.

    - Recontour the land and create marsh and upland habitat at borrow locations.

    - Remove encroachments from the water side of the Sacramento River east levee as needed to ensure that the levee can be certified as meeting the minimum requirements of the National Flood Insurance Program and U.S. Army Corps of Engineers (USACE) design criteria, and address Federal Emergency Management Agency (FEMA) requirements for the State Route 99/70 bridge crossing of the NCC.

1.3 TYPE OF EIR AND RELATIONSHIP TO OTHER DOCUMENTS

1.3.1 SECOND-TIER EIR

CEQA allows for the preparation of environmental documents using a multilevel approach whereby a broad-level EIR, termed a "program EIR," includes an analysis of general matters (e.g., the impacts of an entire plan, program, or policy), and subsequent project-level EIRs or negative declarations include analyses of 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* (Local Funding EIR) (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 NLIP. This EIR analyzes the landside components of the NLIP that are proposed for construction in 2008 through 2010, and is tiered from the analysis in the Local Funding EIR. Consistent with State CEQA Guidelines Section 15152, this second-tier EIR incorporates by reference general discussions from the Local Funding EIR as appropriate, and focuses on the significant effects on the environment that were not adequately addressed in that EIR.

1.3.2 COMBINED PROGRAM AND PROJECT EIR

This second-tier EIR is a combined program EIR and project EIR. The 2008 NLIP construction components that are summarized above in Section 1.2 are described in detail and analyzed at a project level in this document. The 2009 and 2010 construction components summarized in Section 1.2 are described more generally and are analyzed in this EIR at a general, program level. The CEQA documentation in this EIR will provide SAFCA with the environmental information needed to support its decision whether to approve detailed design and construction of the 2008 components and to support policy-level choices regarding the physical configuration of the 2009 and

2010 components. The 2009 and 2010 components would then be analyzed at a project level of detail in one or more additional CEQA documents.

1.3.3 RELATIONSHIP TO THE NLIP BANK PROTECTION EIR

At this time, SAFCA is also proposing to implement bank protection measures to control erosion at nine sites along the east bank of the Sacramento River bordering the Natomas Basin. The bank protection improvements are evaluated as a separate project in a separate EIR, *Draft Environmental Impact Report on Natomas Levee Improvement Program Bank Protection Project* (Bank Protection EIR), prepared concurrently with this EIR. Neither the bank protection project analyzed in the Bank Protection EIR nor the levee improvement 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 Chapter 4 of this EIR considers the combined effects of the two projects, along with the effects of other past, present, and probable future projects.

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 with the public and governmental agencies for the Local Funding EIR, 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 Local Funding EIR (page 1-4 of Volume I of that EIR), 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 or involve the displacement of a substantial number of people or residences. Three residences and outbuildings at the eastern end of the NCC south levee may need to be removed/relocated as part of the NCC south levee improvements in 2008, and three residences and several other buildings would have to removed as part of the levee improvements that would be constructed in 2008 on the Sacramento River east levee. Additional residences would need to be removed in Sacramento River east levee Reaches 4B–20A to accommodate Sacramento River east levee improvements in 2009–2010. All relocations of residents would be conducted in compliance with federal and state relocation law. Appropriate compensation would be provided to displaced landowners and tenants, and residents would be relocated to comparable replacement housing. No new construction would be required to achieve the relocation of residences. The physical impacts of removing structures are addressed in relevant sections of the EIR

The removal of soil from agricultural lands for use in construction is discussed in Section 3.2 of this EIR, "Agriculture and Land Use." The use of soil and aggregate resources for levee improvements, precluding their use for other purposes, is also discussed in Section 5.3 of this EIR, "Significant Irreversible Environmental Impacts." The relationship of the potential program of flood control improvements, including the NLIP, to population growth is discussed in Section 5.1 of this EIR, "Growth-Inducing Effects."

This EIR analyzes potential impacts on the following resource areas:

- agriculture and land use,
- geology and paleontological resources,
- hydrology and hydraulics,
- water quality,
- fisheries and aquatic resources,
- terrestrial biological resources,
- cultural resources,
- transportation and circulation,
- air quality,
- noise,
- recreation,
- visual resources,
- utilities and service systems, and
- hazards and hazardous materials.

1.5 INTENDED USES OF THE EIR AND AGENCY ROLES AND RESPONSIBILITIES

SAFCA is the CEQA lead agency for the proposed project and has primary authority for approval of the 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 project, and it may be used 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 actively participate 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 proposed improvements would require permits and authorizations from, or coordination with, numerous federal, state, and local agencies. The following is a list of the agencies that may have responsibility or jurisdiction over the implementation of aspects of the project and the permits or authorizations that may apply to the project:

- USACE: permitting under Section 404 of the Clean Water Act, Section 10 of the Rivers and Harbors Act, and Section 14 of the Rivers and Harbors Act. Compliance with Sections 404 and 10 is required for fill of jurisdictional waters of the United States and navigable waters of the United States, respectively. Section 14 (33 USC 408), which is referred to hereinafter as Section 408, involves approval of federal project levee modifications.

- U.S. Fish and Wildlife Service: Endangered Species Act (ESA) consultation and incidental take authorization.

- National Marine Fisheries Service: ESA consultation and incidental take authorization or concurrence with conclusion of no effect.

- California Reclamation Board (The Reclamation Board) and local reclamation districts: levee and floodway encroachment permits.

- California Department of Fish and Game (DFG): compliance with the California Endangered Species Act and Fish and Game Code Section 1602 (Streambed Alteration).
- Central Valley Regional Water Quality Control Board: National Pollutant Discharge Elimination System permitting under Clean Water Act Section 402, and certification under Clean Water Act Section 401.
- California State Office of Historic Preservation: National Historic Preservation Act Section 106 compliance in relation to federal project authorizations.
- California Department of Transportation: Encroachment permit and/or transportation management plan.
- Sutter and Sacramento Counties: permits for compliance with the State's Surface Mining and Reclamation Act, and other possible construction authorizations/encroachment permits.
- Feather River Air Quality Management District (AQMD) and Sacramento Metropolitan AQMD: review of effects on air quality and authority to construct/permit to operate.
- City of Sacramento: possible construction authorizations/encroachment permits.

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. DFG, as the trustee agency for fish and wildlife resources, has jurisdiction over resources potentially affected by the proposed project.

1.6 DOCUMENTS INCORPORATED BY REFERENCE

In accordance with the State CEQA Guidelines, the Local Funding EIR is incorporated by reference into this EIR, and relevant portions are summarized in this document. The Local Funding EIR 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 7th Street, 7th Floor, Sacramento, California, during normal business hours.

1.7 EIR ORGANIZATION

This DEIR is organized as follows:

- "Executive Summary" summarizes the proposed project, significant environmental effects that would result from project implementation, and mitigation measures proposed to reduce or eliminate those impacts.
- Chapter 1, "Introduction," describes the purpose of this EIR, its relationship to other NLIP EIRs, its scope, and the organization of the DEIR.
- Chapter 2, "Project Description," describes the project objectives, location, and components.
- Chapter 3, "Environmental Setting, Impacts, and Mitigation," describes, by environmental issue area, the existing environmental setting; discusses the potential environmental impacts of the proposed project; and identifies feasible mitigation measures to avoid or substantially lessen significant environmental effects.
- Chapter 4, "Cumulative Impacts," discusses the cumulative impacts that would result from the proposed project in combination with past, current, and probable future projects that could affect the same resources.
- Chapter 5, "Other CEQA-Required Sections," fulfills the CEQA requirements for discussion of the project's growth-inducing impacts, significant and unavoidable impacts, and significant irreversible environmental changes.

- Chapter 6, "Alternatives," describes the alternatives to the proposed project and analyzes their significant environmental effects in comparison to the proposed project.

- Chapter 7, "References," contains a comprehensive listing of the sources of information used in the preparation of the EIR, including agencies or individuals consulted.

- Chapter 8, "List of Preparers," identifies the preparers of this DEIR.

- Appendices:

  - Appendix A, "Notice of Preparation and Scoping Comments";

  - Appendix B, "Hydraulic Modeling Results";

  - Appendix C, "Air Quality Modeling Results"; and

  - Appendix D, "Noise Modeling Results."

1.8 STANDARD TERMINOLOGY

The following are definitions for standard terms as used in this EIR:

Project alternatives—Alternative ways of feasibly attaining most of the basic project objectives that also would avoid or substantially lessen any significant effects of the proposed project. CEQA requires that an EIR describe and evaluate a "reasonable range" of project alternatives. See Chapter 6, "Alternatives."

100-year flood protection—Project design standard that is intended to provide protection against a flood with a 1% chance of occurrence in a given year so as to meet the minimum requirements of the National Flood Insurance Program as determined by FEMA.

Urban-standard ("200-year") flood protection—Project design standard that is intended to provide protection against the most severe floods that are considered reasonably foreseeable based on existing hydrological records. For the Sacramento metropolitan area, these design floods are comparable in size to the "200-year" floods (i.e., those with a 0.5% chance of occurrence in a given year) centered on the lower Sacramento and American Rivers as identified in the Sacramento and San Joaquin River Basins Comprehensive Study completed by the USACE and The Reclamation Board in 2002 (USACE and The Reclamation Board 2002).

Sacramento—Metropolitan area comprising the City of Sacramento and portions of Sutter County and Sacramento County within SAFCA's jurisdiction.

Reach—A segment of a river or tributary where specific improvements are proposed to occur.

Levels of impact significance:

- No impact—No change from existing conditions.

- Less-than-significant impact—A physical effect on the environment that does not exceed the defined significance thresholds.

- Significant impact—A substantial or potentially substantial adverse change in any of the physical conditions within the area affected by the project, as demonstrated by exceeding the defined significance thresholds without the implementation of feasible mitigation or alternatives. Where available, feasible mitigation is identified that would eliminate or reduce a significant impact to a less-than-significant level.

- Significant and unavoidable impact—A significant environmental effect that exceeds the defined thresholds of significance and that cannot be reduced to a less-than-significant level through the implementation of feasible mitigation measures or alternatives.

1.9 PUBLIC PARTICIPATION AND THE EIR PROCESS

On June 4, 2007, SAFCA issued a notice of preparation (NOP) of a DEIR and filed the NOP with the State Clearinghouse. 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 DEIR from interested agencies, individuals, and organizations. The NOP and copies of the scoping comments provided to SAFCA are included in Appendix A.

In accordance with CEQA review requirements, this DEIR 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 to ensure that information pertinent to permits and approvals is provided to the decision makers for SAFCA and the CEQA responsible agencies. This document is available for review by the public during normal business hours at the SAFCA office at 1007 7th Street, 7th Floor, Sacramento, California.

SAFCA will hold one or more public meetings during the comment period—including a meeting to be held during the regular October 18, 2007, meeting of the SAFCA Board—at which it will receive input from agencies and the public on the DEIR. In addition, written comments from the public, reviewing agencies, and stakeholders 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 e-mail address:

Attn: John Bassett/NLIP Landside DEIR Comments
Sacramento Area Flood Control Agency
1007 7th Street, 7th Floor
Sacramento, CA 95814
Fax number: (916) 874-8289
E-mail 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 DEIR. 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 one or more of the following written findings with respect to each significant environmental effect identified in the EIR:

- Changes or alterations have been incorporated into the project that mitigate or avoid the significant effects on the environment.

- 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.

- 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 significant unavoidable environmental effects, the Board will 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 must also 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 will be issued.

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2 PROJECT DESCRIPTION

This chapter describes the proposed project in the following four sections:

- Section 2.1, "Project Need, Objectives, and Plan Formulation," explains the project background and project purpose and need, lists the project objectives, and describes the project plan formulation process.
- Section 2.2, "Existing Project Facilities and Potential Borrow Sites," describes the existing flood control and major irrigation infrastructure facilities that would be modified as part of the proposed project, and describes the potential sources of borrow material for construction.
- Section 2.3, "Description of the Proposed Project," provides details on construction and management of the project elements.
- Section 2.4, "Ability of the Proposed Project to Meet the Project Objectives," summarizes the ways in which the proposed project would meet the project objectives.

Please note: *All exhibits for Chapter 2 are included at the end of the Chapter 2 text.*

2.1 PROJECT NEED, OBJECTIVES, AND PLAN FORMULATION

2.1.1 PROJECT BACKGROUND AND NEED

The proposed project is a major portion of the Natomas Levee Improvement Program (NLIP), a component of the flood control improvements analyzed in SAFCA's *Environmental Impact Report on Local Funding Mechanisms for Comprehensive Flood Control Improvements for the Sacramento Area* (Local Funding EIR) (February 2007), from which this EIR is tiered. The NLIP entails improving the levee system that protects the 53,000-acre Natomas Basin in northern Sacramento and southern Sutter Counties, California, including a portion of the city of Sacramento (Exhibit 2-1). The Natomas Basin is generally bounded by leveed reaches of the Natomas Cross Canal (NCC) on the north, the Sacramento River on the west, the American River on the south, and the Pleasant Grove Creek Canal (PGCC) and Natomas East Main Drainage Canal (NEMDC)/Steelhead Creek on the east (Exhibit 2-2).

SAFCA's intent is to provide the Natomas Basin with at least a 100-year level of flood protection by the end of 2010 and a "200-year" level of protection by the end of 2012. Achievement of these aims would significantly reduce the risk of an uncontrolled flood in the Natomas Basin that would result in a catastrophic loss of property (estimated at $7 billion) and a prolonged interruption of commercial activity, including the operation of Sacramento International Airport (Airport) and closure of Interstate 5 (I-5) and State Route (SR) 99/70. Flooding is particularly hazardous in a heavily urbanized basin like Natomas because of the depths that floodwaters can reach—more than 10 feet in some areas, as shown in Exhibit 2-3.

2.1.1.1 DEFICIENCIES OF THE NATOMAS LEVEE SYSTEM

Refer to Chapter 2 of the Local Funding EIR (which is included as an attachment to this EIR) for general information about the flood risk to Sacramento, SAFCA's role in flood control, and the history of regional flood control improvements. Refer to Chapter 3 of the Local Funding EIR for an overview of the need for the NLIP. As described in that chapter, SAFCA and the U.S. Army Corps of Engineers (USACE), in cooperation with the California Department of Water Resources (DWR) and the State of California Reclamation Board (The Reclamation Board), have conducted engineering studies that show the Natomas Basin to be vulnerable to uncontrolled flooding as a result of levee overtopping, levee seepage that could threaten levee stability, and riverbank erosion. The USACE determined in 2006 that the Natomas Basin has less than a 100-year level of

protection against levee failure. This led to a proposal for remapping of the Natomas Basin floodplain by the Federal Emergency Management Agency (FEMA), which will show the basin within the 100-year floodplain.

Approximately 26 miles of the levees surrounding the Natomas Basin require one or more forms of remediation to address the potential for failure in a 100-year or "200-year" flood event. SAFCA is designing the NLIP in coordination with the federal and state flood control project sponsors, the USACE and The Reclamation Board, to address the deficiencies in the Natomas levee system with a focus on achieving a 100-year level of protection by 2010. This will require improving the following conditions along the NCC south levee, the Sacramento River east levee, and the PGCC west levee:

- Inadequate freeboard—The NCC south levee, portions of the Sacramento River east levee, and the PGCC west levee are not high enough to provide at least 3 feet of freeboard above the 100-year water surface elevation, and several reaches do not provide 3 feet of freeboard above the "200-year" design water surface elevation (Exhibit 2-4).

- Underseepage and through-seepage vulnerability—Most of these same reaches do not meet recently adopted federal criteria for safely containing underseepage and through-seepage when the water surface in the adjacent channel reaches the 100-year elevation or, in some cases, the "200-year" elevation (Exhibit 2-5).

- Erosion—Because of ongoing erosion, several sites along the Sacramento River east levee do not meet current federal criteria for waterside levee stability and integrity (Exhibit 2-6). One area along the NCC south levee may also require erosion protection.

The proposed project analyzed in this EIR encompasses the "landside components" of the NLIP improvements of the NCC south levee, Sacramento River east levee, and PGCC west levee: addressing freeboard deficiencies through levee raises; addressing seepage potential using a combination of seepage berms, cutoff walls, and relief wells; and acquiring additional right-of-way to construct the improvements and to prevent encroachment into the flood control system. These improvements would include recontouring the levee slopes where necessary to provide a 3:1 horizontal-to-vertical (3H:1V) waterside slope and a 3H:1V (preferred) or 2H:1V (maximum) landside slope.

Erosion sites are addressed in a separate proposed project that SAFCA is analyzing in a separate EIR, as explained in Section 1.3.3, "Relationship to the NLIP Bank Protection EIR."

2.1.1.2 LEVEE ENCROACHMENTS AND THE ADJACENT SETBACK LEVEE CONCEPT

Since 2006, when SAFCA completed its Natomas Levee Evaluation Study, the USACE has issued a draft white paper outlining national procedures for managing "encroachments" in the footprint of federal project levees. These procedures, which are still under development, indicate that any vegetation that has stems greater than 2 inches in diameter and any structures, such as utility lines, fences, and other appurtenances, must be removed from the footprint of the levee. The USACE defines the footprint of the levee as the levee crown, the waterside and landside levee slopes, and the area within 15 feet of the waterside and landside toes of the levee. Of the levees around the Natomas Basin, the Sacramento River east levee in particular has significant encroachments in the form of both trees and structures, such as fences and gates, that support the residential land uses on the water side of the levee. These encroachments can affect levee integrity, hinder inspections, and prevent maintenance access. They will all have to be removed if this policy is strictly enforced.

The USACE has indicated that it may allow flexibility in the application of the vegetation-removal policy in California, based on consideration of endangered species habitat requirements and site-specific conditions. However, there is substantial disagreement among experts about the relative risks and benefits of woody vegetation on California levees, and it will likely be difficult to achieve consensus on the details of policy implementation. Substantial removal of structural encroachments and large woody vegetation from the levee

slopes and at the levee toes is likely to be required for USACE acceptance that the Natomas system meets FEMA criteria for the 100-year level of protection. Removal would trigger significant mitigation requirements that could be difficult to complete and potential disputes with landowners over the legal implications of removing appurtenant structures. Removal would likely take several years to achieve because of environmental and legal issues.

As an alternative to the potential for substantial removal of vegetation and structural encroachments along the Sacramento River east levee, SAFCA is proposing to construct an "adjacent setback levee," consisting of a new levee crown and embankment adjoining the land side of the existing levee. Construction of an adjacent setback levee would shift the jurisdictional levee landward, thereby providing more flexibility with respect to the management of structures and vegetation on the waterside slope. Exhibit 2-7 depicts the adjacent setback levee concept. The adjacent setback levee would be constructed to provide the required freeboard and would include seepage remediation where required.

2.1.1.3 MEETING MULTIPLE FEDERAL MANDATES IN THE NATOMAS BASIN

In addition to the USACE's flood control mandate, the federal government has significant aviation safety and habitat protection mandates in the Natomas Basin, as represented by the Federal Aviation Administration (FAA) and the U.S. Fish and Wildlife Service (USFWS), respectively. The Airport experiences a high rate of aircraft bird strikes, which pose a substantial hazard to flight safety, and has been directed by FAA to reduce wildlife attractants in the Airport Critical Zone, the area within a 10,000-foot radius from the centerline of the two parallel runways for turbine-powered aircraft. Open water and agricultural crops are recognized as being the greatest wildlife attractants in the Airport vicinity, and rice cultivation is considered the most incompatible agricultural crop because of its flooding regime.

USFWS, with the California Department of Fish and Game (DFG), oversees the protection of the special-status wildlife species in the Natomas Basin. A major component of this protection is the Natomas Basin Habitat Conservation Plan (NBHCP), an agreement between these resource agencies, the City of Sacramento, and Sutter County that provides a framework for the protection of 22 special-status species. Sacramento County is not a participant in the NBHCP, and is therefore not subject to its provisions.

To avoid potential conflicts between the federal mandates, SAFCA intends to design and construct the NLIP in a manner that would also serve to reduce wildlife hazards in the vicinity of the Airport while preserving and enhancing the critical habitat values upon which the Natomas Basin species of concern to USFWS and DFG depend, as described in the NBHCP. The primary species of concern are giant garter snake and Swainson's hawk. In addition, the NLIP improvements would be undertaken in a manner that avoids impacts on, and preferably improves, aviation safety as it interfaces with flood control features and operations.

2.1.2 PROJECT OBJECTIVES

As stated in the Local Funding EIR, the overall project objectives of SAFCA's flood control improvement program, including the NLIP, are to:

(1) complete the projects necessary to provide 100-year flood protection for developed areas in the major floodplains of the Sacramento metropolitan area (Sacramento) 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.

The specific objectives of the proposed project analyzed in this EIR are to:

(1) provide at least 100-year flood protection as quickly as possible while laying the groundwork to achieve at least "200-year" flood protection over time,

(2) use flood control projects in the vicinity of the Airport to facilitate changes in the management of Airport lands that reduce hazards to aviation safety, and

(3) use flood control projects to enhance habitat values by increasing the extent and connectivity of the lands in Natomas being managed to provide habitat for giant garter snake, Swainson's hawk, and other special-status species.

2.1.3 PROJECT PLAN FORMULATION

2.1.3.1 PLAN FORMULATION PROCESS

SAFCA formulated a proposed project and a range of project alternatives intended to achieve the specific project objectives through the following steps:

(1) identification of the deficiencies in the Natomas levee system that must be addressed to provide "200-year" flood protection,

(2) identification of the deficiencies that must be addressed to provide at least 100-year flood protection as quickly as possible,

(3) identification of feasible remedial measures to address the deficiencies,

(4) determination of the likely environmental impacts of the remedial measures,

(5) development of a reasonable range of flood control alternatives around the remedial measures, and

(6) addition of measures to ensure that each alternative would improve aviation safety and enhance habitat values.

Additional information on the formulation of the proposed project and alternatives is provided in Chapter 6, "Alternatives."

2.1.3.2 PLANNING OF PROJECT ELEMENTS TO MEET MULTIPLE OBJECTIVES

Recognizing the importance of securing maximum federal support for the flood control project, SAFCA has explored implementation approaches that also advance the achievement of federal aviation and wildlife protection objectives where complementary opportunities exist. Accordingly, the proposed project includes the following elements:

(1) The project would include construction of a new drainage canal (referred to in this document as the "GGS/Drainage Canal") designed to provide giant garter snake habitat and some irrigation infrastructure west of the Airport. Construction of these facilities would allow for dewatering of the ditch running along the western portion of the Airport runway system, a recognized flight safety hazard, by offsetting the effects on drainage and irrigation needs and giant garter snake habitat.

(2) The project would combine SAFCA's need for levee embankment and berm material with the Sacramento County Airport System's (SCAS's) need to modify the condition and management of Airport bufferlands so as to reduce wildlife hazards affecting Airport operations, and in a manner that enhances the connectivity of areas managed specifically for their habitat value.

The proposed improvements to the Sacramento River east levee would require constructing an enlarged levee embankment (adjacent setback levee) with extensive seepage berms on the land side of the levee (Exhibit 2-8). Expanding the landside levee footprint necessitates redesigning and relocating the irrigation and drainage infrastructure currently located along the landside toe of the levee. Approximately 4.4 million cubic yards of soil material would be needed for construction of the levee embankment, berms, and relocated canals along the Sacramento River east levee. About 600,000 cubic yards would be obtained through excavation of the new GGS/Drainage Canal between Reclamation District (RD) 1000's existing North Drainage Canal north of the Airport and its existing West Drainage Canal southwest of the Airport (Exhibit 2-8).

The new GGS/Drainage Canal would be designed and managed to provide a dispersal corridor for giant garter snake that would link emerging blocks of managed giant garter snake habitat in the vicinity of Prichard Lake north of the Airport and around Fisherman's Lake south of the Airport. The new canal would intercept much of the drainage and irrigation flows that are currently routed through the Airport West Ditch, which runs parallel to the west runway. Provision of the proposed new GGS/Drainage Canal, along with rearrangement of local irrigation facilities, would remove most of the flows from the Airport West Ditch and eliminate hazards currently associated with this feature—specifically, the attraction of wildlife (especially birds) that pose both an aircraft strike hazard in the runway area and a physical obstruction hazard to aircraft that may leave the runway during adverse takeoff or landing situations.

The new GGS/Drainage Canal would also generally improve stormwater drainage on lands in the western portion of the Natomas Basin, including Airport bufferlands. It would thus reduce standing water on lands near the Airport Operations Area and the aviation hazards associated with the resulting attraction to wildlife.

SAFCA would obtain the balance of the fill material it needs for the improvements along the Sacramento River east levee from parcels in the Airport bufferlands, land planned for habitat development by The Natomas Basin Conservancy (TNBC), and nearby privately owned agricultural land (Exhibit 2-8). Borrow operations would consist of (1) shallow excavation and grading of lands to preserve the current agricultural condition (cropland) or a similar condition (managed grassland) suitable for providing foraging habitat for the Swainson's hawk, and (2) deeper excavation and reclamation of lands to a "managed marsh" condition similar to existing preserves throughout the area that TNBC, as plan operator for the NBHCP, owns and manages for giant garter snake habitat.

In some areas, the adjacent setback levee and seepage berms along the land side of the Sacramento River east levee would extend into mature stands of trees. The project design would include accommodations to retain some of these trees through the use of relief well arrays for 20–30 years (the assumed useful life of the relief wells) where practicable (see "Use of Relief Wells to Avoid Removal of Structures and Trees along Sacramento River East Levee Reaches 4B–20A" in Section 2.3.2.4). The proposed project includes planting a substantial number of trees (totaling approximately 150 acres, shown conceptually in Exhibit 2-8) to offset the near-term losses and additional losses expected to result from future expansions of the levee footprint and seepage berms (see Section 4.2.4.2 in Chapter 4, "Cumulative Impacts"). Where trees would be planted in corridors, shallow excavation of the land in the corridors may be undertaken before trees are planted; this practice could provide additional borrow for construction while placing the plantings closer to groundwater and thus providing better conditions for more rapid tree growth.

2.2 EXISTING PROJECT FACILITIES AND POTENTIAL BORROW SITES

All project construction activities would take place within the Natomas Basin, except for the development of a borrow site on RD 1001 land northeast of the basin. Exhibit 2-8 shows the locations of the planned improvements and potential borrow sources. The following subsections describe the existing flood control facilities, their general setting, and adjacent irrigation infrastructure and the potential borrow sources for the proposed project.

2.2.1 FLOOD CONTROL AND IRRIGATION FACILITIES

2.2.1.1 NATOMAS CROSS CANAL SOUTH LEVEE

The NCC is a 5.3-mile-long channel that carries water from several tributary watersheds in western Placer County and eastern Sutter County to the Sacramento River. The NCC begins at the PGCC and East Side Canal and extends southwest to its confluence with the Sacramento River near the Sankey Road/Garden Highway intersection. During periods of flooding, the Sutter Bypass, Sacramento River, and NCC all contribute to raised water elevations that can affect the NCC levees. For engineering purposes, the levee is divided into seven reaches, as shown in Exhibits 2-8 and 2-9. Much of the south levee contains an existing stability berm with an internal drainage system. Levee slopes are approximately 3H:1V on the water side and 2H:1V on the land side. There is an approximately 80- to 100-foot maintenance access area on the land side of the levee through most of the NCC's length.

Exhibit 2-9 shows the area around the NCC south levee.

Farms and rural residences are located on both sides of the NCC, with rice the primary crop under cultivation. The Lucich North and Frazer Habitat Preserves, maintained by TNBC, lie south of the NCC south levee from the eastern end of Reach 2 through the western end of Reach 6. A few residences are situated 700–1,000 feet north of the NCC south levee in Reach 1, and a few residences are situated 50–200 feet south and west of the levee along Reach 6. At Reach 7, a residence and several ranch buildings are situated within 25 feet of the levee's landside toe. Other nearby land uses include the Verona Village Resort, a small trailer campground, marina, restaurant, and store on the west side of Garden Highway, approximately 660 feet southwest of the west end of the NCC levee at the north end of Reach 1 of the Sacramento River east levee.

A drainage canal, referred to as the Vestal Drain, runs parallel to the NCC south levee through much of Reach 2, approximately 100 feet from the landside levee toe. There is a private irrigation pump and irrigation canal at the landside levee toe in Reach 1. Natomas Central Mutual Water Company's (NMWC's) Bennett Pumping Plant and RD 1000's Pumping Plant No. 4 are located in Reach 2, and the NMWC Northern Pumping Plant is located in Reach 3. NMWC's North Main Canal runs parallel to the levee through Reaches 4 and 5, approximately 100 feet from the landside levee toe.

2.2.1.2 SACRAMENTO RIVER EAST LEVEE

An 18-mile-long section of the east levee of the Sacramento River protects the west side of the Natomas Basin between the NCC and the American River. For planning purposes, the levee is divided into 20 reaches, as shown in Exhibits 2-8 and 2-10. Garden Highway is located on top of the levee crown within all 20 reaches. A drained, 10-foot-wide stability berm is present on the landside slope of the levee between the NCC and Powerline Road (Reaches 1–12). Cutoff walls were previously constructed through the levee in Reaches 12– 20.

Exhibit 2-10 shows the features along the Sacramento River east levee.

The land uses along the levee vary from north to south. Along the land side, Reaches 1–13 are bordered mainly by private agricultural lands containing a few rural residences, Airport bufferlands, and two farmed TNBC parcels. Teal Bend Golf Club is west of the Airport, adjacent to the levee along Reach 6. The parcels bordering Reaches

14–18 contain more residences, several rural estates, and three TNBC parcels. The land side of Reaches 19 and 20 is bordered by residential subdivisions, a business park, and the City of Sacramento's Natomas Oaks Park, undeveloped Costa Park site, and Shorebird Park.

Several marinas and three restaurants are located along the water side of the levee in Reaches 1–18. Sacramento County's Elkhorn Boat Access is located in Reach 9. More than 150 residences and numerous private boat docks are located between the lower part of Reach 2 and the lower part of Reach 18; as mentioned previously, many fences, gates, and other appurtenances associated with these properties are located on the levee itself. On the water side of the levee in Reaches 19 and 20 are a mix of residences, private boat docks, businesses, and Sand Cove Park. Discovery Park is just southeast of Reach 20.

Several irrigation canals, pipelines, wells, and pump stations exist along the Sacramento River east levee. The Elkhorn Main Irrigation Canal (Elkhorn Canal) and the Riverside Main Irrigation Canal (Riverside Canal) are key agricultural irrigation canals in the NMWC system. The Elkhorn Canal runs parallel to the Sacramento River east levee from the North Drainage Canal in Reach 4B through Reach 8 and into the start of Reach 9 (1,250 feet south of Elkhorn Boulevard); this canal and is supplied by the Prichard and Elkhorn Pumping Plants on the Sacramento River. The Riverside Canal extends from just north of Reach 13 to the middle of Reach 19 and is supplied by the Riverside Pumping Plant, on the Sacramento River just north of Radio Road. Several lateral canals connect to the Elkhorn and Riverside Canals. The existing Elkhorn and Riverside Canals are highline canals that use gravity flow to deliver water for irrigation by maintaining water levels above the surrounding ground levels. These canals have earthen embankments with side slopes that are nearly vertical, requiring regular maintenance.

In addition to the NMWC irrigation systems, there are several landowner-operated systems along the levee. These facilities are located primarily in Reaches 1–4A and 9–12, in areas not currently served by the NMWC systems. The areas are serviced by either well pumps on the land side or river pumps, which discharge into buried pipelines, small irrigation ditches, or directly onto fields. The distribution systems run along the landside toe of the levee to supply fields that slope away from the levee. There are approximately nine small pumping plants that provide water from the river and approximately 10 groundwater well pumps.

Several drainage pumping plants are operated by RD 1000 along the Sacramento River east levee. These facilities pump drain water from the main drainage canal system into the river. They include Pumping Plant No. 2, located in Reach 4B; Pumping Plant No. 3, located in Reach 13; and Pumping Plant No. 1, located between Reach 19B and Reach 20. Pumping Plant No. 2 was temporarily removed as part of an emergency levee repair in 2006 and would be replaced as an element of the proposed project in 2009–2010.

2.2.1.3 PLEASANT GROVE CREEK CANAL WEST LEVEE

The PGCC west levee extends southerly from the east end of the NCC south levee to the north end of the NEMDC/Steelhead Creek levee near the Sankey Road crossing (Exhibit 2-9). The PGCC west levee protects the Natomas Basin from flood flows from Pleasant Grove Creek and other creeks in western Placer County, as well as from water backed up in the NCC from high river stages in the Sacramento River. Levee slopes are generally 2H:1V on both the water side and land side of the levee. Natomas Road is located on top of the levee crown. No berms support this levee. SAFCA constructed steel sheetpile walls capped by concrete pavement sections at Howsley, Fifield, and Sankey Roads in 1996 to provide hardened sections at these roadway crossings where freeboard was inadequate. The Fifield Road/Natomas Road intersection was raised by Sutter County when it replaced the Fifield Road bridge over the PGCC. Several drainage culverts cross under the PGCC to drain areas to the east into the RD 1000 drainage system. A private canal extends parallel to the PGCC west levee for about 1,500 feet at the landside levee toe.

Exhibit 2-9 shows the area around the PGCC west levee.

Farms and scattered rural residences are located on both sides of the PGCC. A few residences are located within 500–1,200 feet of the west levee along Fifield Road. A manufacturing facility and a railroad siding are located just past the end of the PGCC at Sankey Road.

2.2.2 BORROW SITES

Borrow sites are areas from which earthen materials would be removed for use in construction. The sites would be recontoured and developed as either managed marsh or grassland habitat following excavation for this use, as described in Section 2.3.4.3. Where borrow sites would be used over more than one construction season, the work would progress in cells that would be incrementally developed as habitat as the borrow activities are completed.

The improvements to the NCC south levee, proposed for construction in 2008, would be completed using borrow from a site owned by RD 1001 about 5 miles northeast of the Natomas Basin along Pacific Avenue, just east of the RD 1001 borrow site used for SAFCA's 2007 NCC South Levee Phase 1 Improvements project. The site was in rice cultivation in summer 2007. In accordance with an agreement with RD 1001, SAFCA would assist in obtaining permits for the development of this site as a borrow source for the NLIP and for future use by RD 1001. This site likely would be used also for the proposed PGCC west levee construction in 2009–2010. It is expected that the site would be reclaimed in sections as borrow operations move through the parcel sequentially over time.

Several other properties have been identified as likely sources of soil borrow, mainly for use in the improvements to the Sacramento River east levee. The identification of these potential borrow sites was based on several criteria:

(1) Preference was given to sites nearest to the construction areas. The use of borrow sites near the construction areas would reduce the potential costs and environmental effects (air emissions) of hauling material. In addition, scrapers rather than trucks may be used in some instances to move soil material from a borrow site to a construction area when the borrow site is within approximately 1 mile of the point of use, thereby reducing the amount of material handling required and further associated construction costs and air pollutant emissions.

(2) Sites were selected to maximize the achievement of multiple project objectives to the extent feasible:

- Airport bufferland parcels were identified as potential borrow sources because borrow operations on these lands would supply material for levee improvements and include a reclamation strategy that would reduce wildlife attraction and associated hazards to aviation safety.

- Private parcels historically used for rice cultivation were selected as potential borrow sources to provide for (a) additional conversion of suitable land to marsh that would be managed specifically as higher-quality giant garter snake habitat, and (b) the retention of land in rice production under public agency or habitat management agency ownership.

- Preference was given to sites adjacent to parcels already managed to provide special-status species habitat (TNBC parcels and the Airport's Prichard Lake mitigation site). Developing these sites for their habitat value following borrow activity would provide for larger contiguous blocks of managed habitat in the Natomas Basin.

- TNBC parcels already planned for development in the near term were considered for their borrow potential.

SAFCA has identified the following preferred borrow sources for the 2008 and 2009–2010 flood control and irrigation infrastructure improvements along the Sacramento River east levee, and redundant sources that may be pursued if negotiations regarding the preferred sources are unsuccessful or additional quantities are found to be needed during construction (Exhibit 2-8):

- Bolen South and Nestor Preserves (2008 preferred): A 56-acre portion of TNBC's 102-acre Bolen South Preserve west of Powerline Road and just south of Sankey Road and an 80-acre portion of TNBC's 230-acre Nestor Preserve east of Powerline Road and north of Powerline Road. These sites, planned by TNBC for habitat creation in 2008, could provide soil for construction in the upper reaches of the Sacramento River east levee and the upper portion of the relocated Elkhorn Canal. SAFCA would undertake the creation of marsh and upland habitat in coordination with TNBC.

- Vestal and/or Spangler property (2008 preferred): Privately owned farmland near the NCC. These two properties are situated west and east, respectively, of Powerline Road and north of Sankey Road, adjacent to existing TNBC properties, and are currently in rice cultivation. Soil from the sites could be used for construction in the upper reaches of the Sacramento River east levee, the NCC south levee, or the PGCC west levee. After the removal of borrow soil, managed marsh would be created to provide giant garter snake habitat on the portion of the property that is excavated, with the remainder retained in rice production under public agency or habitat management agency ownership.

- Airport bufferlands north of the Airport complex (2008 potential, 2009 preferred, 2010 potential): Sacramento County property north of Elverta Road and west of Powerline Road. These lands could provide soil for use along the middle reaches of the Sacramento River east levee, most likely in 2009. They could also provide material for construction in the upper reaches of the levee in 2008 or in the lower reaches of the levee in 2010, if needed. After the removal of borrow material, the areas north of the North Drainage Canal would be converted to managed marsh suitable as giant garter snake habitat between existing TNBC and Airport managed habitats, and the remainder would be reclaimed as managed grassland.

- Fisherman's Lake area (2010 preferred): TNBC-owned and privately owned parcels between TNBC-managed habitat areas. Several parcels may be suitable sources of borrow material for use in the lower reaches of the Sacramento River east levee and are strategically situated for creation of habitat that would link existing TNBC parcels.

- Brookfield property (2008 potential, 2010 potential): Located west of the PGCC at Fifield Road, this private property is currently in rice cultivation and is intended by the owner to serve as a mitigation site for future development. Material from this property could be used along the upper reaches of the Sacramento River east levee in 2008 or on the PGCC west levee in 2010. After the removal of borrow material, it is expected that the land would be converted to marsh habitat.

- Airport bufferlands south of the Airport complex (2009–2010 potential): Sacramento County property south of I-5 and west of Powerline Road. Soil borrow from part of this property may be suitable for use along the middle and lower reaches of the Sacramento River east levee. After the removal of borrow material, the land would be converted to grassland, with the southernmost portion possibly suitable for woodland planting.

2.3 DESCRIPTION OF THE PROPOSED PROJECT

2.3.1 OVERVIEW OF THE PROPOSED PROJECT ELEMENTS

The elements of the proposed project are described in this section in four broad, overlapping categories:

- levee raising and seepage remediation,
- improvements to major irrigation and drainage infrastructure,
- habitat development and management, and
- additional actions to meet FEMA requirements: encroachment management and bridge crossing modifications.

Additionally, right-of-way would be acquired within the footprint of the proposed features, at borrow sites, and to prevent encroachment and provide for maintenance access along the land side of the flood control facilities.

Table 2-1 summarizes the major elements of the proposed project and lists the sections of this chapter where they are discussed in detail. As explained in Section 1.3.2, "Combined Program and Project EIR," the proposed project includes 2008 construction components, which are described and analyzed in this EIR at a project level of detail, and 2009–2010 elements, which are described and analyzed at a general, program level of detail.

Table 2-1
Summary of the Major Elements of the Proposed Project

Project Element	Proposed Activity and Timing	Section(s) of This EIR Where Described
2008 Construction (analyzed at a project level in this EIR)		
Levee raising and seepage remediation: NCC south levee	Raise and realign the NCC south levee to provide additional freeboard and more stable waterside and landside slopes and to reduce the need for removal of waterside vegetation. (May 8–November 1, 2008) Construct a seepage cutoff wall through the levee crown in Reaches 3–7. (May 8–October 15, 2008)	2.3.2.2
Levee raising and seepage remediation: Sacramento River east levee (adjacent setback levee)	Construct a raised adjacent setback levee from the NCC to just south of the North Drainage Canal (Reaches 1–4B partial) with a 100-foot seepage berm in Reaches 2 and 3 and a 300-foot seepage berm in Reach 4B. (May 1–November 1, 2008)	2.3.2.3
Improvements to major irrigation and drainage infrastructure	Construct a new canal designed to provide drainage and associated giant garter snake habitat (referred to in this EIR as the "GGS/Drainage Canal") between the North Drainage Canal and Elkhorn Reservoir. (May 1–November 1, 2008) Relocate the Elkhorn Canal (highline irrigation canal) between the North Drainage Canal and Elkhorn Reservoir in anticipation of the filling of the existing Elkhorn Canal at the toe of the Sacramento River east levee in 2009. (May 1–November 1, 2008) Remove a deep culvert at the location of Pumping Plant No. 2. (May 1–November 1, 2008)	2.3.3.1–2.3.3.3, 2.3.4.3
Habitat creation and management	Establish vegetative habitat features in the new GGS/Drainage Canal. (Fall 2008) Recontour and create managed marsh and grassland on lands used as borrow sources. (Fall 2008 or spring 2009) Establish grassland on the adjacent setback levee slopes and seepage berms. (August 1–December 31, 2008) Install woodland plantings to offset the loss of portions of tree groves in the landside levee footprint. (Fall 2008)	2.3.4.3
Right-of-way acquisition	Acquire right-of-way through fee title or easement interest within the footprint of the project features, at the borrow sites, and to prevent encroachments into the flood control system. (Before construction)	2.3.2.1

Table 2-1 Summary of the Major Elements of the Proposed Project		
Project Element	Proposed Activity and Timing	Section(s) of This EIR Where Described
2009–2010 Construction (analyzed at a program level in this EIR)		
Levee raising and seepage remediation: Sacramento River east levee (adjacent setback levee)	Construct an adjacent setback levee from just south of the North Drainage Canal to the American River north levee, raised where needed to provide adequate freeboard, with seepage berms, relief wells, and cutoff walls for seepage remediation as required (the use of 300-foot berms is still under study). (May 1–November 1, 2009, and May 1–November 1, 2010)	2.3.2.4
Levee raising and seepage remediation: PGCC west levee	Raise levee, flatten waterside and landside slopes, and construct seepage berms along the PGCC west levee (specific berm widths and potential use of cutoff walls in some areas to be determined). (May 1–November 1, 2010)	2.3.2.5
Improvements to major irrigation and drainage infrastructure	Construct the new GGS/Drainage Canal between Elkhorn Reservoir and the West Drainage Canal (specific alignment to be determined), and improve the West Drainage Canal to provide enhanced giant garter snake habitat. (May 1–November 1, 2009) Implement Airport West Ditch improvements in connection with construction of the GGS/Drainage Canal to allow the Airport to decommission the agricultural irrigation function of this facility and eliminate the hazards currently associated with it. The airport stormwater detention function provided by this ditch would continue. The ditch would therefore be recontoured as a gently sloping swale to facilitate periodic maintenance such as mowing. (May 1–November 1, 2009) Relocate the Riverside Canal and the Elkhorn Canal downstream of Elkhorn Reservoir (specific alignments to be determined) and fill the existing canals (May 1–November 1, 2009) Construct RD 1000 Pumping Plant No. 2 (April 1, 2009–September 1, 2010)	2.3.3.1–2.3.3.5, 2.3.4.3
Habitat creation and management	Establish habitat enhancements in the new GGS/Drainage Canal and improved West Drainage Canal (specific design features to be determined). (Fall 2009) Recontour and create marsh and managed grassland on lands used as borrow sources (specific management plans to be developed). (Fall or spring after borrow excavation in 2009 and 2010) Establish grassland on the adjacent setback levee slopes and seepage berms. (Fall after construction in 2009 and 2010) Install woodland plantings to offset the loss of portions of tree groves in the landside levee footprint (locations to be determined). (Fall 2009 and 2010)	2.3.4.3

Table 2-1 Summary of the Major Elements of the Proposed Project		
Project Element	Proposed Activity and Timing	Section(s) of This EIR Where Described
Additional actions to meet FEMA requirements: encroachment management on the Sacramento River east levee, and bridge crossing modifications at the NCC	Remove encroachments from a portion of the water side and land side of the Sacramento River east levee as needed to ensure that the levee can be certified as meeting the minimum requirements of the NFIP and USACE design criteria (specific criteria still under discussion). (Timing to be determined) Modify the SR 99/70 crossing of the NCC as needed to meet FEMA requirements (Timing to be determined)	2.3.5
Right-of-way acquisition	Acquire right-of-way through fee title or easement interest within the footprint of the project features, at the borrow sites, and to prevent encroachments into the flood control system. (Before construction)	2.3.2.1
Notes: GGS = Giant Garter Snake; NCC = Natomas Cross Canal; NFIP = National Flood Insurance Program; PGCC = Pleasant Grove Creek Canal; RD = Reclamation District; USACE = U.S. Army Corps of Engineers		

Aspects of the 2009–2010 elements that would be defined further to support project-level environmental analysis of these elements include the following:

- seepage remediation methods for reaches indicated as requiring 300-foot seepage berms, greater definition of the locations of seepage well arrays, and identification of specific borrow sites for 2010 construction along the Sacramento River east levee;
- widths of seepage berms and potential use of cutoff walls in some locations along the PGCC west levee;
- alignments of the new GGS/Drainage Canal in the area of the Teal Bend Golf Club, the relocated Elkhorn Canal, and the Riverside Canal;
- specific design features to accommodate and enhance giant garter snake use of the GGS/Drainage Canal;
- management plans for created marshes and grasslands;
- locations of woodland plantings;
- definition of the USACE encroachment removal policy; and
- preferred method to address FEMA requirements for the SR 99/70 bridge crossing of the NCC.

2.3.2 Levee Raising and Seepage Remediation

2.3.2.1 General Methods

The following subsections provide an overview of the approaches to addressing freeboard deficiencies and seepage potential that would be used in various combinations on the NCC south levee, Sacramento River east levee, and PGCC west levee and describe the proposed extent of land acquisition for flood control facilities.

Levee Raises

All of the NCC south levee reaches, many of the Sacramento River east levee reaches, and several sections of the PGCC west levee lack the required 3 feet of freeboard above the 100-year water surface profile. To meet overall NLIP goals, SAFCA would increase the levee freeboard sufficiently in freeboard-deficient areas to meet the desired minimum of 3 feet of freeboard above the "200-year" water surface profile. The PGCC west levee at Sankey Road, however, would not be raised by SAFCA as part of the proposed project. In all reaches, the final levee configuration must meet the USACE criteria of a 20-foot-wide minimum crown, a 3H:1V waterside slope, and a 3H:1V (preferred) or 2H:1V (maximum) landside slope. Because the levees in most of the project reaches currently have landside slopes of 2H:1V, the proposed project includes flattening most of these slopes to a 3H:1V profile.

The freeboard increases would be accomplished through raises of the existing NCC and PGCC levees, or through construction of the raised adjacent setback levee adjacent to the existing Sacramento River east levee:

- Raise of existing levee (NCC south levee/PGCC west levee). For a minor raise of the levee crown elevation (typically 6 inches or less), the raise may be limited to the levee crown area, provided that there is enough existing crown width to accommodate the raise without narrowing the crown to a width that is less than the minimum requirement. For most of the NLIP levee raises, however, a greater crown raise is required and/or the levee slopes must be flattened. The required crown elevation would be met through a full levee raise. Full levee raises consist of an embankment raise from the landside or waterside toe (or both) upward to the increased crown elevation. This requires partially excavating the levee slope to provide a working platform for equipment, typically 10 feet wide, and rebuilding the levee to the appropriate elevation by benching the new embankment material into the existing embankment material. Exhibit 2-11 illustrates a levee raise and flattening of a landside levee slope from 2H:1V to 3H:1V.

- Adjacent setback levee (Sacramento River east levee). The proposed adjacent setback levee adjoining the Sacramento River east levee (Exhibit 2-7) would be constructed with a crown elevation 3 feet above the "200-year" water surface profile. In the upper reaches, where the existing levee has freeboard deficiencies of as much as 3 feet, the crown of the adjacent setback levee would be higher than the existing levee and Garden Highway roadway (Exhibit 2-12, top illustration). In the lower reaches, where the existing levee has sufficient freeboard, the adjacent setback levee would be the same height as the existing levee (Exhibit 2-12, bottom illustration).

Seepage Remediation

Underseepage problems can occur where levees are constructed on low-permeability foundation soil (silt and clay) underlain by a higher-permeability layer (sand and gravel). Excessive underseepage makes the levee susceptible to failure during periods of high river stage. Under these conditions, seepage travels horizontally under the levee and then is forced vertically upward through the low-permeability foundation layer, often referred to as a "blanket." Failure of the blanket can occur either by uplift, a condition in which the blanket does not have enough weight to resist the confined pressure acting upon the bottom of the blanket, or by piping (internal erosion) caused by water flowing under high vertical gradients through the erodable blanket and carrying fine soil particles out of the foundation materials. Through-seepage is seepage through a levee embankment that can occur during periods of high river stage. Depending on the duration of high water and the permeability of embankment soil, seepage may exit the landside face of the levee. Seepage can also pass directly through pervious layers in the levee if such layers are present. Under these conditions, the stability of the landside levee slope may be reduced. Exhibit 2-13 illustrates levee underseepage and through-seepage.

Excessive underseepage gradients can be corrected through the use of cutoff walls, seepage berms, and relief wells. The choice of seepage remediation is influenced by the depth and continuity of pervious soil layers, adjacent land use, environmental constraints, construction cost, construction schedule, and long-term maintenance

capability. Of the three remediation methods, seepage berms are generally the preferred engineering method for addressing underseepage in the project area because they are the most reliable and the most adaptable to different geotechnical conditions (e.g., seismic groundshaking or revised design criteria). Relief wells require the least amount of construction disturbance but require routine maintenance and are the least reliable as a large-scale remediation method in the project area. Cutoff walls require little construction disturbance outside the levee footprint, provided that there is sufficient room for construction equipment, but they are often more costly than seepage berms and are less adaptable to changes in engineering standards.

Through-seepage can be corrected by constructing cutoff walls or stability berms. There are two known areas of through-seepage instability potential in the project area, where the NCC south levee and the PGCC west levee meet. The reach where the NCC south levee and the Sacramento River east levee meet is being corrected in 2007. The use of cutoff walls in these portions of the levee system would address both through-seepage and underseepage. Therefore, with regard to seepage potential, the focus in the proposed project design is on underseepage remediation.

Underseepage Remediation with Seepage Berms

Seepage berms are wide embankments placed outward from the levee landside toe to lengthen the underseepage path and thereby lower the exit gradient of seepage through permeable layers under the levees to acceptable levels (Exhibit 2-14). Berms typically extend from 80 feet (a minimum berm width) to 300 feet from the landside toe of the levee. The thickness of the berm depends on the severity of the seepage flow but generally begins at 5 feet near the landside levee toe for a 100-foot berm and 7.5 feet for a 300-foot berm and tapers to a thickness of 3 feet at the end of the berm.

For the proposed project, a hybrid type of berm is being considered. This type of berm consists of a soil mass over a drain rock layer covered by a geotextile filter fabric to control the exit gradient of seepage through material underlying the levee. Water travels through the drain rock. The distance the berm extends from the levee is designed to reduce the hydraulic exit gradient of the water to acceptable levels. A seepage collection ditch likely would be constructed at the landward toe of all seepage berms.

Underseepage Remediation with Relief Wells

Relief wells provide protection against excessive levee underseepage by providing a lower resistance pathway for underseepage to exit to the ground surface at the landside toe of the levee without creating sand boils or piping levee foundation materials. Relief wells are an option for addressing underseepage only in reaches where continuous sand and gravel layers have been identified by the geotechnical explorations and analyses.

Relief wells are constructed near the landside toe of the levee to provide pressure relief beneath surficial fine-grained soils (clay or silt “blanket”) (Exhibit 2-15). The wells are constructed using drilling equipment to bore a hole vertically through the fine-grained blanket layer and into the coarse-grained aquifer layer beneath. Pipe casings and filters are installed to allow the pressurized water to flow to the ground surface, thereby relieving the pressures beneath the clay blanket. A collection pipe or ditch is used to carry seepage water to a surface drain. The wells require regular maintenance to ensure proper operation.

Relief wells generally are spaced at 50- to 100-foot intervals. Although during elevated river stages they conduct water to the surface without pumping (artesian flow), pumping costs are incurred to convey the collected water back into the river. Additional maintenance costs associated with the wells include periodic video surveying, well performance testing, cleaning, and miscellaneous repairs. Monitoring wells (piezometers) are installed between relief wells to allow monitoring of the wells to ensure that hydraulic pressure is being relieved.

Relief wells can be used to avoid obstructions on the land side of the levee toe (such as buildings or trees) that otherwise would have to be removed for the construction of berms. The proposed project includes the strategic placement of relief wells for this purpose. Exhibit 2-16 illustrates the use of relief wells to avoid the removal of a

grove of trees. However, relief wells are not considered to be as reliable as seepage berms because they can become plugged up over time, and they would be installed with the expectation that they would eventually be removed (in 20–30 years) and replaced with berms.

Underseepage Remediation with Cutoff Walls

Cutoff walls reduce underseepage by providing a barrier of low-permeability material through the levee and levee foundation where sandy or gravelly soils of higher permeability can transmit seepage during high water stages. The cutoff wall depths necessary to limit underseepage at the design water surface elevation to gradients specified by the USACE are determined by geotechnical analysis. Cutoff walls for underseepage are generally installed to depths that will tie in with existing impervious or lower permeability soil layers beneath the levee foundation.

Cutoff walls can be constructed by a number of methods to suit site conditions and schedule requirements. The most common methods include the installation of cutoff walls consisting of a soil-cement-bentonite (SCB) mix or a soil-bentonite mix using conventional trench methods, deep soil mixing (DSM), or trench remixing deep (TRD). Additionally, cutoff walls can be constructed either at the levee centerline or at the levee waterside toe. The available working area for construction must be about 30 feet wide. In some locations, the lack of a bench of sufficient width on the water side of the levee, the presence of vegetation, or other factors may preclude construction of a waterside cutoff wall. Because the adjacent setback levee would essentially constitute a new levee along the land side of the existing levee, a cutoff wall could be constructed beneath its waterside slope, along the landside toe of the existing levee, without requiring modification of the existing levee. This possibility is also being analyzed.

Exhibit 2-11 illustrates a typical cutoff wall through a levee centerline.

Conventional slurry cutoff walls are typically constructed using an excavator with a long-stick boom capable of digging a trench to a maximum depth of approximately 80 feet. Bentonite slurry is pumped into the trench during trench excavation to prevent caving. The soil, cement, and bentonite are mixed to achieve the required cutoff wall strength and permeability, and the mixture is backfilled into the trench. Construction of a conventional slurry cutoff wall through the center of the levee typically requires that the existing levee be degraded as much as one-third of the levee height to prevent hydraulic fracturing. Select fill is used to rebuild the levee.

DSM cutoff walls can reach depths of 200 feet. They are constructed by parallel augers drilling vertically through the levee and substrate. Cement and bentonite are pumped into the interconnected holes as the augers are inserted and withdrawn. The levee is normally degraded as necessary to create a 30-foot flat top width on which the equipment operates.

TRD cutoff walls can be constructed to depths similar to DSM walls. The TRD method uses a cutter chain on a wide shaft (similar to a large chain saw) set vertically into the foundation soil. Cement and bentonite are pumped into the shaft at various depths as the cutters move along the wall alignment. Again, the levee is normally degraded as necessary to create a 30-foot flat top width on which the equipment operates.

Exhibit 2-17 shows typical cutoff wall construction equipment and techniques.

Land Acquisition

Several of the measures described above would increase the footprint of the flood control system: levees would be widened on the land side as a result of raising, construction of an adjacent setback levee, flattening of the waterside and/or landside slopes, and construction of seepage berms. In addition, a 50-foot-wide access and maintenance corridor would be established at the landside toes of the levees or at the ends of the 100-foot seepage berms in the reaches where they are constructed. In reaches with 300-foot seepage berms, SAFCA would establish a 20-foot-wide access and maintenance corridor. The proposed improvements also include a woodland corridor to replace trees that are removed within the levee footprint and maintenance access areas, and canal

construction east of the flood control features. SAFCA also would acquire adjacent land for relocation of infrastructure from the flood control corridor and planned improvements outside the flood control corridor (e.g., GGS/Drainage Canal), with appropriate easements provided to utility owners upon completion of the work. To meet its project footprint needs, SAFCA would acquire private lands in fee and would acquire an easement interest where the project features would be on Airport land (owned by Sacramento County). Where the project footprint would overlie land owned and managed by TNBC, SAFCA may either purchase the land in fee or obtain easements.

As part of the proposed project, SAFCA would acquire additional land at the landside toe of the proposed flood control features to prevent encroachment into the flood control system and preserve the land for possible future expansion of flood control facilities, including flattening the land side of the levees to a 5H:1V slope using funding generated through future development fees (see Local Funding EIR Section 3.4.8, "Levee Integrity Program"). If such expansion were to occur, the impacts would be similar to those described in this EIR for the proposed project. However, these improvements have not been planned or designed yet, are not funded, and would not be expected to be constructed for at least 10 years.

Exhibit 2-18 and Table 2-2 identify the parcels within the footprint of the 2008 project components, including those where SAFCA proposes to acquire land through fee title, or in which SAFCA proposes to acquire an easement interest, to implement the 2008 construction elements and preserve adjacent lands. The specific project features are described in Section 2.3.2.2 for the improvements to the NCC south levee; Section 2.3.2.3 for the improvements to the Sacramento River east levee in Reaches 1–4B improvements; and Sections 2.3.3.2 and 2.3.3.3 for the Elkhorn Canal relocation and GGS/Drainage Canal construction, respectively.

Table 2-2
Land Ownership in the Proposed Project Footprint for 2008 Construction

Owner or Parcel Name in EIR Text	Assessor's Parcel Number
Private Landowners	
Brookfield property	35-080-021
Private landowner	35-080-025
Private landowner	35-080-026
Private landowner	35-050-027
Private landowner	35-050-028
Private landowner	35-050-029
Private landowner	35-050-030
Private landowner	35-070-014
Private landowner	35-070-015
Spangler property	35-130-004, 35-130-009, 35-130-010, 35-130-011, 35-130-012, 35-130-013
Vestal property	35-010-001, 35-010-008, 35-130-003, 35-130-007, 35-130-008, 35-104-001
Private landowner	35-010-005
Private landowner	35-010-006
Private landowner	35-010-009
Private landowner	35-010-002
Private landowner	35-010-023
Private landowner	35-020-018
Private landowner	35-020-019

Table 2-2 Land Ownership in the Proposed Project Footprint for 2008 Construction	
Owner or Parcel Name in EIR Text	Assessor's Parcel Number
Private landowner	35-020-020
Private landowner	35-020-017
Private landowner	35-030-002
Private landowner	35-030-008
Private landowner	35-030-012
Private landowner	35-030-013
Private landowner	35-030-006
Private landowner	35-030-007
Private landowner	35-030-016
Private landowner	35-330-013
Private landowner	201-0150-040
Private landowner	201-0150-041
Private landowner	201-0150-042
Private landowner	201-0150-020, 201-0250-041
Private landowner	201-0150-040
Private landowner	201-0250-002
The Natomas Basin Conservancy	
Nestor	35-140-035, 35-140-003, 35-140-004, 35-020-013, 35-020-014, 35-140-015
Bolen South	35-020-016
Frazer	35-070-011, 35-070-012
Lucich North	35-130-016, 35-130-017
Huffman West	35-030-019, 35-030-020, 35-030-021, 35-030-025
Atkinson	35-330-024
County of Sacramento	
County of Sacramento	35-330-014, 35-330-015, 35-330-004 201-0010-008, 201-0010-010, 201-0010-011, 201-0010-015, 201-0010-016, 201-0010-017, 201-0010-018, 201-0010-019, 201-0010-020, 201-0010-021, 201-0010-022, 201-0010-023, 201-0010-024, 201-0010-025, 201-0010-026 201-0130-011, 201-0130-012, 201-0130-032 201-0140-059, 201-0140-063, 201-0140-064, 201-0140-065, 201-0140-066, 201-0140-067 201-0150-055, 201-0150-033
Other	
Natomas Central Mutual Water Company	35-130-018, 201-0010-044, 201-0010-045, 201-0010-046, 201-0010-062, 201-0250-042
Sacramento-San Joaquin Drainage District	35-010-020
Reclamation District 1001	33-280-025

2.3.2.2 NATOMAS CROSS CANAL SOUTH LEVEE (2008 CONSTRUCTION)

General Construction Plan for Improvements to the Natomas Cross Canal South Levee

The proposed project would include raising the entire NCC south levee (Station 0+00 to Station 287+50) and would continue the construction of a seepage cutoff wall from the eastern terminus of the NCC South Levee Phase 1 Improvements (NCC Phase 1 Improvements) being constructed in 2007 to the eastern end of the NCC south levee (approximately Station 58+00 to Station 287+50). Exhibit 2-19 shows the extent of the improvements in plan view.

Volume II of the Local Funding EIR described and analyzed the NCC Phase 1 Improvements, which consist of the construction of a cutoff wall from NCC south levee Station 0+00 to Station 125+00 and Sacramento River east levee Station 0+00 to 5+00 in 2007; however, because of a shortened construction work window, the eastern extent of potential 2007 construction was subsequently limited to Station 58+00. The NCC Phase 1 Improvements, which began in August 2007 and must be completed in September 2007, are intended to complete installation of a cutoff wall for the northernmost 500 feet of the Sacramento River east levee at the NCC interface (Station 0+00 to Station 5+00) and for the NCC south levee from its intersection with the Sacramento River east levee (Station 0+00) to the NMWC Bennett Pumping Plant (Station 58+00). To the extent that installation of the Phase 1 cutoff wall does not reach Station 58+00 during the 2007 construction season, this work would be included in the 2008 construction for the proposed project. The construction activities and quantities of construction materials described in this section are based on the assumption that the Phase 1 construction will reach Station 58+00 in 2007.

Construction of the NCC south levee component of the proposed project is anticipated to begin in May 2008 and continue through November 1, 2008. The work west of SR 99/70 may need to be limited to the period ending September 30, 2008, to avoid potential disturbance of giant garter snake habitat during the species' inactive season. Completion of quality control testing, including continuous core sampling at intervals along the proposed cutoff wall, would continue beyond the November 1, 2008, completion date for levee restoration. Table 2-3 shows the estimated construction schedule. The main construction activities are described below.

Table 2-3
Proposed Construction Schedule for Improvements to the Natomas Cross Canal South Levee (2008 Construction)

Construction Activity	Start Date (2008)	Duration (days)	End Date (2008)
Mobilization	May 8	20	May 30
Clearing and grubbing/stripping	June 2	17	June 20
Levee raising—Station 0+00 to Station 58+00	June 16	87	September 30
Levee degrading—Station 58+00 to Station 287+50	June 16	78	September 17
Cutoff wall installation—Station 58+00 to Station 287+50	June 30	88	October 15
Levee reconstruction and raising—Station 58+00 to Station 287+50	July 22	84	November 1

Source: Data provided by Wood Rodgers in 2007

Cutoff Wall Construction along the Natomas Cross Canal South Levee

Preparation for construction of the cutoff wall would begin with using scrapers (or other suitable equipment, depending on the slope) to clear and grub/strip the surface to a depth of 2 inches to remove low-growing vegetation, loose stone, and surface soils. This material would be hauled off-site. The top 4 inches of aggregate

base from the operating road also would be removed and stockpiled for later reuse. Waste material would be hauled to an off-site location.

As described in Section 2.3.2.1 above, construction of the cutoff wall would include degrading the existing levee to a depth equal to one-third its total height (approximately 6 feet). A 70-foot-deep cutoff wall would be constructed for a total length of 22,950 lineal feet (1.5 million square feet), with the method of installation at the contractor's discretion. Given anticipated schedule constraints, a three-heading, double-shift work schedule is anticipated. Material degraded to support cutoff wall construction would be compacted at the landside toe of the levee to support the levee raising operation described below under "Raising of the Natomas Cross Canal South Levee."

Approximately 42,000 cubic yards of imported material may be required to provide suitable material for the cutoff wall (estimated based on the assumption that 25% of excavated material would be unsuitable for this use). The unsuitable material would need to be disposed of off-site. Table 2-4 outlines the schedule and equipment anticipated for each phase of the work.

Table 2-4
Anticipated Equipment Types and Duration of Use for
Construction of the Natomas Cross Canal South Levee Cutoff Wall (2008 Construction)

Construction Phase	Equipment Types and Number of Each Type	Duration (days)
Clearing and grubbing/stripping	Elevating scrapers (3)	20
	Water truck (1)	20
	Front-end loader (1)	20
	Haul trucks (12)	20
Levee degrading (lags clearing and grubbing/stripping by 14 days)	Bulldozers (2)	50
	Scrapers (2)	50
	Loader (1)	50
	Water truck (1)	50
Cutoff wall construction (lags levee degrading by 14 days)	Long-reach hydraulic excavators (3)	80
	Front-end loaders (3)	80
	Extended-boom pallet loaders (2)	80
	300-kW generators (3)	80
	Slurry pumps (3)	80
	Pickup trucks (10)	80
	Haul trucks (3)	80
Compaction of degraded material to support levee raising (concurrent with levee degrading)	Bulldozer (1)	50
	Water truck (1)	50
	Sheepsfoot rollers (2)	50
Borrow site excavation (concurrent with cutoff wall construction)	Excavator (1)	80
	Water truck (1)	80
	Haul trucks (5)	80
Demobilization/cleanup (follows cutoff wall construction)	Water trucks (2)	14
	Hydroseeding truck (1)	14
	Haul trucks (2)	14

Source: Data provided by Wood Rodgers in 2007

Detailed analyses would be needed to determine the appropriate design for the improvements to the NCC south levee at SR 99/70. Cutoff walls and relief wells are both being considered for this location, which presents significant constraints because of the proximity of the Howsley Road overcrossing and interchange to the land side of the levee. SAFCA's preferred seepage remediation method is to construct the cutoff wall continuously across the highway. This would require temporary and sequential closure of the northbound and southbound lanes as the wall is constructed (see "Traffic Control for Improvements to the Natomas Cross Canal South Levee" below).

The crew size for this phase of the project during its peak activity is estimated at 45–55 people working on three fronts (i.e., at three locations) during two 12-hour shifts, 6 days a week, Monday through Saturday. Equipment maintenance activities would be conducted on Sundays and would require a minimal crew. Cutoff wall construction is expected to require 24-hour-per-day construction.

The information in Table 2-4 includes stripping of the levee to support both cutoff wall construction and levee raising operations, which would generate approximately 13,500 cubic yards of material for off-site disposal. During the cutoff wall construction phase, the top 4 inches of the existing operating road surfacing (5,000 cubic yards) would be salvaged for installation after levee raising is completed. To complete this operation, an additional 2,500 cubic yards of gravel surfacing would be imported.

Raising of the Natomas Cross Canal South Levee

To obtain a minimum of 3 feet of freeboard above the "200-year" design water surface, the levee would be raised approximately 3 feet using imported material meeting USACE requirements for levee fill. To avoid impacts on the water side of the levee, the raising between Station 0+00 and Station 58+00 would begin on the existing waterside top of slope and extend landward of the existing levee approximately 30 feet. Levee raising between Station 58+00 and Station 215+00 would begin at the waterside slope at the point of levee degrade and build on the compacted levee degrade material at the landside toe. These landside levee raises are depicted in Exhibit 2-20.

Throughout Reaches 6 and 7, Sutter County infrastructure (Howsley Road and related features) and private residences are close to the NCC south levee. A portion of Howsley Road, the Morrison Canal, a roadway drainage pump station, and three residences and outbuildings would need to be relocated to accommodate the landward levee raise in Reaches 6 and 7. If hydraulic modeling shows that channel hydraulics would not be affected by a waterward raise, however, the levee would be raised waterward from approximately Station 215+00 to Station 251+00 (where Howsley Road parallels the south levee), encroaching on the NCC channel approximately 30 feet. See Exhibit 2-21 for a typical waterside levee raise.

Between Stations 251+00 and 281+00, the levee would be raised on the land side, similar to Stations 0+00 through 215+00. As the levee approaches the residence and outbuildings west of Reach 7, between Stations 281+00 and 287+00, the levee would also be raised landward; however, to minimize the landside encroachment, the waterside toe of the raised levee would be shifted waterward, beginning at the ordinary high-water mark (elevation 34.6 feet). Smooth transition distances of up to 200–500 feet would link the waterward and landward raises. If hydraulic modeling indicates that unacceptable hydraulic impacts would not result from the waterside levee raising, only two structures in Reach 7 (a residence and a semimobile trailer) would require removal or relocation.

In some locations where the levee would be raised on the land side, the existing waterside slope is currently steeper than 3H:1V. In these locations, the levee would be shifted farther landward and the waterside slope would be trimmed to a 3H:1V slope. An exception to this practice would be at locations where dense vegetation is located at the waterside toe (primarily between Station 0+00 and Station 45+00). At these locations, a waterside bench would be cut at elevation 31 or 34 feet, where the slope would transition from the existing slope to the new 3H:1V slope. Below the level of the bench, the existing slope line would be retained so that vegetation removal would be avoided; above this bench, the oversteepened slope would be trimmed back to the 3H:1V slope line.

Elevation 31 feet was selected for consistency of elevation in much of the affected levee length, with a transition to elevation 34 feet in a few locations where the vegetation is denser at a higher elevation. This cut would produce approximately 25,000 cubic yards of material, which would be used as supplemental fill for levee raising. The new landside slope also would be 3H:1V. Where the levee would be raised on the water side, all vegetation on the water side would be removed to facilitate placement of the new material to a 3H:1V slope. An 18-inch-thick riprap blanket would be placed from an elevation of 3 feet (approximately the mean summer water elevation) to the channel invert to protect the new levee embankment toe from wave erosion. The landside slope also would be stripped and the slope would be flattened to 3H:1V. Existing stability berms would be incorporated into the landside slope flattening. A minimum 20-foot-wide area along the landside toe would be raised a minimum of 1 foot above adjacent field level for maintenance access.

Approximately 400,000 cubic yards of imported soil borrow material would be required for the levee raising. Hauling of material from the borrow site is anticipated to occur during a single 10-hour shift each day.

Table 2-5 lists the equipment and number of days it would be used for the major construction activities associated with levee raising.

Table 2-5
Anticipated Equipment Types and Duration of Use for Raising the Natomas Cross Canal South Levee (2008 Construction)

Construction Phase	Equipment Types and Number of Each Type	Duration (days)
Levee raising	Dozer (1)	85
	Water trucks (2)	85
	Sheepsfoot compactors (4)	85
	Water truck (1)	85
Borrow site excavation (concurrent with levee raising)	Excavators (5)	85
	Dozer with Ripper (1)	85
	Water truck (1)	85
	Haul trucks (30)	85
Finish grading (follows levee raising)	Motor graders (2)	10
	Water trucks (2)	10
Operating road construction (follows finish grading)	Haul trucks (5)	10
	Smooth drum rollers (2)	10
	Motor graders (2)	5

Source: Data provided by Wood Rodgers in 2007

The crew size for this phase of the project during its peak is estimated at 55–65 people working 12-hour shifts, 6 days a week, Monday through Saturday. Again, it is anticipated that equipment maintenance activities would be conducted on Sundays and would require a minimal crew.

Removal of Structures for Improvements to the Natomas Cross Canal South Levee

As noted above under "Raising of the Natomas Cross Canal South Levee," relocation of Howsley Road, the Morrison Canal, a roadway drainage pump station, and three residences and outbuildings would be required by landward levee raises in Reaches 6 and 7. If hydraulic modeling indicates that unacceptable hydraulic impacts

would not result from waterside levee raising in Reaches 6 and 7, only two structures in Reach 7 (a residence and a semimobile trailer) would require relocation as a result of the proposed levee improvements.

Utility Modifications and Miscellaneous Work for Improvements to the Natomas Cross Canal South Levee

Pipelines penetrate the NCC south levee at the following four locations:

- Odysseus Farms (Bolen Ranch), 18-inch pump discharge line levee penetration;
- NMWC's waterside Bennett Pumping Plant, one 42-inch and one 36-inch penetration;
- NMWC's Northern Pumping Plant, three 30-inch and two 42-inch penetrations; and
- RD 1000's landside Pumping Plant No. 4, three 48-inch penetrations.

None of these penetrations comply with current USACE regulations; therefore, they would be raised to have their inverts above the "200-year" water surface elevation and would be equipped with waterside shutoff valves. If pipes are corroded, they may have to be replaced down the waterside slope of the levee.

As part of raising the pump station discharge pipelines that cross the NCC south levee, canals south of the levee would need to be relocated farther from the levee toe in the following locations: the RD 1000 Vestal Drain and NMWC Bennett Canal between Station 55+50 and Station 61+50 and the NMWC North Main Canal between Station 120+00 and Station 123+50 and between Station 216+00 and 218+00. The ditch segments would be moved about 100 feet farther away from the levee toe. Some of this work may be accomplished by NMWC as part of its Sankey Diversion Fish Screen Project, but the timing of this NMWC project is uncertain. If the work is not accomplished by NMWC, SAFCA would conduct the canal relocations at the time the pipelines are raised.

Between Station 0+00 and Station 19+00 of the NCC south levee, SAFCA intends to obtain a landside levee maintenance access area to match the 80- to 100-foot maintenance access area already established for the levee. This area is currently in active rice fields. Once the maintenance access area is established, this area would be filled to be above the agricultural field grade to prevent encroachment by farming operations into the maintenance access area and to provide an operating road at the levee toe.

Between Station 99+00 and Station 124+00, a low-lying area between the levee landside toe and an operating road for the Lucich North Habitat Preserve would be filled to raise the grade of the operating road at the landside toe.

In 1996, as part of SAFCA's NCC and PGCC Levee Project, 200 feet of floodwall was installed to raise the NCC levee around the SR 99/70 NCC bridges. The top of wall for this floodwall is at elevation 44.80 feet (National Geodetic Vertical Datum [NGVD] 29). To conform to current levee criteria, the floodwall would need to be raised to elevation 49.3 feet. This raising would require approximately 150 cubic yards of concrete.

Total Borrow and Hauling for Improvements to the Natomas Cross Canal South Levee

Combining the supplemental soil volumes given above for cutoff wall construction and levee raising, the total in-place borrow quantity is 485,000 cubic yards. Adding a 20% swell factor for haul, the total hauling is 580,000 cubic yards. The truck counts for hauling this material are included in Tables 2-4 and 2-5 above.

The RD 1001 borrow site described in Section 2.2.2 would be permitted and used for the NCC levee improvements. The potential haul routes from the RD 1001 site are shown in Exhibit 2-22.

Construction Staging Areas for Improvements to the Natomas Cross Canal South Levee

Construction staging would take place in areas adjacent to the NCC south levee, within the maintenance access areas between Stations 0+00 and 56+00, 61+00 and 96+50, 99+00 and 216+00, and 251+00 and 281+00.

Cutoff wall construction would require temporary establishment of three on-site slurry batch plants that would occupy about 1–2 acres each. Each batch plant site would likely contain tanks for water storage, a pug mill mixer, bulk bag supplies of bentonite, bentonite and cement storage silos, cyclone mixers, pumps, and generators. The sites would also include slurry tanks to store the blended slurries temporarily until they are pumped to the work sites. Slurry constituents would be mixed with water at the batch plant and the mixture would be pumped from the tanks through pipes to the cutoff wall construction work sites.

Traffic Control for Improvements to the Natomas Cross Canal South Levee

At SR 99/70, it is anticipated that the cutoff wall would be constructed by the DSM method. SR 99/70 is a major thoroughfare with high traffic volumes. The highway consists of two lanes in each direction separated by a 45-foot median. Coordination with the California Department of Transportation would be required so that portions of the highway could be shut down to allow for the installation of the cutoff wall. Traffic control could be accomplished by constructing a temporary median detour for either the northbound or southbound traffic, which would run all lanes into a single lane in each direction on one side of the separated highway. This detour would occur in two stages and would alternate northbound and southbound directions in each stage. Alternatively, the existing shoulders could be used to restrict traffic flow to a single lane in one direction and provide enough separation between traffic and the work to avoid detouring traffic across the median. This would require investigations into the condition of the existing structural sections of mainline and shoulder pavement for staged construction of traffic. A third alternative is to use the existing at-grade intersections of Catlett Road and SR 99/70, and Sankey Road and SR 99/70 to reroute traffic to either northbound or southbound lanes of SR 99/70. The appropriate detour configuration would be finalized as part of the project design.

Postconstruction Site Condition

After construction, the levee slopes and any previously vegetated areas disturbed during construction would be seeded with a grass mix that meets DFG criteria. To the extent that they do not interfere with flood control inspection and operations, maintenance practices for the grassland cover of the levee slopes would be conducted to promote the value of these areas as foraging habitat for Swainson's hawk, as described in Section 2.3.4.3 below.

2.3.2.3 Sacramento River East Levee Reaches 1–4B (2008 Construction)

General Construction Plan for Improvements to Sacramento River East Levee Reaches 1–4B

The 2008 construction plan for the Sacramento River east levee would include improvements from the northern end of Reach 1 at the NCC south levee through a portion of Reach 4B (approximately Station 0+00 to Station 214+00). The beginning of a woodland tree grove at Station 214+00 serves as the lower limit of the 2008 work.

As discussed above (see Section 2.1.1.2, "Levee Encroachments and the Adjacent Setback Levee Concept," and Section 2.3.2.1, "General Methods"), an adjacent setback levee is proposed in lieu of modifying the existing Sacramento River east levee, which has substantial structural and vegetation encroachments along its water side. The adjacent levee raise would involve the construction of a new embankment adjacent to the existing levee. A minimum 5-foot-wide shoulder would extend from the landside edge of the crown of the existing levee to the water side of the new adjacent setback levee embankment. A 3H:1V slope would extend up to the crown of the adjacent setback levee. The crown would be at least 20 feet wide and would be topped with an aggregate base access road for inspection and maintenance. The adjacent setback levee would have a 3H:1V landside slope. It would be constructed of compacted random fill material from borrow sources and from the excavation of the existing landside stability berm. Exhibit 2-12 (top illustration) shows these dimensions in cross section.

In Reach 1, where no seepage berm is proposed, the maintenance corridor on the land side of the levee would be elevated and sloped to ensure access for inspection and maintenance of the levee when the adjacent fields are

irrigated or the adjacent land is saturated from rainfall. In the other reaches, where seepage berms are proposed, the berms would provide an elevated corridor above the nearby agricultural fields.

Table 2-6 summarizes the proposed improvements by reach. Exhibit 2-23 shows the project features in these reaches in plan view, including the extent of the adjacent setback levee, berms, and permanent right-of-way/maintenance access; also shown are the areas around existing roadway intersections that would need to be raised and potential woodland planting locations.

Table 2-6
Proposed Improvements to the Sacramento River East Levee in Reaches 1–4B (with Adjacent Setback Levee) (2008 Construction)

Reach	Beginning Station	Ending Station	Length (feet)	Average Raise Height (feet)	Underseepage Remediation
1	00+00	48+00	4,800	2.36	None
2	48+00	100+00	5,200	2.32	100-foot seepage berm
3	100+00	110+00	1,000	2.43	100-foot seepage berm
4A	110+00	208+00	9,800	2.30	100-foot seepage berm
4B	208+00	214+00	600	2.35	300-foot seepage berm

Source: Data provided by HDR in 2007

For 2008 construction of improvements to the Sacramento River east levee, it is assumed that a main construction staging area would be located on approximately 1 acre near Riego Road. The area would be fenced and would be used for the contractor's and engineer's construction trailers, parking for personnel, machine maintenance tool and parts, possibly water trucks, and the storage of fuels and other materials to be used for construction. The project right-of-way along the construction area also would be used for staging of construction materials and equipment.

The levee improvements are anticipated to be constructed between May 1, 2008, and November 1, 2008. Some related activities, such as utility relocations and removal or relocations of residential or agricultural structures, may be conducted before May 1, and site restoration and demobilization would extend through November.

Personnel, equipment, and imported materials would reach the project site via SR 99, Sankey Road, Riego Road, and Elverta Road. The primary corridors where construction activity would take place are the adjacent levee alignment and existing dirt roads used for access to the work areas; soil borrow areas; and paved roads, including Powerline, Sankey, and Riego Roads.

Construction Sequence for Improvements to Sacramento River East Levee Reaches 1–4B

Table 2-7 provides a summary of the major construction activities, their potential schedule and durations, and the anticipated work shifts needed to complete them. The duration of each sequence is given in actual construction days. The construction sequence can be divided into four different headings in order to avoid 24-hour construction days. The activities are described in the following subsections. The actual construction sequence would be determined by the construction contractor and may vary from the sequence described below. The crew size during its peak is estimated at 60 people per shift working 12-hour shifts. The total number of required shifts can be found in Table 2-7.

Table 2-7
Overview of Construction Sequence for Proposed Improvements to the Sacramento River East Levee in Reaches 1–4B (2008 Construction)

Construction Activity	Estimated Start Date (2008)	Estimated End Date (2008)	Estimated Duration (days)	Number of Headings	Anticipated Number of 12-Hour Shifts
Power pole relocation		Before May 1	–	–	–
Mobilization	May 1	June 1	27	1	1
Site preparation (tree removal, clearing, grubbing, stripping)	June 1	July 1	25	2	50
Relocation of canal and removal of landside structures and other facilities	May 1	May 28	24	2	48
Excavation of stability berm and inspection trench	July 1	July 15	14	4	48
Construction of adjacent levee raise and seepage berms	July 15	October 16	80	4	320
Reconstruction of Garden Highway at intersections	September 1	October 1	27	2	54
Installation of surface drainage outlets across Garden Highway	September 1	October 1	27	2	54
Site restoration and demobilization	November 1	November 30	26	2	52

Source: Data provided by HDR in 2007

Power Pole Relocation

Power poles that currently exist on the landside slope of the levee and at the levee toe would need to be relocated and/or rerouted to accommodate the widened levee footprint. Poles could be relocated to the water side of the existing levee embankment (on the opposite side of the Garden Highway) or placed on special footings within the levee and berm slopes. Tree pruning would likely be required in some locations to accommodate the power poles and wires. The relocations would be conducted by the utility companies in coordination with the construction operations.

Construction Mobilization

Mobilization would include setting up construction offices and transporting heavy earthmoving equipment to the work site, and may also include borrow site preparation. One or more construction staging areas would be established temporarily on the land side of the levee within the project right-of-way at locations determined by the contractor based on contractor preference and environmental and land use constraints.

Site Preparation (Tree Removal, Clearing, Grubbing, and Stripping)

Site preparation would entail removing trees and other large vegetation from the construction area and stripping the top 6 inches of material from the landside slope of the existing levee, the footprint of the adjacent setback levee, the seepage berm areas, and the 50-foot-wide permanent maintenance access corridor. Large roots and deleterious material would then be grubbed from the working area. To the extent feasible, trees that must be removed from within the footprint of the adjacent setback levee or berms would be relocated outside of the footprint to new woodland planting areas, where a substantial number of new trees would also be planted (see

Section 2.3.4.3). Excess earth materials (organic soils, roots, and grass from borrow areas and the adjacent levee foundation and excavated material that does not meet levee embankment criteria) would be used in the reclamation of borrow areas or hauled off-site to landfills. Cleared vegetation (i.e., trees, brush) would be hauled off-site to landfills.

Relocation of Irrigation Ditch

A private irrigation ditch is situated along the top of an existing berm in Reach 1 within the proposed footprint of the adjacent setback levee. Before filling of the existing ditch, a new ditch would be constructed in Reach 1 to serve irrigation needs for agricultural uses of the land along this reach. The new ditch would be constructed from Station 0+00 to Station 25+00 and would be elevated, similar to the existing canal, to allow for gravity flow southward from the NCC. The relocated ditch would cross under Sankey Road through a culvert and meet the existing canal lateral at Station 25+00. The existing ditch would be drained and any unsuitable material from the ditch bottom would be excavated and hauled off-site.

Removal of Landside Structures and Other Facilities

Residences and other farm structures that are within the proposed footprint of the adjacent setback levee embankment, berms, and maintenance areas at Station 35+00 in Reach 1 (house, barn, and shed) and Station 63+00 in Reach 2 (two houses, garage, sheds, barns) would have to be removed or relocated farther from the flood control facilities before the start of levee construction. Irrigation facility collection/distribution boxes, wells, and standpipes within the footprint of the flood control features would be demolished and replaced as needed. Debris from structure demolition, power poles, utility lines, piping, and other materials requiring disposal would be hauled off-site to a suitable landfill. Demolished concrete could be sent to a concrete recycling facility. Wells and septic systems would be abandoned in accordance with the applicable state and county requirements.

Excavation of Stability Berm and Inspection Trench

The existing stability berm along the levee would be excavated and the soil and drain rock would be stockpiled for use in the construction of the adjacent setback levee. The geotextile fabric from the drain layer would be discarded. A 3-foot-deep inspection trench would also be excavated along the foundation of the adjacent levee raise area after stripping has occurred. The purpose of this trench is to expose or intercept any undesirable underground features such as old drain tile, water or sewer lines, other debris, animal burrows, buried logs, or pockets of unsuitable material (e.g., sand lenses). After inspection, the trench would backfilled and compacted as part of the embankment construction.

Construction of Adjacent Levee Raise and Seepage Berms

At the borrow sites, dozers would excavate the borrow material and push it into stockpiles. Front-end loaders would load haul trucks with the material for transport to the levee construction sites. At the levee construction sites, the haul trucks would dump the borrow material and motor graders would spread it evenly. Sheepsfoot rollers would be used to compact the material as water trucks ensure proper moisture control. The same sequence would be used for construction of the hybrid seepage berms. An aggregate base access road would be constructed on the crown of the new levee.

Reconstruction of Garden Highway at Intersections

The Garden Highway intersections at Sankey and Riego Roads would require reconstruction to accommodate the raised adjacent setback levee. It is anticipated that the Garden Highway would be extended up and onto the widened adjacent levee at these locations to meet with the secondary roads. Approach embankments at the intersections would be enlarged and the entire intersections would be repaved. Intersecting roads would be raised at a slope of 15H:1V, extending the approach embankment approximately 350 feet outward from the levee. The

side slopes of the raised embankments would be at a 3H:1V slope. Traffic control and detours would be required during this phase of construction. Examples of traffic control measures to be considered include:

- use of flaggers to maintain alternating one-way traffic while work is proceeding on one-half of the intersection,
- use of advance construction signs and other public notices to alert drivers of activity in the area, and
- use of "positive guidance" detour signing on alternate access roads to minimize inconvenience to the driving public.

If detours are required for through traffic, local traffic would be allowed, subject to minor delays during critical operations.

Installation of Surface Drainage Outlets across Garden Highway

Between the adjacent setback levee and the Garden Highway pavement, a new storm drain system would be constructed to convey surface water beneath Garden Highway and toward the Sacramento River. A surface collection system (drainage swale) would convey runoff water to drop inlets located approximately 200–500 feet apart, and new pipe laterals would convey the water beneath Garden Highway to the waterside slope (Exhibit 2-24). Excavation of a trench across Garden Highway would be required, and those segments where excavation occurs would have to be reconstructed. Single-lane traffic controls and through-traffic detours, as described under "Reconstruction of Garden Highway at Intersections," would be required during this phase of construction.

Site Restoration and Demobilization

Upon completion of construction activities, the levee slopes and the tops of the seepage berms would be hydroseeded. Any construction debris would be hauled to an appropriate waste facility. Equipment and materials would be removed from the site, and staging areas and any temporary access roads would be restored to preproject conditions. Demobilization would likely occur in various locations as construction proceeds along the project alignment.

Borrow Quantities and Material Hauling for Improvements to Sacramento River East Levee Reaches 1–4B

Most of the fill needed for construction would be random fill for the construction of the levee raise and the top layer of the hybrid seepage berm. Drain rock and soil material excavated from the existing stability berm and inspection trench would also be used for construction. Table 2-8 shows the quantity of each fill item needed and the expected source. The random fill quantity includes a 25% shrinkage factor to account for volume loss during placement. Table 2-8 also summarizes the number of haul trips per day and the number of 12-hour work days necessary to complete the movement and placement of fill. Assuming a 6-day-per-week work schedule, this equates to a 93-day construction window. If this window is increased, the number of truck trips per day would decrease. Haul trips for each material type were calculated conservatively estimating 15 cubic yards of material per truck. Note that for some material it may be possible to use a scrape-and-place method that would eliminate the need for haul trucks. The possibility of using scrapers would be investigated further during design.

Potential haul routes from the borrow sources to the Sacramento River east levee work area for 2008 are shown in Exhibit 2-25. The borrow areas for 2008 construction would be converted to managed marsh habitat and potentially upland habitat, as described in Section 2.3.4.3.

Table 2-8
Quantities of Fill and Haul Trips Required for Proposed Improvements to the Sacramento River East Levee in Reaches 1–4B (2008 Construction)

Material Type	Quantity (cubic yards)	Haul Trips per Day [1]	Source (Average Round-Trip Haul Distance)
Random Fill	1,161,000	980	Vestal/Spangler—preferred major source (3 miles)
			Brookfield property—alternative major source (13 miles)
			Airport north properties—alternative major source (3 miles)
			Bolen South/Nestor—preferred additional source (3 miles)
Reusable Fill	146,000	130	Levee degrade (0.1 mile)
Drain Rock	207,000	180	Commercial source (30 miles)
Aggregate Base	8,100	10	Commercial source (30 miles)
Total	1,522,100	1,300	

Note:
[1] Conservatively assumes truck capacity of 15 cubic yards, 108-day construction window, and use of haul trucks for all material.
Source: Data provided by HDR in 2007

Construction Equipment for Improvements to Sacramento River East Levee Reaches 1–4B

Table 2-9 summarizes the types of equipment that may be used throughout the construction sequence, along with an approximation of the duration of each activity.

Table 2-9
Anticipated Equipment Types and Duration of Use for Proposed Improvements to Sacramento River East Levee Reaches 1–4B (2008 Construction)

Construction Phase	Equipment Type and Number of Each Type	Work Days
Mobilization	–	27
Site preparation (tree removal, clearing, grubbing, stripping)	Scrapers (2) Front-end loaders (2) Crawler/tractors (tree pushers) (2) Water trucks (2) Motor graders (4) Haul trucks (8)	25 25 25 25 25 25
Relocation of canal and removal of landside structures and other facilities	Excavators (4) Haul trucks (4) Front-end loaders (2)	24 24 24
Excavation of stability berm and inspection trench	Excavators (4) Scrapers (4) Haul trucks (10)	13 13 13
Construction of adjacent levee raise and seepage berms (includes borrow site activities)	Scrapers (10) Excavators (4) Front-end loaders (4) Haul trucks (15 cu. yd.) (60) Bulldozers (4) Sheepsfoot compactors (6) Motor graders (6) Water trucks (5)	80 80 80 80 80 80 80 80

Table 2-9
Anticipated Equipment Types and Duration of Use for Proposed Improvements to Sacramento River East Levee Reaches 1–4B (2008 Construction)

Construction Phase	Equipment Type and Number of Each Type	Work Days
Reconstruction of Garden Highway at two intersections	Backhoes (2) Smooth drum compactors (2) Asphalt pavers (2) Haul trucks (8)	27 27 27 27
Installation of surface drainage outlets across Garden Highway	Backhoes (2) Concrete trucks (6) Roller compactors (2) Asphalt paver (1) Haul truck (1)	27 27 27 27 27
Site restoration and demobilization	Hydroseeding trucks (2) Water trucks (2) Haul trucks (2)	26 26 26

Note: cu. yd. = cubic yards
Source: Data provided by HDR in 2007

Postconstruction Site Condition

Following construction, the levee slopes, seepage berms, maintenance access right-of-way, and any previously vegetated areas disturbed during construction would be seeded with a grass mix that meets DFG criteria. To the extent that they do not interfere with flood control inspection and operations, maintenance practices for the areas of grassland cover within the footprint of the flood control facilities would be conducted to promote the value of these areas as foraging habitat for Swainson's hawk, as described in Section 2.3.4.3 below.

2.3.2.4 Sacramento River East Levee Reaches 4B–20A (2009–2010 Construction)

Program Level of Project Detail for Construction of Improvements to Sacramento River East Levee Reaches 4B–20A

As explained earlier in this EIR in Section 1.3.2, "Combined Program and Project EIR," and Section 2.3.1, "Overview of the Proposed Project Elements," the elements of the project that are proposed for construction in 2009–2010 are described and evaluated in this EIR at a programmatic level. The documentation in this EIR will provide SAFCA with the environmental information needed to support its decision whether to support policy-level choices regarding the physical configuration of the 2009 and 2010 components. The 2009 and 2010 components would then be analyzed at a project level of detail in one or more additional CEQA documents. Accordingly, the design and construction of the improvements to the Sacramento River east levee proposed for 2009–2010 construction are described in less detail than the 2008 construction elements (improvements to the NCC south levee and Sacramento River east levee Reaches 1–4B) described above.

General Construction Plan for Improvements to Sacramento River East Levee Reaches 4B–20A

The 2009–2010 improvements to the Sacramento River east levee would extend from Reach 4B (below Station 214+00) through Reach 20A (Station 925+50) (Exhibit 2-26). It is anticipated that construction of improvements to the Sacramento River east levee would encompass Reaches 4B–6A and 9B–11B in 2009 and Reaches 6B–9A and 12–20A in 2010. The construction season is assumed to be May 1–November 1 in both 2009 and 2010.

Required Freeboard Increases and Proposed Underseepage Remediation for Sacramento River East Levee Reaches 4B–20A

Levee crown raises are required to provide adequate freeboard above the 100-year design water surface elevation in Reaches 4B–10 and above the "200-year" design water surface elevation in Reaches 11A and 11B. Downstream of Reach 11B (Powerline Road), there is adequate freeboard above the "200-year" design water surface elevation, and levee crown raises are not required. Substantial structural encroachments and large amounts of woody vegetation are present on the waterside slope of the existing levee, and the adjacent setback levee is proposed to extend through Reaches 4B–19A to avoid the need for extensive removal of the existing vegetation and encroachments on the waterside slope to meet USACE criteria. The existing levee in Reaches 19A–20B already has a wide crown, and extensive residential development is also located along the landside levee toe; therefore, construction of the adjacent setback levee is not proposed for these reaches. The adjacent setback levee would extend outward at least 11 feet from the landside edge of the existing levee crown and would have a 3H:1V landside slope. The upper illustration in Exhibit 2-12 shows the adjacent setback levee as it would be constructed in Reaches 4B–11B, with a crown elevation above that of the existing levee; the lower illustration shows the adjacent setback levee as it would be constructed in Reaches 12–19B, with a crown elevation the same as that of the existing levee.

Underseepage remediation is required in many of the reaches from 4B through 20A. Reach 20B has sufficient freeboard for the "200-year" water surface elevation, and a cutoff wall that meets current design criteria was constructed in 2000 by the USACE. Because this wall was constructed to an adequate depth, this reach does not need additional seepage remediation. Based on the results of geotechnical investigations, engineering and cost considerations, and land use constraints, a combination of seepage remediation measures is proposed for Reaches 4B–20A. In addition to seepage berms, as described for Reaches 1–4B, cutoff walls and relief wells are proposed for some reaches. The general plan for construction of the adjacent setback levee would be as described in Section 2.3.2.3 for Reaches 1–4B, with the addition of cutoff wall construction and relief well installation.

Table 2-10 shows the required levee crown raises and proposed underseepage remediation by reach. Exhibit 2-26 shows the anticipated footprint of the flood control facilities and the access and maintenance area. Although Table 2-10 and Exhibit 2-26 indicate 300-foot seepage berms for some reaches, the use of cutoff walls is being evaluated further for these areas.

Table 2-10
Proposed Improvements to the Sacramento River East Levee in Reaches 4B–20B (with Adjacent Setback Levee in Reaches 4B–19B) (2009–2010 Construction)

Reach	Beginning Station	Ending Station	Length (feet)	Average Raise Height (feet)	Underseepage Remediation[1] Required to Meet 100-Year Requirement[2]
4B	214+00	228+00	1,400	2.4	300-foot seepage berm with relief wells at tree groves
5A	228+00	263+00	3,500	1.5	100-foot seepage berm with relief wells at tree groves
5B	263+00	280+00	1,700	1.6	None[3]
6A	280+00	303+00	2,300	2.0	300-foot seepage berm
6B	303+00	330+00	2,700	2.0	95-foot-deep relief wells (50-foot right-of-way) Cutoff wall at pump station and reservoir
7	330+00	362+00	3,200	2.2	None
8	362+00	402+00	4,000	2.0	300-foot seepage berm with relief wells at tree groves
9A	402+00	407+00	500	1.4	None
9B	407+00	468+10	6,110	1.4	None

Table 2-10
Proposed Improvements to the Sacramento River East Levee in Reaches 4B–20B (with Adjacent Setback Levee in Reaches 4B–19B) (2009–2010 Construction)

Reach	Beginning Station	Ending Station	Length (feet)	Average Raise Height (feet)	Underseepage Remediation[1] Required to Meet 100-Year Requirement[2]
10	468+10	495+00	2,690	1.5	300-foot seepage berm with relief wells at tree groves Cutoff wall at pump station
11A	495+00	535+00	4,000	1.1	None[3]
11B	535+00	635+00	10,000	1.1	None[3]
12	635+00	667+00	3,200	0	None
13	667+00	700+00	3,300	0	30-foot-deep relief wells (50-foot right-of-way) Cutoff wall at pump station
14	700+00	732+00	3,200	0	None
15	732+00	780+00	4,800	0	100-foot seepage berm
16	780+00	832+00	5,200	0	None
17	832+00	842+00	1,000	0	100-foot seepage berm
18A	842+00	848+00	600	0	None
18B	848+00	857+00	900	0	None
19A	857+00	875+00	1,800	0	100-foot seepage berm
19B	875+00	925+00	5,000	0	None[3]
20A	925+00	925+50	50	0	Pump station cutoff wall and jet grouting
20B	925+50	960+00	3,450	0	Existing cutoff wall meets criteria

Notes:
[1] Additional analysis is under way regarding the use of cutoff walls in place of some 300-foot berms.
[2] Underseepage remediation is shown as a project component only for areas that do not meet criteria for the 100-year profile. Seepage remediation will be required in the future in additional reaches to meet the "200-year" profile. All remediation needed at this time, both raises and seepage improvements, will be designed for the "200-year" profile.
[3] Seepage remediation required for "200-year" profile.
Source: Data provided by HDR in 2007

Removal of Structures and Vegetation along Sacramento River East Levee Reaches 4B–20A

Removal of some residences, other structures, and woodland vegetation, including mature trees, would be required to create ample space for the adjacent setback levee, berms, and maintenance access corridor. It is anticipated that residences would be removed at Station 245+00 in Reach 5A, Station 368+00 in Reach 8, Station 436+50 in Reach 9A, and Station 468+00 in Reach 10 (see Exhibit 2-26).

Use of Relief Wells to Avoid Removal of Structures and Trees along Sacramento River East Levee Reaches 4B–20A

As described under "Underseepage Remediation with Relief Wells" in Section 2.3.2.1, the proposed project includes the strategic use of relief wells to avoid some structures and tree groves that would otherwise have to be removed for the construction of seepage berms. In an effort to decrease project costs and negative impacts on residents and the environment, seepage berms are proposed to be interrupted and relief wells used around existing homes and large tree groves where feasible. Drainage canals would be installed to collect well discharge water and transport it to existing pump stations or detention areas. Tables 2-11 and 2-12 list the locations of the

residences and woodland tree groves, respectively, that may be protected with relief wells. The locations of the indicated relief well arrays are shown in Exhibit 2-26.

Table 2-11
Potential Stationing of Relief Wells for Protection of Residences along Sacramento River East Levee Reaches 4B–20A (2009–2010 Construction)

Beginning Station	Ending Station	Length (feet)	Reach	Width of Seepage Berm (feet)
381+00	386+00	500	8	300
486+00	497+00	1100	10	300
535+00	540+00	500	11	100
665+00	670+00	500	13	300

Source: Data provided by HDR in 2007

Table 2-12
Potential Stationing of Relief Wells for Protection of Woodland Tree Groves along Sacramento River East Levee Reaches 4B–20A (2009–2010 Construction)

Beginning Station	Ending Station	Length (feet)	Reach	Width of Seepage Berm (feet)
214+00	218+50	450	4B	300
226+00	232+00	600	4B	300
300+00	303+00	300	6	300
399+00	401+00	200	8	300
485+00	498+00	1300	10	300
538+00	542+00	400	11	100
555+00	560+00	500	11	100
617+00	621+00	400	11	100
686+00	693+00	700	13	300

Source: Data provided by HDR in 2007

Relief wells would provide the necessary seepage remediation in the near term; however, they require routine maintenance and are expected to have a useful life of 20–30 years. After this period, it is expected that the relief wells, trees, and structures would be removed and the berms would be completed. The timing of removal of the relief wells and completion of the berms has not been determined, and this activity is not currently being planned or designed; it is described as a potentially foreseeable future action in Chapter 4, "Cumulative Impacts." (See Section 2.3.4.3, "Habitat Creation and Management," for a description of the planting and maintenance of trees to offset losses that would result from construction of the adjacent setback levee and berms and probable future losses upon removal of the relief wells.) Depending on right-of-way negotiations with the owners of the residential structures, the structures could be purchased and removed in the near term during the 2009 and 2010 construction.

Material Quantities and Borrow Sources for Improvements to Sacramento River East Levee Reaches 4B–20A

Table 2-13 shows the anticipated fill quantities for the adjacent setback levee and proposed seepage remediation measures.

Table 2-13
Material Quantities Anticipated for Proposed Improvements to the Sacramento River East Levee in Reaches 4B–20A (2009–2010 Construction)

Material Type	Quantity (cubic yards)	Haul Trips per Day
Random fill	2,663,000	Approx. 1,100
Reusable fill	170,150	10–150
Drain rock	352,000	120–190
Aggregate base	22,700	20
TOTAL	3,207,850	Approx. 1,300–1,400

Source: Data provided by HDR in 2007

Borrow material is anticipated to be obtained from Airport bufferlands north and south of the Airport Operations Area and from among parcels in the Fisherman's Lake area (see Exhibit 2-8). The borrow sites would be converted to managed marsh and managed grassland under public agency or TNBC ownership after the removal of borrow material (see Section 2.3.4.3).

Miscellaneous Construction Elements for Improvements to Sacramento River East Levee Reaches 4B–20A

Modifications of roadway intersections with Garden Highway, utility relocations, removal of pumps and wells, and private canal relocation would be similar to these activities as described for the improvements to Sacramento River east levee Reaches 1–4B.

Postconstruction Site Condition

As described for Reaches 1–4B, after construction, the levee slopes, seepage berms, maintenance access right-of-way, and any previously vegetated areas disturbed during construction would be seeded with a grass mix that meets DFG criteria. To the extent that they do not interfere with flood control inspection and operations, maintenance practices for the areas of grassland cover within the footprint of the flood control facilities would be conducted to promote the value of these areas as foraging habitat for Swainson's hawk, as described in Section 2.3.4.3 below.

Issues Requiring Further Planning for Improvements to Sacramento River East Levee Reaches 4B–20A

Several aspects of the 2009–2010 construction elements for Sacramento River east levee Reaches 4B–20A remain to be investigated further for development of a more specific project proposal, which would be evaluated in one or more future CEQA documents. These include seepage remediation methods for reaches indicated as requiring 300-foot seepage berms, greater definition of the locations of seepage well arrays, identification of specific borrow sites for 2010 construction, and requirements for encroachment removal.

2.3.2.5 PLEASANT GROVE CREEK CANAL WEST LEVEE (2009–2010 CONSTRUCTION)

The PGCC west levee is vulnerable to seepage and stability concerns and does not have the requisite 3 feet of freeboard over the "200-year" flood elevation. The proposed project includes improvements to 17,400 feet of the PGCC west levee, beginning at the east end of the NCC improvements at Howsley Road and extending southerly to Sankey Road. Construction is anticipated to proceed in 2010 on this component of the NLIP. Details of the proposed improvements will be developed based on additional geotechnical studies and cost analysis, and the improvements will be evaluated further in one or more future CEQA documents. The improvements are expected to consist of the following:

- an average levee raise of 1 foot,
- widening of the levee to provide a minimum top width of 26 feet to accommodate safe lane widths for Natomas Road,
- flattening the water side of the levee to a 3H:1V slope,
- reconstructing the landside levee slope with new, select material to create a 3H:1V slope (the existing slope ranges from 2:1 to 2.5:1), and
- constructing a 100-foot-wide seepage/stability berm.

An irrigation canal at the landside toe of the existing levee would need to be relocated to the west to accommodate the berm construction. Several structures associated with the industrial facility near the southern end of the PGCC would need to be relocated.

The anticipated borrow source for soil material is the RD 1001 site northeast of the Natomas Basin (Exhibit 2-8). Construction of the PGCC west levee improvements would require approximately 85,000 cubic yards of select borrow material, 330,000 cubic yards of random fill, and 42,000 cubic yards of drain rock. Approximately 25 acres of the 120-acre RD 1001 borrow site would be used to provide the required earthen material.

The postproject site condition (grass-covered levee slopes and berms) and long-term maintenance practices would be as described in Section 2.3.4.3 below.

2.3.3 MAJOR IRRIGATION AND DRAINAGE INFRASTRUCTURE

2.3.3.1 OVERVIEW OF MAJOR DRAINAGE AND INFRASTRUCTURE MODIFICATIONS

There are two major canal systems in the Natomas Basin: an irrigation system owned and operated by NMWC and a drainage system owned and operated by RD 1000. NMWC pumps water into the basin to provide irrigation water to its shareholders for agriculture use within the basin. During winter (October through April), drainage is primarily rainfall runoff; during summer (May through September), drainage water from agricultural fields is typically recirculated for irrigation. Because the basin is surrounded by levees, all excess drainage within the basin must be pumped out. In general, water is pumped into the basin from the Sacramento River and NCC as irrigation water and returned to the river via RD 1000's drainage system. In the southern part of the Natomas Basin, the City of Sacramento also operates several drainage pump stations that serve residential areas.

As a result of the planned levee improvements in the Natomas Basin, the irrigation canals currently at the toe of the Sacramento River east levee (the Elkhorn Canal and the Riverside Canal) would be replaced with new irrigation canals set back from the existing levee farther to the east. The existing and proposed irrigation canals are highline canals, which means that the bottom of the canal is roughly equal to the surrounding ground elevation. Irrigation canals would be constructed high enough to raise water levels above the levels of the adjacent

fields to allow for gravity flow into the fields. The proposed GGS/Drainage Canal would be constructed with the top of bank roughly at existing ground level to facilitate drainage. Material excavated to construct the GGS/Drainage Canal would generally be used to construct the embankments of the adjacent highline irrigation canals. Some import of soil materials and export of materials to levee construction would be required to accommodate the phasing of the activities.

To avoid interruptions in service along the existing irrigation canals, the relocated canals would be constructed and operational before construction of planned levee improvements that would conflict with the existing irrigation canals. Thus, in any particular reach, the new canal would be constructed before the levee improvements in that same reach. In preparation for the levee improvements planned for construction in 2009 (Reaches 4B–6A), approximately half of the new Elkhorn Canal (North Drainage Canal to Elkhorn Reservoir) is planned for construction in 2008 so that it can be in operation before the levee improvements in those reaches are constructed. In 2009, the remainder of the Elkhorn Canal and the Riverside Canal relocations would be constructed. Therefore, the entire irrigation system could be watered and operational before the old canals are abandoned and filled as part of the 2010 levee improvements (Reaches 6B–9A and 12–20A). The GGS/Drainage Canal from the North Drainage Canal to Elkhorn Reservoir also would be constructed in 2008 because this section would run parallel to and within the same right-of-way as the proposed Elkhorn Canal in this area. Concurrent construction of these new irrigation and drainage facilities would facilitate the use of excavated material from the GGS/Drainage Canal excavation for use as embankment material along the Elkhorn Canal.

To take advantage of the common construction practices and to maximize the use of common facilities, the rearrangement of irrigation and drainage facilities required to provide for rerouting of flows that contribute to the Airport West Ditch would be undertaken in conjunction with these proposed NLIP improvements in 2009. This work would include modifications and extension of existing irrigation infrastructure and modification of some local drainage conveyance facilities.

Finally, the proposed project would include the removal of a deep culvert beneath the levee section at the RD 1000 Pumping Plant No. 2 location and the replacement of a relocated RD 1000 Pumping Plant No. 2, which was removed from the western end of the North Drainage Canal in response to underseepage observed during extended winter storms in January 2006.

Exhibit 2-27 shows the locations of the major irrigation and drainage improvements described in this section.

2.3.3.2 RELOCATION OF THE ELKHORN AND RIVERSIDE CANALS (2008 AND 2009 CONSTRUCTION)

General Construction Plan for Relocated Canals

The Elkhorn and Riverside irrigation canals would be constructed with sufficient height to raise water levels above the levels of adjacent fields. Design water levels would be based on existing levels at service points along the alignment and the tops of embankments would provide for 1 foot of freeboard. To provide for stable banks, side slopes of 3H:1V would be used. The invert of canals would be lined with concrete to control vegetation and to allow for maintenance with minimal disturbance of aquatic habitat along the water's edge.

Elkhorn Canal

Approximately 22,300 feet of the Elkhorn Canal would be relocated to accommodate the levee construction. This facility is a main irrigation canal that services NMWC's Central and Elkhorn systems from their Prichard and Elkhorn Pumping Plants on the Sacramento River. Located at the north end of the canal, the Prichard Pumping Plant has a design capacity of approximately 150 cubic feet per second (cfs). The Elkhorn Pumping Plant, located near the center of the Elkhorn Canal at Reservoir Road, has a design capacity of approximately 60 cfs. Approximately 100 field services, roadway crossings, and diversion boxes are located along the canal. The

services, roadway crossings, and diversion boxes would need to be replaced as part of the proposed project. Approximately 1 mile of the existing Elkhorn Canal is concrete lined; the remainder is earth lined.

The main irrigation canals feed a number of lateral irrigation canals and service gates for individual fields (irrigation turnouts). The canal cross section is based on maintaining water levels at each of these service points. Based on required water levels and using 1 foot of freeboard, the top of the embankment can be set. The cross-sectional area of the canal is based on the conveyance capacity required to maintain the downstream water service elevations at each service point with the allowable head provided at the pumping plants during peak flow operation. Generally, canals are operated with very flat slopes because of limited available elevation fall between the pumping plants and the service points. The canals also must have sufficient level-control structures (check structures) to maintain water levels at service points when flows are at a minimum.

The proposed alignment of the new Elkhorn Canal is based primarily on the extent of the planned levee improvements. The canal was sited as close as possible to the projected toe of the new levee (with allowance made for a future 5H:1V landside levee slope). After this initial alignment was determined, a number of site-specific factors were considered and used to refine the alignment. The final alignment minimizes conflicts with known cultural resources sites and existing trees. Based on these site-specific factors and the variations in the proposed seepage remediation methods in different reaches, the alignment is only roughly parallel to the projected levee toe.

North of Elkhorn Reservoir, the maximum bottom width of the new canal would be 20 feet. The top-of-canal embankment (approximately elevation 32+/- North American Vertical Datum 1988) would be 15 feet wide on the field side of the canal to provide a patrol road for operation and 15 feet wide on the levee side for maintenance. A right-of-way width of approximately 150 feet would be required for the canal construction north of Elkhorn Reservoir. Exhibit 2-28 shows the canal cross section through this reach.

The alignment of the Elkhorn Canal through Teal Bend Golf Club is under study. One proposed alignment is through the golf course along Walnut Road. An alternative alignment would be along the levee toe landward of the flood control facility corridor, approximately 220 feet from the existing centerline of Garden Highway based on the proposed levee improvements (Exhibit 2-27). This alignment would infringe on the existing golf course greens and fairways of at least three holes located along Garden Highway. To minimize the impacts on the existing golf course, a buried pipeline could be utilized in place of constructing a new open canal. For maintenance purposes, it is assumed that parallel pipelines would be required so that flow could be maintained in one pipeline while the other is being cleaned.

South of Elkhorn Reservoir, the proposed bottom width of the canal would likely be narrower, and final design would be based on required capacity.

Riverside Canal

Approximately 18,600 feet of the Riverside Canal would be relocated to accommodate the levee construction. This facility is a main irrigation canal that services NMWC's Riverside system. The supply for this canal is the Riverside Pumping Plant, a 45-cfs pumping plant on the Sacramento River just north of Radio Road. The canal flows south along the toe of the levee to approximately Bryte Bend Road. The canal south of Bryte Bend Road is abandoned. The canal north of the Riverside Pumping Plant is supplied by relifted water at RD 1000's Pumping Plant No. 3, which is equipped with a 20-cfs lift pump for NMWC. From Plant 3, the canal flows north approximately 950 feet and turns away from the levee. Approximately 80 field services, roadway crossings, and diversion boxes are located along the canal. The turnouts, roadway crossings, and diversion boxes would need to be replaced as part of this project.

Like the Elkhorn Canal alignment, the alignment of the Riverside Canal would be based primarily on the extent of the planned levee improvements. The canal would be sited as close as possible to the projected toe of the new levee (allowing for a future 5H:1V landside levee slope). After this initial alignment is determined, a number of

other factors would be considered and used to refine the alignment. One-half to 3/4 mile south of San Juan Road southward to I-80, there are a number of residences along the landside toe of the levee. To avoid bisecting these private properties, it is likely that the Riverside Canal alignment would follow the eastern property line of these parcels. The final alignment would also aim to minimize conflicts with existing trees and any other site-specific constraints that are identified during design. Based on these site-specific factors and the variation of the proposed seepage remediation methods in different reaches, the alignment would be only roughly parallel to the projected levee toe.

The proposed bottom width of the relocated Riverside Canal would be determined during final design to meet existing capacity needs.

2008 Elkhorn Canal Construction

The 2008 construction plan would include the new Elkhorn Canal from the North Drainage Canal to Elkhorn Reservoir, between Reach 4B and Reach 6B (Exhibit 2-29). On the north end, the new canal would be connected with the existing Prichard Pumping Plant outfall and an outlet to the North Drainage Canal would be constructed. An outfall to provide for connection to RD 1000 Pumping Plant No. 2, during its 2009 construction, would be incorporated into the 2008 canal construction to eliminate the need for future canal disturbance. The discharge pipes from the Prichard Pumping Plant would be extended to the relocated canal. The outlet to the North Drainage Canal would be combined with the GGS/Drainage Canal outfall with a gated control structure in the irrigation canal and a piped outlet to the North Drainage Canal.

At the southern end, the new Elkhorn Canal would connect into a concrete-lined sediment basin with an area of approximately 50,000 square feet. The proposed sediment basin would be connected to Elkhorn Reservoir with a temporary pipe and outfall structure. During the 2009 construction season (see below), Elkhorn Reservoir would be dewatered and piping from the Elkhorn Pumping Plant would be extended to the new sediment basin, at which time Elkhorn Reservoir would be abandoned and filled.

The materials to construct the new Elkhorn Canal would come primarily from the construction of the new RD 1000 GGS/Drainage Canal. The import of some additional fill material would be required to complete construction of the canal embankment. After the completion of construction, the new Elkhorn Canal would be put into service and the existing Elkhorn Canal would be dewatered and allowed to dry up.

The 2008 work would begin in May 2008 and continue over a 6-month period through October 2008. The anticipated construction labor force would consist of 15–20 people working 8- to 10-hour shifts, 5 days per week. A smaller crew would perform maintenance activities on Saturdays. The major construction stages are described below.

Because the 2008 portion of the Elkhorn Canal and the GGS/Drainage Canal would be constructed parallel within the same right-of way, they would be constructed concurrently. This approach would facilitate the use of material from the GGS/Drainage Canal excavation for use as embankment material along the Elkhorn Canal. Table 2-14 shows the overview of the construction schedule.

Table 2-14
2008 Construction Season Schedule for the Relocated Elkhorn Canal and the New GGS/Drainage Canal

Construction Phase	May	June	July	August	September	October
Mobilization						
Clearing and grubbing/stripping						
Grading, relocation, reconnecting turnouts, piping, etc.						
Finishing site and grading work						
Restoration						
Demobilization/cleanup						

Clearing and Grubbing/Stripping

Preparation for canal construction would entail using bulldozers/scrapers to clear and grub/strip the surface to a depth of 4–6 inches and remove low-growing vegetation and loose surface soils. Suitable materials removed during this stage could be stockpiled. Unsuitable material would be wasted and hauled off-site. The right-of-way for the canal that would need to be cleared (including GGS/Drainage Canal right-of-way) is approximately 225 feet wide. Bulldozers/scrapers and front-end loaders would be used to excavate and move material. Water trucks would be used to control dust and dump trucks would be used to haul unsuitable materials away.

This phase of construction would commence immediately after mobilization and would most likely occur in multiple sections of the Elkhorn Canal and GGS/Drainage Canal alignments simultaneously.

Utility Relocation

Utility poles in the path of the canal construction would need to be relocated before any excavation. Backhoes, cranes, and flatbed trucks would be used to excavate and move utility poles and other structures. A compactor would be used to compact and stabilize the area.

Natural gas pipelines, wells, and other gas facilities would be avoided in design of the Elkhorn Canal and GGS/Drainage Canal.

Pump Discharge Pipe Extension

Because the new Elkhorn Canal would be relocated farther from NMWC's pumping plants than the existing canal, additional pipe would need to be installed to maintain the connections between the pumping plants and the irrigation canals. In particular, discharge pipes would need to be extended at Prichard Pumping Plant and Elkhorn Pumping Plant. Pipes would be transported to the site on flatbed trucks. Excavators and backhoes would be used to dig the pipe trench and lay the sections of welded steel pipe and backfill the trench. The trench would be deep enough to provide for a minimum of 12 inches of cover. A small compactor would be used to compact the soil over the pipe. The discharge piping would be above the "200-year" water surface elevation across the levee. The construction of pipelines at the existing Prichard Pumping Plant would occur during the 2008 construction season, and at the Elkhorn Pumping Plant pipeline construction would occur during the 2009 construction season.

Water Control Facility Construction

New facilities that would be constructed include distribution boxes, gate valves, cast-in-place concrete headwalls and control structures, culverts, and a proposed concrete-lined sediment basin adjacent to Elkhorn Reservoir. Backhoes and excavators would be used to excavate material for the new facilities. Precast distribution boxes, pipes, and other appurtenances would be transported to the site on flatbed trucks. Other concrete facilities would be poured in place and concrete would be transported to the site in ready-mix and boom concrete pumper trucks. Small compactors would be used to compact fill material around the facilities.

Embankment and Access Road Construction

The existing Elkhorn Canal is a highline canal, and construction of its replacement would require little or no excavation but a large amount of borrow material. The bottom of the new Elkhorn Canal channel would be approximately at existing ground level. During construction, approximately 100,000 cubic yards of borrow material would be required to build up the embankments of the new canal, which would be approximately 4 feet above the channel bottom with 3H:1V side slopes. Bulldozers and graders would be used to move and shape the embankment material, sheepsfoot and smoothdrum rollers would be used to compact the embankment material, and water trucks would be used on-site for dust control and moisture conditioning.

Approximately 20,000 cubic yards of fill would need to be hauled on-site from a nearby borrow source for construction of the new Elkhorn Canal in 2008. The anticipated borrow source is TNBC's Nestor site, with other identified NLIP borrow sources as a backup.

Canal Lining

The bottom of the Elkhorn Canal channel would be lined with concrete to provide for maintenance between seasons while minimizing impacts on the adjacent canal banks. Ready-mix and concrete pumper trucks would be required to apply the concrete to the bottom of the channel. It is anticipated that approximately 3,000 cubic yards of concrete would be required in 2008 for the proposed Elkhorn Canal lining.

Irrigation Interconnections

This phase includes work required to interconnect the proposed Elkhorn Canal with the existing irrigation canals within the Natomas Basin. Excavators and backhoes would be used to trench any connectors and motor graders would be used to shape the embankments. A water truck would be used to control dust and provide moisture conditioning during the excavation and construction of the interconnection facilities. Canal interconnections would be performed before the abandonment of the existing Elkhorn Canal.

Erosion Control

Erosion control measures would be installed before the start of construction and would be maintained throughout the construction period to prevent sedimentation of adjacent waterways. A hydroseeding truck would be used at the end of construction to seed any disturbed area. Water trucks would be used throughout the construction period to control dust in any disturbed areas.

Irrigation Canal Abandonment

Once the newly constructed canal is completed and operable, the existing Elkhorn Canal would be abandoned. Irrigation flows would be rerouted to the new canal and the existing canal would be dewatered and abandoned. The filling of the abandoned Elkhorn Canal between Reaches 4B and 6B would take place as part of the 2009–2010 levee construction.

Portions of farm canals and other irrigation canals would be abandoned because of the relocation of the Elkhorn Canal. Such segments that are outside the footprint of the proposed levee improvements would be filled after the relocation of the Elkhorn Canal is completed. Dump trucks would be used to haul fill material to those canals, rollers would be used to compact the fill, and water trucks would be used for dust control.

Demobilization/Cleanup

This phase includes dismantling any temporary facilities, hauling away any leftover construction materials, and cleaning up the site. All disturbed areas would be reseeded and graded to drain. A front-end loader and dump trucks would used to move materials. This phase of construction would also entail general cleanup and hauling away unused and waste materials. All construction equipment would be removed.

Table 2-15 lists the estimated construction equipment requirements for each construction phase of the relocated Elkhorn Canal between the North Drainage Canal and Elkhorn Reservoir.

Table 2-16 lists the material sources, estimated quantities, estimated hauling requirements, and waste quantities and hauling requirements for the 2008 construction of the relocated Elkhorn Canal. The TNBC Nestor site would be the soil borrow source, with other identified NLIP borrow sources as a backup. The Nestor site would be converted to marsh and upland habitat after the removal of borrow.

Table 2-15
Anticipated Equipment Requirements and Duration of Use
for Construction of the Relocated Elkhorn Canal Segment in 2008

Construction Phase	Equipment Types and Number of Each Type	Work Days
Clearing and grubbing/stripping	Dozers (4)	6
	Water trucks (2)	6
	Front-end loaders (4)	6
Utility relocation	Dozers (2)	12
	Excavators (2)	12
	Compactor (1)	6
Water control facility construction	Backhoes (2)	16
	Flatbed trucks (2)	16
	Generators (2)	16
	Compactors (2)	6
Embankment and access road construction	Dozers (2)	55
	Sheepsfoot rollers (2)	55
	Water trucks (2)	55
	Smooth drum rollers (2)	3
	Motor graders (2)	55
Canal lining	Boom trucks (2)	8
	Concrete pump (1)	8
Irrigation interconnections	Excavators (2)	4
	Water truck (1)	4
	Motor grader (1)	4

Table 2-15
Anticipated Equipment Requirements and Duration of Use for Construction of the Relocated Elkhorn Canal Segment in 2008

Construction Phase	Equipment Types and Number of Each Type	Work Days
Pump discharge pipe extension	Excavators (2)	8
	Front-end loaders (2)	8
	Welders (2)	8
	Crane (1)	8
	Small compactor (1)	8
	Water truck (1)	8
Erosion control	Hydroseeding truck (1)	1
	Water truck (1)	15
Irrigation canal abandonment	Loaders (2)	8
	Compactors (2)	8
Demobilization/cleanup	Truck (1)	1
	Front-end loader (1)	1

Table 2-16
Hauling Requirements for Construction of the Relocated Elkhorn Canal Segment in 2008

Construction Phase	Material Source	Material Destination	Volume (cubic yards)	Number of Trucks[1]	Total Truck Trips per Day	Days to Complete
Clearing/grubbing	Project	Waste	4,000	10	80	4
Embankment construction	Borrow	Irrigation ditch[2]	20,000	10	100	10
Embankment construction	GGS/Drainage Canal	Irrigation ditch	See Table 2-20	–	–	–
Concrete delivery	Off-site	Project	2,600	10	40	9
Miscellaneous deliveries	Off-site	Project	NA	NA	1	16
Finish grading	Off-site	Seeding	7,000	2	2	14

Notes:
GGS = Giant Garter Snake; NA = not available
[1] Truck capacity is assumed to be 15 cubic yards.
[2] Assumes an average round trip haul of 4 miles.

2009 Construction of the Elkhorn and Riverside Canals

The 2009 construction plan would include the relocation of the remainder of the Elkhorn Canal (south of Elkhorn Reservoir) and the relocation of the Riverside Canal. The 2009 construction would include the same construction phases as described for the 2008 construction. Timing of the new canal construction would be critical to avoid interruptions in irrigation service. The remainder of the new Elkhorn Canal, from Elkhorn Reservoir south, and the new Riverside Canal would be constructed before existing canals are filled in as part of the levee improvements in Reaches 6B–9A and 12–20B scheduled for construction in 2010.

As noted above, during the 2009 construction season, the following activities would take place, in addition to the general canal construction activities described for the 2008 construction season:

- Elkhorn Reservoir would be dewatered and piping from the Elkhorn Pumping Plant would be extended to the new settling basin, at which time Elkhorn Reservoir would be abandoned and filled.

- The pipelines from the Elkhorn and Riverside Pumping Plants to the relocated irrigation canals would be constructed.

Table 2-17 lists the construction phases and estimated construction equipment requirements for this effort.

Table 2-17
Anticipated Equipment Requirements and Duration of Use for Construction of the Relocated Elkhorn and Riverside Canal Segments in 2009

Construction Phase	Equipment Types and Number of Each Type	Duration (days)
Clearing and grubbing/stripping	Dozers (4)	15
	Water trucks (2)	15
	Front-end loaders (4)	15
Utility relocations	Dozers (2)	30
	Excavators (2)	30
	Compactor (1)	15
Facility construction	Backhoes (2)	45
	Flatbed trucks (2)	45
	Generators (2)	45
	Compactors (2)	15
Embankment and access road construction	Dozers (2)	145
	Sheepsfoot rollers (2)	145
	Water trucks (2)	145
	Smooth drum rollers (2)	8
	Motor graders (2)	145
Canal lining	Boom trucks (2)	22
	Concrete pump (1)	22
Irrigation interconnections	Excavators (2)	12
	Water truck (1)	12
	Motor grader (1)	12
Pump discharge pipe extension	Excavators (2)	22
	Front-end loaders (2)	22
	Welders (2)	22
	Crane (1)	22
	Small compactor (1)	22
	Water truck (1)	22
Erosion control	Hydroseeding truck (1)	3
	Water truck (1)	15

Table 2-17 Anticipated Equipment Requirements and Duration of Use for Construction of the Relocated Elkhorn and Riverside Canal Segments in 2009		
Construction Phase	Equipment Types and Number of Each Type	Duration (days)
Irrigation canal abandonment	Loaders (2)	22
	Compactors (2)	22
Demobilization/cleanup	Truck (1)	3
	Front-end loader (1)	3

Table 2-18 lists the material sources, estimated quantities, estimated hauling requirements, and waste quantities and hauling requirements for the 2009 construction of the relocated Elkhorn and Riverside Canals.

Table 2-18
Hauling Requirements for Construction of the Relocated Elkhorn and Riverside Canal Segments in 2009

Construction Phase	Material Source	Material Destination	Volume (cubic yards)	Number of Trucks[1]	Total Truck Trips per Day	Days to Complete
Clearing/grubbing	Project	Waste	11,000	10	80	10
Embankment construction	GGS/Drainage Canal	Project	See Table 2-22	–	–	–
Concrete delivery	Off-site	Project	6,900	10	40	22
Miscellaneous deliveries	Off-site	Project	NA	NA	1	45
Finish grading	Off-site	Seeding	18,000	2	2	36

Notes:
GGS = Giant Garter Snake; NA = not available
[1] Truck capacity is assumed to be 15 cubic yards

2.3.3.3 NEW GGS/DRAINAGE CANAL (2008 AND 2009 CONSTRUCTION)

General Construction Plan for the GGS/Drainage Canal

The new GGS/Drainage Canal would provide connectivity of aquatic habitat between the North Drainage Canal and Fisherman's Lake to enhance giant garter snake migration within the Natomas Basin. In addition to providing giant garter snake habitat, the GGS/Drainage Canal would intercept flows from non-Airport property sources. Irrigation and drainage water currently flowing into the Airport West Ditch from non-Airport property would be incorporated into the GGS/Drainage Canal.

The GGS/Drainage Canal would generally extend parallel to the Sacramento River east levee, between the North Drainage Canal at the RD 1000 Pumping Plant 2 in the north and tying into the West Drainage Canal in the south approximately 1,000 feet south of Elkhorn Boulevard. The GGS/Drainage Canal construction would include reconstruction of the West Drainage Canal to a point approximately 3,000 feet east of Power Line Road. The length of the entire GGS Canal, including the reconstruction, would be approximately 44,000 linear feet.

The portion of the GGS/Drainage Canal that would be constructed in 2008 would be adjacent to the Elkhorn Canal. Thus, the alignment was based on the same factors discussed above for the Elkhorn Canal. The alignment of the GGS/Drainage Canal is shown in Exhibits 2-27 and 2-29.

The GGS/Drainage Canal would have a series of check structures along its length to maintain consistent water levels in the low-flow channel of the canal during the snake's active season (April to October). Supplemental water would be provided from NMWC's irrigation system. The low-flow channel would have a top width of approximately 50 feet and an average depth of approximately 6 feet. Vegetation within the canal would be managed by mowing and/or excavation. Canal management is described in Section 2.3.4.3.

North of Reservoir Road (Exhibit 2-30), the canal would be set back a minimum of 200 feet from the projected levee toe to minimize concerns of excessive seepage exit gradients in the bottom of the canal. The canal in this location would have a 10-foot bottom width and 3H:1V side slopes. The depth would be sufficient to provide a minimum water depth of 4.5 feet with allowance for 1 foot of water level variance and a minimum of 1 foot of freeboard. A 20-foot right-of-way would separate the proposed GGS/Drainage Canal from the proposed relocated Elkhorn Canal.

The alignment in the area of Teal Bend Golf Club is under study. This reach of canal would have a 10-foot bottom width and 3H:1V side slopes. One proposed alignment is through the golf course, along Walnut Road. An alternative alignment would run east along Reservoir Road north of the golf course and then south along the golf course's eastern boundary.

South of Teal Bend Golf Club and north of I-5 (Exhibit 2-31), the GGS/Drainage Canal would be set back a minimum of 2,000 feet from the levee to minimize concerns of excessive seepage exit gradients in the bottom of the canal. In this reach, a 15-foot-wide bench would be included on each side of the low-flow channel. Overbank areas would have the potential for flooding during 10-year or greater storm events.

South of I-5, the existing RD 1000 West Drainage Canal would be modified to provide improved snake habitat value in the reach between I-5 and Fisherman's Lake. This reach of the GGS/Drainage Canal would include a 10-foot-wide bench on the north side. Tules would be planted on the slope adjacent to the bench and would typically be inundated with water. This would allow the existing channel section to remain open for conveyance capacity, while increasing available refugia for the snake. The normal water level for this reach would be 6-7 feet in winter and 7-8 feet in summer. A 20-foot-wide patrol road would flank each side of the GGS/Drainage Canal and would be slightly elevated above adjacent land.

2008 GGS/Drainage Canal Construction

The 2008 construction plan would include the construction of the GGS/Drainage Canal from the North Drainage Canal to the slough east of Elkhorn Reservoir (Exhibit 2-27), between Reach 4B and Reach 6B. The GGS/Drainage Canal would tie into the North Drainage Canal east of the proposed replacement RD 1000 Pumping Plant No. 2 location. The tie-in at the North Drainage Canal would be made by piping the GGS/Drainage Canal under the access road at the North Drainage Canal. The tie-in at the south end would be a temporary connection at the slough by piping under the Moody Canal into the slough. The connections into both the North Drainage Canal and the slough would be constructed with concrete headwalls, control structures, and erosion protection at outlets.

The GGS/Drainage Canal and Elkhorn Canal would be parallel and separated by a 20-foot right-of-way access. The two canals would cross each other approximately 350 feet north of Elkhorn Reservoir in the adjacent agricultural field. Because the GGS/Drainage Canal would be lower in elevation, approximately 3.5–5.5 feet below existing grade, it would be piped underneath the Elkhorn Canal.

Because the 2008 portion of the GGS/Drainage Canal and the Elkhorn Canal would be constructed parallel within the same right-of way, they would be constructed concurrently. This approach would facilitate the use of material from the GGS/Drainage Canal excavation for use as embankment material along the Elkhorn Canal.

Construction of the GGS/Drainage Canal would include the same construction phases as described above for the Elkhorn Canal, with differences highlighted below. Unlike the Elkhorn Canal, however, the GGS/Drainage Canal would not be concrete lined.

Clearing and Grubbing/Stripping

Refer to the discussion described above for the 2008 Elkhorn Canal construction.

Utility Relocation

Refer to the discussion above for the 2008 Elkhorn Canal construction.

Excavation and Trenching

The top of bank for the GGS/Drainage Canal would be approximately at existing ground level. During construction, a trench at least 6 feet deep and an average width of 55 feet would need to be excavated for the construction of the GGS/Drainage Canal. It is anticipated that approximately 85,000 cubic yards of excavated material would be stockpiled for use during construction of the Elkhorn Canal embankments.

Facility Construction

Refer to the discussion above for the 2008 Elkhorn Canal construction.

Embankment and Access Road Construction

Refer to the discussion above for the 2008 Elkhorn Canal construction.

Reclamation

Reclamation would include planting tules on the sloped banks. Backhoes would be used to prepare the planting areas and a water truck would be used to control dust.

Drainage Interconnections

This phase includes work required to interconnect the new GGS/Drainage Canal with the existing drainage canals within the Natomas Basin. Excavators would be used to trench any connectors and motor graders would be used to shape the embankments. A water truck would be used to control dust and provide moisture conditioning during the excavation and construction of the interconnection facilities.

Erosion Control

Refer to the discussion above for the 2008 Elkhorn Canal construction.

Demobilization/Cleanup

Refer to the discussion above for the 2008 Elkhorn Canal construction.

Table 2-19 lists the construction phases and estimated construction equipment requirements for construction of the GGS/Drainage Canal between the North Drainage Canal and the slough to the east of Elkhorn Reservoir in 2008.

Table 2-19
Anticipated Equipment Requirements and Duration of Use for Construction of the New GGS/Drainage Canal Segment in 2008

Construction Phase	Equipment Types and Number of Each Type	Duration (days)
Clearing and grubbing/stripping	Dozers (4)	18
	Water trucks (2)	18
	Front-end loaders (10)	18
Utility relocations	Dozers (2)	16
	Excavators (2)	16
	Compactor (1)	8
Excavation and trenching	Scrapers (4)	10
	Excavators (2)	14
	Water trucks (2)	14
Facility construction	Backhoes (2)	24
	Flatbed trucks (2)	24
	Generators (2)	24
	Compactor (1)	8
Embankment and access road construction	Dozers (2)	8
	Sheepsfoot rollers (2)	8
	Water trucks (2)	8
	Smooth drum rollers (2)	4
	Motor graders (2)	8
Reclamation	Backhoes (2)	16
	Water trucks (2)	16
Drainage interconnections	Excavators (2)	6
	Water truck (1)	6
	Motor grader (1)	6
Erosion control	Hydroseeding truck (1)	1
	Water truck (1)	15
Demobilization/cleanup	Truck (1)	1
	Front-end loader (1)	1

Table 2-20 lists the material sources, estimated quantities, estimated hauling requirements, and waste quantities and hauling requirements for the 2008 GGS/Drainage Canal construction.

Table 2-20
Hauling Requirements for Construction of the New GGS/Drainage Canal Segment in 2008

Construction Phase	Material Source	Material Destination	Volume (cubic yards)	Number of Trucks[1]	Total Truck Trips per Day	Days to Complete
Clearing/Grubbing	Project	Waste	20,000	20	80	18
Excavation	–	–	–	–	–	–
Scraper	Project	Irrigation ditch	31,000	Scraper to levee		
Trucked[2]	Project	Irrigation ditch	54,000	30	300	12
Concrete delivery	Off-site	Project	30	1	1	5
Miscellaneous deliveries	Off-site	Project	NA	NA	1	4
Finish grading	Off-site	Seeding	8,000	2	2	16

Notes:
[1] Truck capacity is assumed to be 15 cubic yards.
[2] Assumes average round trip haul of 2 miles.

2009 GGS/Drainage Canal Construction

The 2009 construction plan would include the construction of the GGS/Drainage Canal from the slough east of Elkhorn Reservoir to the West Drainage Canal, improvements to the West Drainage Canal to enhance habitat value for giant garter snake, and abandonment of the temporary connection of the GGS/Drainage Canal at the slough adjacent to Elkhorn Reservoir. Reclamation would include planting tules on the sloped banks. In the portion of the canal below I-5, tules would be planted above the canal bench. Backhoes would be used to prepare the planting areas and a water truck would be used to control dust.

Table 2-21 lists the construction phases and estimated construction equipment requirements for this effort.

Table 2-21
Anticipated Equipment Requirements and Duration of Use for Construction of the New GGS/Drainage Canal Segment and West Drainage Canal Improvements in 2009

Construction Phase	Equipment Types and Number of Each Type	Duration (days)
Clearing and grubbing/stripping	Dozers (4)	28
	Water trucks (2)	28
	Front-end loaders (10)	28
Utility relocations	Dozers (2)	24
	Excavators (2)	24
	Compactor (1)	12
Excavating and trenching	Scrapers (4)	55
	Excavators (2)	76
	Water trucks (2)	76
Facility construction	Backhoes (2)	36
	Flatbed trucks (2)	36
	Generators (2)	36
	Compactor (1)	12

Table 2-21
Anticipated Equipment Requirements and Duration of Use for Construction of the New GGS/Drainage Canal Segment and West Drainage Canal Improvements in 2009

Construction Phase	Equipment Types and Number of Each Type	Duration (days)
Embankment and access road construction	Dozers (2)	12
	Sheepsfoot rollers (2)	12
	Water trucks (2)	12
	Smooth drum rollers (2)	6
	Motor graders (2)	12
Reclamation	Backhoes (2)	24
	Water trucks (2)	24
Drainage interconnections	Excavators (2)	9
	Water truck (1)	9
	Motor grader (1)	9
Erosion control	Hydroseeding truck (1)	2
	Water truck (1)	15
Demobilization/cleanup	Truck (1)	2
	Front-end loader (1)	2

Table 2-22 lists the material sources, estimated quantities, estimated hauling requirements, and waste quantities and hauling requirements for the 2009 GGS/Drainage Canal construction.

Table 2-22
Hauling Requirements for Construction of the New GGS/Drainage Canal Segment and West Drainage Canal Improvements in 2009

Construction Phase	Material Source	Material Destination	Volume (cubic yards)	Number of Trucks[1]	Total Truck Trips per Day	Days to Complete
Clearing/grubbing	Project	Waste	30,000	20	80	27
Excavation	–	–	–	–	–	–
Scraper	Project	Irrigation ditch	180,000	Scraper to levee		
Trucked[2]	Project	Irrigation ditch	310,000	30	300	70
Concrete delivery	Off-site	Project	45	1	1	7
Miscellaneous deliveries	Off-site	Project	NA	NA	1	6
Finish grading	Off-site	Seeding	12,000	2	2	24

Notes:
NA = not available
[1] Truck capacity is assumed to be 15 cubic yards.
[2] Assumes average round trip haul of 2 miles.

2.3.3.4 AIRPORT WEST DITCH (2009 CONSTRUCTION)

As part of a safety survey conducted by the FAA for the Airport, the FAA expressed concern that the Airport West Ditch provides habitat for wildlife that potentially create a hazard to aircraft. The FAA recommended relocation of the ditch to alleviate the hazard. Additionally, a longstanding problem has existed with leakage from a 24-inch pipeline, resulting in marshy conditions along its route, approximately 11,000 feet between the intake structure and delivery point at the Airport pumps. During the past year the Airport began receiving all of its domestic (drinking) water supply from the City of Sacramento via a pipeline and storage tank project. Two of the on-Airport water wells previously used to provide domestic water were connected to the Airport landscape irrigation piping system, and the water supply to the "leaky underground pipe" was deactivated. All of the Airport's landscape irrigation needs are now provided on-site, and there is no need for the leaky pipe to remain in place. Irrigation water provided by NMWC still flows south through the Airport West Ditch, however, whereupon it is pumped to privately owned farms west of the Airport. The proposed project would include the construction of canal improvements to allow for decommissioning of the agricultural irrigation function of the ditch. During storms the Airport West Ditch receives stormwater runoff from a portion of the impervious surfaces on the west side of the Airport. Depending on the water volume, some of the stormwater is retained in the ditch until it can drain off-site to the Sacramento River. Therefore, the stormwater detention function of the Airport West Ditch must still continue. In addition to the habitat-related safety issues, the ditch presents a physical obstruction hazard to planes that may leave the runway during adverse takeoff or landing situations. Therefore, the final stage of this project component would consist of regrading of the Airport West Ditch to a gently sloping swale that can be easily maintained through mowing or other means. The more gradual gradient would also pose a lower threat to aircraft that may unexpectedly exit the runway.

To take advantage of the common construction practices and to maximize the use of common facilities, the rearrangement of irrigation and drainage facilities required to provide for rerouting of flows that contribute to the Airport West Ditch would be accomplished along with the proposed NLIP improvements. The proposed GGS/Drainage Canal would intercept many of the Airport West Ditch's offsite irrigation and drainage sources and reroute flows outside of the Airport Operations Area. The intent is to reroute year-round flows through the GGS/Drainage Canal. Additional irrigation infrastructure improvements required to reroute these flows would be implemented along with the GGS/Drainage Canal construction.

Table 2-23 lists the anticipated equipment requirements for modifications to the Airport West Ditch.

Table 2-23
Anticipated Equipment Requirements and Duration of Use for Airport West Ditch Modifications in 2009

Construction Phase	Equipment Types and Number of Each Type	Duration (days)
Clearing and grubbing/stripping	Dozers (2)	10
	Water truck (1)	10
	Front-end loaders (2)	10
Excavation and trenching	Excavators (2)	20
	Front-end loaders (2)	20
	Water truck (1)	20
Pipeline rehabilitation	Excavators (2)	10
	Dump truck (1)	10
	Generator (1)	10
	Water truck (1)	10
	Small compactor (1)	2

Table 2-23 Anticipated Equipment Requirements and Duration of Use for Airport West Ditch Modifications in 2009		
Construction Phase	Equipment Types and Number of Each Type	Duration (days)
Backfill and finish grading	Compactors (2)	10
	Front-end loaders (2)	10
	Water truck (1)	10
Erosion control	Hydroseeding truck (1)	1
	Water truck (1)	15
Demobilization/cleanup	Truck (1)	1
	Front-end loader (1)	1

Table 2-24 lists the estimated hauling equipment requirements for modifications to the Airport West Ditch.

Table 2-24 Hauling Requirements for Airport West Ditch Improvements in 2009						
Construction Phase	Material Source	Material Destination	Volume (cubic yards)	Number of Trucks[1]	Total Truck Trips per Day	Days to Complete
Clearing/grubbing	Project	Waste	2,000	2	8	20
Filling existing ditch	Borrow site	Existing ditch	15,000	10	80	13
Miscellaneous deliveries	Off-site	Project	NA	NA	1	5
Finish grading	Off-site	Seeding	650	1	1	3

Notes:
NA = not available
[1] Truck capacity is assumed to be 15 cubic yards.

2.3.3.5 PUMPING PLANT NO. 2 IMPROVEMENTS (2008 AND 2009 CONSTRUCTION)

Removal of Culvert at Pumping Plant No. 2 Site (2008 Construction)

SAFCA would undertake a second phase of the levee repairs and facility removal adjacent to the RD 1000 Pumping Plant No. 2 site at the west end of the North Drainage Canal as part of the proposed project. The first phase of repairs included installation of a sheet pile cutoff wall along the waterside levee slope to a depth of approximately 110 feet below the top of the existing ground and other minor site improvements to temporarily stabilize the site for the winter of 2006–2007. This work constituted an emergency action that fell within the scope of the Governor's February 24, 2006, Emergency Declaration and Executive Order S-01-06.

The second phase of work at this site includes: (1) excavating and removing approximately 400 feet of the existing levee section adjacent to the Pumping Plant No. 2 site to expose a deep culvert and possible voids under the levee, (2) removing the deep culvert, (3) reconstructing the levee adjacent to the pumping plant sump with levee embankment fill, and (4) demolishing, removing, and relocating the pumping plant remnants within the project footprint. The last activity, reconstruction of the pumping plant, would be conducted in 2009 and is described in the next subsection.

The project-related work would be confined to an area of approximately 2.3 acres. A stockpile and staging area of approximately 4.5 acres would be established near the work area.

Garden Highway would be closed to through traffic during construction, with traffic rerouted along Powerline Road or SR 99/70 via Riego Road and Elverta Road. Local access to businesses and the RD 1000 pump tender's building would be maintained.

Excavation limits would be extended to reconstruct the levee section adjacent to the sump and to reach areas where anomalies were identified during a geophysical investigation of the site. An area on the water side of the sheet pile wall would be excavated to lower the ground surface so as to reduce the loading on the sheet pile and excavation shoring system as the excavation takes place on the landside of the sheet piles. The waterside elevation would not be reduced below elevation 33 feet (North American Vertical Datum 88).

Total excavation volume is approximately 48,000 cubic yards. Excavated material would be stored on the site along the dewatered section of the North Drainage Canal, east of the abandoned sump, and in an adjacent agricultural field along the canal.

During excavation, the remnants of the pumping plant would be demolished and removed. This work includes relocation of a 36-inch irrigation supply pipe that is within the excavation limits. A temporary plastic fabric-lined ditch at the outfall of this pipe would also be relocated to provide for sufficient staging and stockpile areas. A short irrigation system outage would be taken to allow for relocation of the pipe and ditch.

The levee section would be reconstructed with an engineered fill. Suitable levee embankment soil from the excavation stockpile would be reused for levee reconstruction. Where necessary, materials would be mixed with imported select materials. Approximately 17,000 cubic yards of select embankment materials would be imported from the project borrow sources.

Heavy equipment that would be required for construction includes the following: semi flatbed and/or box trucks to deliver equipment and materials; a crane to drive sheet pilings for additional shoring needs; dump trucks to haul debris, stockpile excavated levee material, and import select soil materials for levee reconstruction; two hydraulic excavators; two dozers for stripping and stockpiling material, a grader, water truck, and front-end loader for maintenance of haul roads and stockpiles; and a roller compactor for levee construction. On-site activities would generate up to 80 truck trips per day during excavation stockpiling for approximately 5 weeks. Normal deliveries and construction personnel would generate an additional approximately 10 round trips per day. During import of materials, 10–15 trucks would be used, generating approximately 60 round-trip truck trips per day for approximately 5 weeks.

Pumping Plant No. 2 Reconstruction and Relocation (2009 Construction)

In response to underseepage observed during extended winter storms in January 2006, RD 1000's Pumping Plant No. 2 was taken out of service and dismantled. RD 1000 also filled the intake channel section approximately 600 feet away from (east of) the Sacramento River east levee and drove sheet piles through the ring levee embankment between the sump for the pump station and the adjacent canal to further cut off the underseepage, as described above. Pumping Plant No. 2 would be reconstructed and relocated as part of the proposed project at the western end of the North Drainage Canal, approximately 900 feet east of the centerline of the levee in the vicinity of the intersection with the P6 Drain. Long discharge pipes would extend over the levee to the Sacramento River. The work is expected to take place in 2009.

Critical sizing for Pumping Plant No. 2 is based on the capacity to pump drainage water from the Natomas Basin during a 100-year base flood event. To maintain the equivalent capacity, some additional pumping horsepower would be needed to overcome the losses associated with longer discharge lines.

Two 42-inch steel discharge pipes, approximately 850 feet long, would connect the two 300-horsepower pumps from the pump station to a new concrete outfall structure in the Sacramento River. The new outfall structure would be constructed close to the location of the original Pumping Plant No. 2 outfall structure. A separate 36-inch pipe would be constructed parallel to the landward section of the discharge pipes to restore the connection between NMWC's Central Main Irrigation Canal (land side of the levee) and the North Drainage Canal (approximately 600 linear feet). Based on anticipated loose foundation soils in the backfill area, it is anticipated that pipelines and structures would be pile supported. The invert of discharge pipes would cross over the levee above the "200-year" flood elevation in the Sacramento River to maintain the design level of flood protection.

The two 300-horsepower pumps would be operated by electricity most of the time. However, an emergency diesel generator would be used in case of power outages. A single 1,000-gallon diesel tank would be installed at the plant. This system would require monthly testing.

Table 2-25 lists the construction phases and estimated construction equipment requirements for the construction of Pumping Plant No. 2.

Table 2-25
Anticipated Equipment Requirements and Duration of Use for Pumping Plant No. 2 Construction in 2009

Construction Phase	Equipment Types and Number of Each Type	Duration (days)
Clearing and grubbing/stripping	Dozer (1)	2
	Water truck (1)	2
	Front-end loader (1)	2
Dewatering	Crane (1)	15
	Pile driver (1)	15
	Front-end loader (1)	15
	Generator (1)	180
Excavation/trenching	Excavator (1)	3
	Front-end loader (1)	3
Foundation construction	Crane (1)	30
	Pile driver (1)	30
	Front-end loader (1)	30
	Generator (1)	30
Concrete construction	Boom truck (1)	60
	Generator (1)	60
	Concrete pump (1)	10
Pipeline construction	Excavator (1)	30
	Welders (2)	30
	Crane (1)	30
	Front-end loader (1)	30
	Small compactor (1)	5
	Water truck (1)	5

Table 2-25 Anticipated Equipment Requirements and Duration of Use for Pumping Plant No. 2 Construction in 2009		
Construction Phase	Equipment Types and Number of Each Type	Duration (days)
Backfill and finish grading	Front-end loader (1)	10
	Dozer (1)	10
	Water truck (1)	10
	Compactor (1)	10
	Motor grader (1)	2
Electrical and mechanical equipment installation and start-up	Crane (1)	5
Erosion control	Hydroseeding truck (1)	1
	Water truck (1)	15
Demobilization/cleanup	Trucks (2)	1
	Front-end loader (1)	1

Table 2-26 lists the material sources, estimated quantities, estimated hauling requirements, and waste quantities and hauling requirements for the construction of Pumping Plant No. 2.

Table 2-26 Hauling Requirements for Pumping Plant No. 2 Construction in 2009						
Construction Phase	Material Source	Material Destination	Volume (cubic yards)	Number of Trucks[1]	Total Truck Trips per Day	Days to Complete
Clearing/stripping	Project	Waste	200	2	8	2
Excavation/backfill	Project	Stockpile at site	1,900	2	20	7
Dewatering	Project	Project	NA	1	1	15
Pipeline and foundation rock backfill	Off-site	Project	1,000	5	20	4
Foundation and pipe pile supports	Off-site	Project	NA	2	4	3
Concrete delivery	Off-site	Project	300	2	4	10
Pipe	Off-site	Project	NA	2	8	4
Rock	Off-site	Project	700	2	10	5
Miscellaneous deliveries	Off-site	Project	NA	NA	1	30
Equipment supply	Off-site	Project	NA	1	1	5
Finish grading	Off-site	Project	100	1	1	1

Notes:
NA = not available
[1] Truck capacity is assumed to be 15 cubic yards.

2.3.4 HABITAT DEVELOPMENT AND MANAGEMENT (BEGINNING IN 2008)

2.3.4.1 SUMMARY OF LAND COVER CHANGES

As described in previous sections of this chapter, the proposed project includes elements providing at least 100-year flood protection as quickly as possible, while (1) laying the groundwork to achieve at least "200-year" flood protection over time, (2) facilitating changes in the management of Airport lands that reduce hazards to aviation safety, and (3) enhancing habitat values by increasing the extent and connectivity of the lands in the Natomas Basin managed to provide habitat for giant garter snake, Swainson's hawk, and other special-status species. The project features have been developed with the goal of meeting these multiple objectives simultaneously to the extent feasible. Postproject land cover types and management practices are proposed to offset the loss of preproject habitat values on affected lands and maximize the habitat value of the project features to the extent feasible.

The following is a summary of the anticipated changes in land cover associated with the 2008–2010 proposed project elements:

- **Flood control facility footprint:** The flood control facility footprint and maintenance access area would be on land currently occupied by cropland (mainly row crops, some rice) and field margins, groves of woodlands, and the Elkhorn and Riverside Canals. After project completion, the levee slopes, berms, and right-of-way would have a managed grass cover. The levee crown would be topped with a roadway.

- **New canal alignments:** The alignments of the relocated irrigation canals and GGS/Drainage Canal would generally be on lands currently in row crops.

- **New woodland areas:** Woodlands would most likely be planted on land that has been in row crops; they may be spread around the margins of TNBC properties.

- **Airport north and south bufferlands (borrow source):** Cropland in the Airport's northern bufferlands, recently in rice cultivation or fallowed rice land, would be converted to managed marsh adjacent to existing TNBC marsh, and to a large area of grassland. Cropland in the Airport's southern bufferlands, currently or recently in row crops and grains, would be converted to managed grassland, possibly with a woodland component.

- **Vestal and/or Spangler property (borrow source):** Part of this privately owned land in rice cultivation would be used for borrow and converted to managed marsh, and the rest would be retained in rice cultivation.

- **RD 1001 borrow site, Brookfield property (potential borrow source), and Fisherman's Lake properties (specific parcels to be determined):** This identified borrow site and other potential borrow sources are currently used for rice cultivation and would be converted to managed marsh after borrow material is removed.

- **TNBC Bolen South and Nestor parcels (borrow sources):** These TNBC parcels are planned for managed marsh and upland habitat. SAFCA would remove borrow material and facilitate construction of the planned habitats.

The land cover conversions are summarized in Table 2-27 in terms of general habitat types. Exhibits 2-32 and 2-33 show the existing and proposed land cover types, respectively, on the lands within the footprint of the proposed project features. Note that although the Vestal, Spangler, and Brookfield properties are all shown, only one is likely to be used for borrow.

Table 2-27
Summary of Pre-Project and Post-Project Land Cover Types by Location

Land Cover Type and Location	Created Landscape (Acres)		Existing Landscape (Acres)									
			Field Crop		Rice		Open Water/Canal		Woodland		Developed	
	2008	2009–2010	2008	2009–2010	2008	2009–2010	2008	2009–2010	2008	2009–2010	2008	2009–2010
Project Footprint and Additional Right-of-Way												
Levee/berm grassland	82	200	67	130	7	23		25	3	22		
Project ROW grassland	5	138	5	138								
Canal grassland	19	76	19	76								
Canal aquatic	16	64	16	64								
Woodland	25	125	25	125								
Project ROW developed	15	45									15	45
Subtotal	**162**	**648**	**132**	**533**	**7**	**23**		**25**	**3**	**22**	**15**	**45**
Borrow Sites												
Managed marsh (Airport)	130				130							
Managed marsh (Natomas)	120				120							
Managed marsh (RD 1001)	30	20			30	20						
Airport grassland		500				500						
Preserved rice crop	130				130							
Subtotal	**410**	**520**			**410**	**520**						
Total	**572**	**1,168**	**132**	**533**	**417**	**543**		**25**	**3**	**22**	**15**	**45**
Summary of Acreages by Landscape Type												
Field crop			132	533								
Grassland	106	914										
Woodland	25	125							3	22		
Rice	130				417	543						
Managed marsh	280	20										
Canal aquatic	16	64						25				
Developed	15	45									15	45
Total	**572**	**1,168**	**132**	**533**	**417**	**543**		**25**	**3**	**22**	**15**	**45**

Notes:
RD = Reclamation District; ROW = right-of-way

2.3.4.2 MANAGEMENT ENTITIES FOR PROJECT FEATURES

Agencies and organizations that would have management responsibility for proposed project features are SAFCA, RD 1000, NMWC, the Airport, and TNBC.

Sacramento Area Flood Control Agency

SAFCA would be responsible for the design and construction of all levee improvements, maintenance access and inspection roads and rights-of-way, replacement canals and associated drainage and irrigation structures, and habitat creation sites. In addition, SAFCA would be responsible for all necessary land acquisitions and easements to construct the project features and achieve the project objectives. However, once these project features are completed, most of the land or land management responsibility would be conferred by SAFCA to the other management entities described below. Memoranda of agreement, land ownership transfers, or management endowments and contracts would be used by SAFCA to transfer land management responsibility to the appropriate public agency or nonprofit land management organization. At the end of the project construction period, all project lands would be in public ownership and/or would be under the permanent control of a natural resource conservation entity.

Reclamation District 1000

The mission and purpose of RD 1000 is to operate and maintain the flood protection levees surrounding the Natomas Basin and operate and maintain the internal drainage system to evacuate agricultural and urban stormwater and incidental runoff. RD 1000 would be responsible for the management of the proposed levee improvements, the new GGS/Drainage Canal, and reconstructed Pumping Plant No. 2. Typical maintenance activities include mowing grassland along levee slopes and berms, canal banks, and rights-of-way; managing canal bank vegetation, including noxious weeds; periodically removing sediment from drainage canals; and maintaining and repairing canal and levee patrol roads.

Natomas Central Mutual Water Company

NMWC is a nonprofit mutual water company with the primary focus of keeping the water conveyance functioning in order to serve the company shareholders. Intensive maintenance to maximize agricultural irrigation services throughout the basin is generally limited to only 10% annually of the approximately 100 miles in the Natomas Basin canal system operated by NMWC. NMWC would be responsible for maintaining and managing the relocated Elkhorn and Riverside Canals and existing irrigation canals. The relocated canals would be maintained in the same manner as the existing canals. Typical maintenance activities include operating and repairing water control structures and barrier gates, periodically removing sediment and noxious aquatic weeds from the canals, repairing canal roads, managing bank vegetation, and mowing grassland along canal and road rights-of-way. However, compared to the existing Elkhorn and Riverside Canals, the relocated canals would have improved levees, better water control structures, and wider roads and right-of-ways. These improvements are expected to ease annual canal management efforts, allowing for a proportionately greater focus on maintenance and operations and less need for system repair and dredging.

Sacramento County Airport System

SCAS manages the Sacramento County–owned bufferlands outside the Airport Operations Area. All project components on land under SCAS management would remain in public ownership.

The Natomas Basin Conservancy

TNBC acquires and manages land for the purpose of meeting the objectives of the NBHCP. To meet the mitigation goals of the NBHCP, developers of projects pay a mitigation fee to TNBC when they apply for building permits. TNBC then uses the mitigation fees to acquire, restore, and manage mitigation lands to provide

habitat for protected species and maintain agriculture in the Natomas Basin. TNBC owns approximately 30 mitigation properties totaling more than 4,500 acres. The Bolen South and Nestor properties are owned by TNBC and would be managed as marsh and upland habitat after SAFCA's removal of borrow material and site restoration. In addition, private land acquired by SAFCA and converted to managed marsh or used for woodland establishment likely would be conveyed to TNBC after creation of permanent habitats as marsh, woodlands, and habitat buffer zones. RD 1000 or SAFCA may also contract with TNBC for management elements of some habitat features (e.g., the GGS/Drainage Canal).

2.3.4.3 HABITAT CREATION AND MANAGEMENT

New GGS/Drainage Canal

See the description of the construction and planting of the new GGS/Drainage Canal in Section 2.3.3.3 above.

The new GGS/Drainage Canal would provide connectivity of aquatic habitat between Fisherman's Lake south of I-5 and the North Drainage Canal in the northern Natomas Basin to enhance opportunities for giant garter snake movement within the basin. The length of the entire GGS/Drainage Canal, including the portion of the West Drainage Canal that is proposed for enhancement, is approximately 44,000 linear feet (8.3 miles). A series of water control structures would be constructed along the length of the canal to maintain consistent water levels in the low-flow channel of the canal during the snake's active season (April–October). Supplemental water would be provided as needed from NMWC's irrigation system. The low-flow channel would have a top width of approximately 50 feet and a water depth of approximately 4–5 feet. The canal would be part of the RD 1000 drainage system.

The GGS/Drainage Canal has been designed so that management of the canal would result in less disturbance to giant garter snake habitat than existing standard canal management practices in the Natomas Basin. A typical existing RD 1000 canal has a narrow channel and right-of-way, and steep side slopes. Some canals have a maintenance road on one side only. The steep side slopes are prone to erosion and earth slope failures, filling the canal bottom with sediment annually. Sedimentation exacerbates the maintenance problem of aquatic weed invasions, and accretion of sediment (which is costly to remove) reduces the capacity of the canals to direct storm flow, resulting in the need for frequent disturbance by heavy equipment of vegetation and soil on canal banks.

The side slopes of the new GGS/Drainage Canal would be gradual and consistent (3H:1V), resulting in greatly reduced erosion and sedimentation. Vegetation on the banks could easily be mowed to a specified stubble height using cutter blades instead of the existing, high-disturbance practice of flail mowing or scraping vegetation from the banks and canal with a drag bucket. These improved canal maintenance practices would substantially reduce disturbance and incidental mortality of giant garter snakes that use bank and shoreline vegetation as cover and feeding habitat.

The GGS/Drainage Canal north of Teal Bend Golf Club would be managed primarily as a linear high-quality giant garter snake habitat and movement corridor, with stormwater drainage a secondary function during major storm events. South of Teal Bend Golf Club, the canal would also serve as a primary giant garter snake habitat area and movement corridor, but the volume of stormwater drainage would increase in a southerly direction because of the natural slope of the basin. Winter storm–related runoff exceeding the capacity of the West Drainage Canal south of I-5 would be pumped into the Sacramento River using Pumping Plant No. 3, consistent with existing stormwater management practice.

The shoreline and lower bank of the GGS/Drainage Canal (including the improved West Drainage Canal) would be planted or managed to promote tule/cattail vegetation as suitable cover and foraging habitat for giant garter snake. However, management of the canal would also require removal of noxious aquatic weeds that obstruct the flow of water. A secure water supply would ensure that water of a suitable quality is present and flowing at low velocity in the canal during the active season of the giant garter snake, and that the water surface would be

managed within a range of approximately 1 foot to provide consistent cover from predators along the tule fringe of canal banks. Input of supplemental canal water would begin at a diversion point on the North Drainage Canal at the north end of the new GGS/Drainage Canal. Other points of inflow may occur at downstream locations.

Managed Marsh Creation and Rice Preservation

Several soil borrow sites would be finish graded and planted with native riparian and marsh vegetation by SAFCA after the completion of borrow activities to create managed seasonal and perennial marsh habitat that would benefit giant garter snake. Design of the marshes would follow the templates established by TNBC on recent projects, the design of SCAS's Willey mitigation site being developed in the northeast part of the basin, and the SCAS marsh mitigation project at Prichard Lake. Examples of preliminary designs of marsh habitat are shown in Exhibits 2-34 and 2-35. These design templates feature a combination of uplands and shallow water bodies, sinuosity of swales, and good water control structures to manage precise water levels at different times of the year. Marshes would have perimeter fences to control and protect grazing animals, such as goats; grazing by goats is a successful management technique used by TNBC to reduce invasions of weedy thatch and exotic plants while retaining sufficient cover for giant garter snake and other semiaquatic species that rely on grassy uplands adjoining the wetland ponds.

Marsh design and management would optimize the values of giant garter snake habitat but minimize the attraction to wildlife species (e.g., flocks of waterfowl, starlings, pheasants) considered to be potentially hazardous to aircraft at low elevations approaching or departing from runways. An essential component of the managed marshes would be procurement of a firm, reliable water supply and good water quality throughout the giant garter snake's active season of April–October. Created marshes on the Airport's northern properties, Vestal or Spangler properties, and Fisherman's Lake area parcels would be situated adjacent to existing TNBC marsh preserves, thereby providing for greater contiguous management areas and enhancing the overall habitat value of the adjacent preserves.

Large portions of properties that SAFCA obtains for borrow operations that would not be needed for borrow extraction (e.g., an anticipated 100–120 acres on the Vestal or Spangler property) would be retained in rice cultivation through an arrangement with a grower or TNBC.

Managed Grassland on Levee Slopes and Seepage Berms

The proposed levee improvements would result in landside slopes that are less steep than the existing slopes, and several reaches of the Sacramento River east levee would have adjoining 100- to 300-foot-wide earthen seepage berms with a nearly flat slope (50H:1V or less). Parallel to the landside toe of enlarged levees and seepage berms would be maintenance access roads and seepage relief wells in some locations. Additional setback bufferland would flank some of these features, and property acquisition for the proposed project may leave SAFCA with remnant portions of acquired parcels that are nonessential to flood control uses. With the exception of the crown of the levee, these areas would be managed as grassland. Most grassland would be mowed or grazed throughout the growing season, with an emphasis on mowing procedures and stubble height to optimize these areas for Swainson's hawk foraging habitat. However, the primary purpose and management priority of levees and seepage berms would continue to be flood protection, for which RD 1000 has principal management and maintenance responsibility.

Managed Grasslands on Land Owned by Sacramento County

Much of the existing cropland in the Airport bufferlands that would be used by SAFCA as a source of soil borrow would be converted to managed grassland after the completion of borrow operations. Managed grasslands have been determined to be the most effective, feasible option for reducing hazardous wildlife populations that currently exist on these lands while minimizing adverse effects on giant garter snake and Swainson's hawk. Managed grasslands would attract substantially less hazardous wildlife than the current land uses because they do not provide waste grain, as do cereal crops, or standing water, as does rice. Grasslands can be managed through a

variety of practices to further reduce hazardous wildlife use, including modifying the selection of plants and grazing animals, and varying the amount and timing of tillage, irrigation, grazing, and cutting to create opportunities to adaptively manage land.

The primary management objective on managed grasslands would be to reduce hazardous wildlife populations to the extent necessary to comply with Title 14, Part 139 of the Code of Federal Regulations and FAA advisory circulars that address hazardous wildlife. All management practices on managed grasslands would be consistent with the implementation measures in the current version of the *Airport Wildlife Hazard Management Plan* (Sacramento County Airport System 2007).

Managed grassland within 10,000 feet of the Airport runways (the Airport Critical Zone) would be managed primarily to reduce the attractiveness to wildlife considered hazardous to aircraft safety. Within this zone, FAA provides specific recommendations for reducing hazardous wildlife. Certain grassland parcels, particularly those outside of the Airport Critical Zone, would be managed more flexibly than others specifically to provide foraging opportunities for Swainson's hawk, which is able to find small rodent prey in low-stature grasslands that provide only low-quality habitat for many species of hazardous wildlife. It is anticipated that some of the managed grasslands would be identified as future mitigation for actions on other lands under SCAS management that adversely affect Swainson's hawk habitat.

Managed grasslands may include nonirrigated hay, irrigated hay, irrigated pasture, and grazed annual grassland. Management of nonirrigated hay would include crop selection, groundwork and planting, application of fertilizers, and cutting. In the Sacramento Valley, rye grass and oats can be grown as nonirrigated hay crops.

Management of irrigated hay would include crop selection, groundwork and planting, irrigation, application of herbicides and fertilizers, and cutting. A variety of forage plants could be grown as irrigated hay, including perennial rye grass, oats, clover, vetch, alfalfa, Sudangrass, and other species.

Management of irrigated pasture would include irrigation, grazing, and maintenance of fences and other infrastructure. Pastures would be swathed or grazed as needed by cattle or sheep, and irrigated from April to October. The primary objective of grazing irrigated pasture would be to maintain vegetation at a low height (i.e., less than 12 inches). Alternatively, grazed pastures could be swathed to achieve the same objective.

Grazed annual grasslands would be grazed on a seasonal basis value that occurs on annual grasslands during summer. Grazing generally results in vegetation of varied height ranging from 4 to 24 inches. If available animals are not sufficient to maintain vegetation at a desired height, annual grassland could be swathed.

In areas that are not adjacent to the Airport runways, grasslands may be managed more specifically as Swainson's hawk foraging habitat. Management practices would be similar to those described above. Outside the 10,000-foot Critical Zone, enhancement of Swainson's hawk foraging and nesting habitat would also be permissible, provided that enhancement activities would not result in a net increase in hazardous wildlife species diversity or abundance over baseline conditions, and in particular, with the approach/departure zone of the two runways and the planned third parallel runway that may be constructed between the years 2020 and 2030.

Woodlands

Woodlands consisting of native riparian species would be established at several sites as a component of the proposed project. SAFCA would acquire and plant woodland tree and shrub species on approximately 150 acres of existing cropland or fallow or ruderal sites. Selection of the locations of created woodlands would depend on the availability of suitable parcels as SAFCA acquires land for levee improvements and setbacks, relocated canal corridors, and borrow sites. Tree groves would be distributed throughout the project area. Priorities for woodland site selection would be to have tall tree species in groves adjacent to hawk foraging fields but distant from the Airport runways.

Groves would be established throughout the project area. Groves would generally be at least 50 feet wide and several hundred feet long, depending on location constraints. Portions of the created woodlands would be at least 100 feet wide or wider to promote successful nesting by a variety of native birds deeper within the grove canopy, where nest parasitism by crows, cowbirds, and starlings is less of a factor in breeding success. At maturity, stand structure would vary from closed canopy woodland to grassland savanna vegetation types.

Planting sites would require suitable soil conditions, water supply during a 3- to 5-year establishment phase, reduced risk of wildfire, and minimal depth to seasonally high groundwater or other natural water sources to sustain trees once irrigation ceases. A mixture of native riparian species would be planted, but predominant species would be valley oak, the primary tree species that would be affected by the proposed improvements to the Sacramento River east levee, and cottonwood, which is a preferred nest tree for Swainson's hawks in the basin and is faster growing than valley oak. Establishment of woody vegetation would likely require more than one technique, including seeding in winter, flood irrigation, drip or agricultural-scale spray heads, cuttings, and acorn planting. Taking into account predictable and unavoidable mortality within the first 5 years of establishment, the intent is to have an average stem density of approximately 50–100 trees and shrubs per acre within 5–10 years of growth.

As described in Section 2.3.2.4 under "Use of Relief Wells to Avoid Removal of Structures and Trees along Sacramento River East Levee Reaches 4B–20," some of the larger and higher quality existing groves of mostly valley oak woodland would be retained where stands can be avoided near but just outside the toe of the adjacent setback levee. Where trees would be removed from existing groves to make way for the proposed flood control system features, they would be transplanted in new locations, including newly planted groves, to the extent feasible. The woodland planting areas could also provide locations for transplanting any elderberry shrubs that would need to be moved from the footprint of flood control improvements.

Wherever possible, groves would be bordered by controlled-access public lands and rights-of-way to reduce the risk of vandalism and other inappropriate uses that may threaten wildlife values or risk wildfires from human sources (campfires, smoking, arson).

2.3.5 Additional Actions to Meet FEMA Requirements: Encroachment Management and Bridge Crossing Modifications (2009–2010 Construction)

2.3.5.1 Encroachment Management

USACE levee guidance that is under development requires the removal of vegetation greater than 2 inches in diameter on the levee slopes and within 15 feet of the waterside and landside levee toes. As described above, the landside slopes of the improved existing NCC south levee, the adjacent setback levee along the Sacramento River east levee, the PGCC west levee, and seepage berms would be planted and maintained in grasses. No woody vegetation would be allowed to become established on these features.

USACE levee guidance also requires an assessment of encroachments on the levee slopes, including utilities, fences, structures, retaining walls, driveways, and other features that penetrate the levee prism. Substantial encroachments are present on the Sacramento River east levee. Should any of these existing encroachments be determined to reduce the integrity of the levee or increase flood risk unacceptably, the encroachments would need to be removed. Along the land side of the adjacent setback levee, only minor encroachment removal is anticipated. This would include the removal of existing power poles on the existing landside slope. Removal of some waterside slope encroachments may be required by the end of 2010 for USACE acceptance that the system meets FEMA criteria for the 100-year level of protection.

2.3.5.2 BRIDGE CROSSINGS

Under applicable FEMA requirements, the plane of the northbound and southbound bridge crossings of SR 99/70 over the NCC must be 4 feet above the 100-year water surface elevation in the NCC. The 100-year water surface elevation is 41.6. The plane of the northbound crossing is 45.4, and the plane of the southbound crossing is 43.4. To meet FEMA requirements, SAFCA will consider the following options for implementation in conjunction with Caltrans in 2009–2010: (1) raise both bridge crossings as necessary to meet minimum FEMA clearance requirements, (2) provide for installation of a closure structure across the southbound crossing in the event of a 100-year or greater flood, or (3) replace the bridge rail structures on the east and west sides of the bridge crossings and modify the levees connecting to these structures so as to provide at least 4 feet of freeboard above the 100-year water surface elevation. Under any of these options, at least the northbound crossing could remain open for use during a 100-year flood event.

The appropriate alternative would be determined as part of further consideration of project design for the 2009–2010 project features.

2.4 ABILITY OF THE PROPOSED PROJECT TO MEET THE PROJECT OBJECTIVES

The specific objectives of the proposed project analyzed in this EIR are to:

(1) provide at least 100-year flood protection as quickly as possible while laying the groundwork to achieve at least "200-year" flood protection over time,

(2) use flood control projects in the vicinity of the Airport to facilitate changes in the management of Airport lands that reduce hazards to aviation safety, and

(3) use flood control projects to enhance habitat values by increasing the extent and connectivity of the lands in Natomas being managed to provide habitat for giant garter snake, Swainson's hawk, and other special-status species.

The proposed project would meet these objectives in the following ways:

- The improvements to the flood control system described in Section 2.3 would provide the system with a 100-year level of protection and improve the levee system to a "200-year" level of protection in some reaches. In addition to the proposed increases in levee freeboard and seepage remediation, construction of the adjacent setback levee would provide greater assurance that the USACE will accept that the flood control system meets FEMA criteria for the 100-year level of protection than if the existing levee were raised and improved in place, given the uncertainties about future requirements for encroachment and vegetation removal and the substantial amounts of encroachments and large woody vegetation on the water side of the existing Sacramento River east levee. Acquisition of additional right-of-way would protect the flood control facilities from future encroachments that could undermine the integrity of the facilities and would allow for possible future expansion.

- The construction of the GGS/Drainage Canal, modifications to the irrigation distribution system, and infrastructure repairs related to the Airport West Ditch would allow for dewatering of this ditch. This would substantially reduce its attraction of wildlife and the associated potential for bird aircraft strikes.

- The conversion of land cover types on Airport lands as part of borrow and reclamation operations would reduce the level of bird attraction to the Airport bufferlands north of the Airport Operations Area (and therefore would reduce aviation hazards) through the replacement of rice and fallowed rice fields with managed grassland and managed marsh. The managed marsh that would be established on the northernmost

portion of the bufferlands parcels would result in less bird attraction than rice cultivation because of the focused management regime that would be employed.

- A large area of rice land used for borrow operations would be reclaimed as managed grassland, which would provide moderate-quality foraging habitat for Swainson's hawk. In addition, other areas of Airport-managed grassland and levee slopes and berms would be managed specifically to enhance their foraging value for Swainson's hawk, within the constraints of the management requirements for Airport safety and maintenance of the flood control system.

- The new GGS/Drainage Canal would provide connectivity of the areas of known giant garter snake populations in the northern and southern parts of the basin and would provide a high-quality movement corridor managed specifically for this species.

- New managed marsh would be created on parcels adjacent to existing marsh habitats managed by TNBC, thus expanding overall managed habitat and improving connectivity between management units for dispersal of the species.

- Woodlands spread throughout the basin would increase potential nest sites for Swainson's hawks and other bird species.

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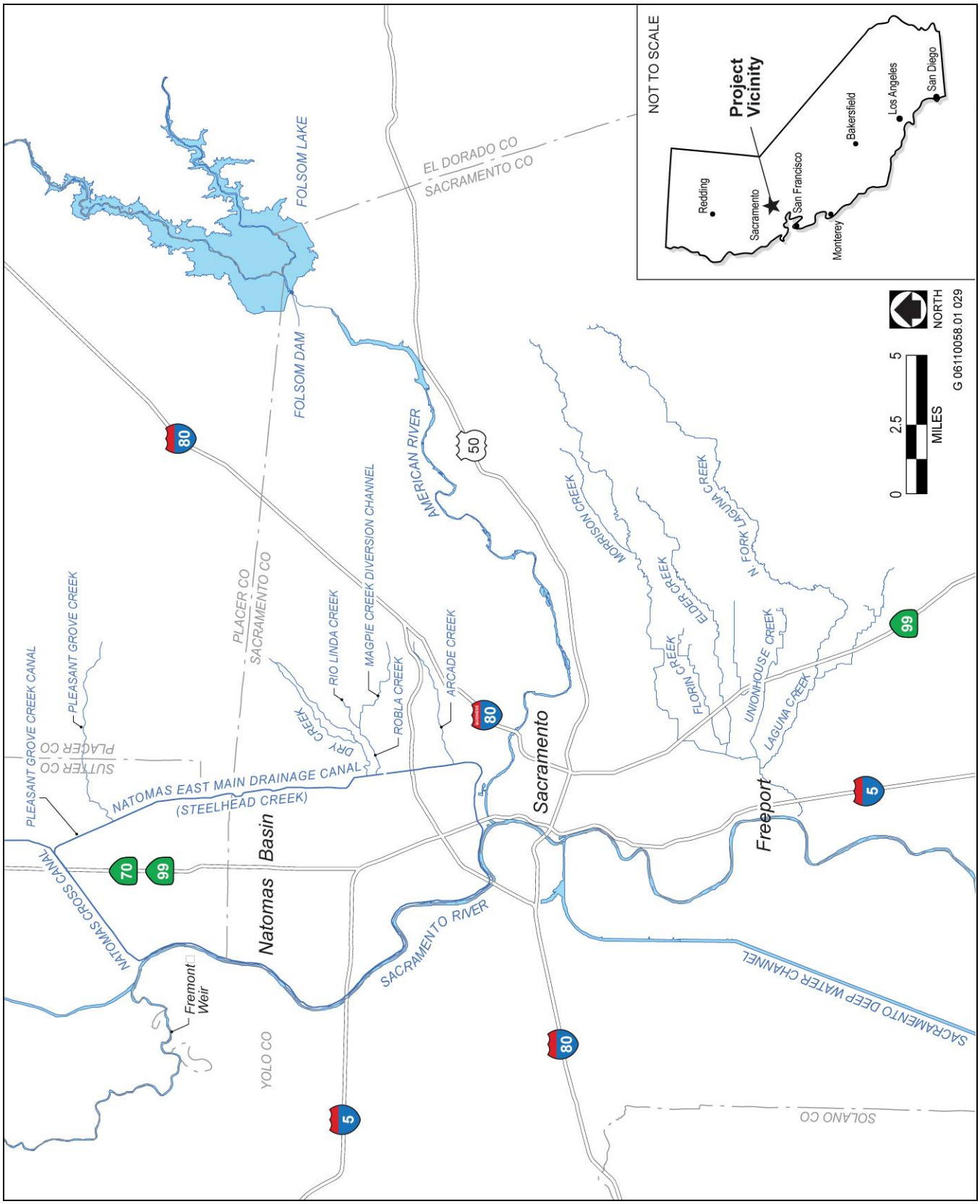
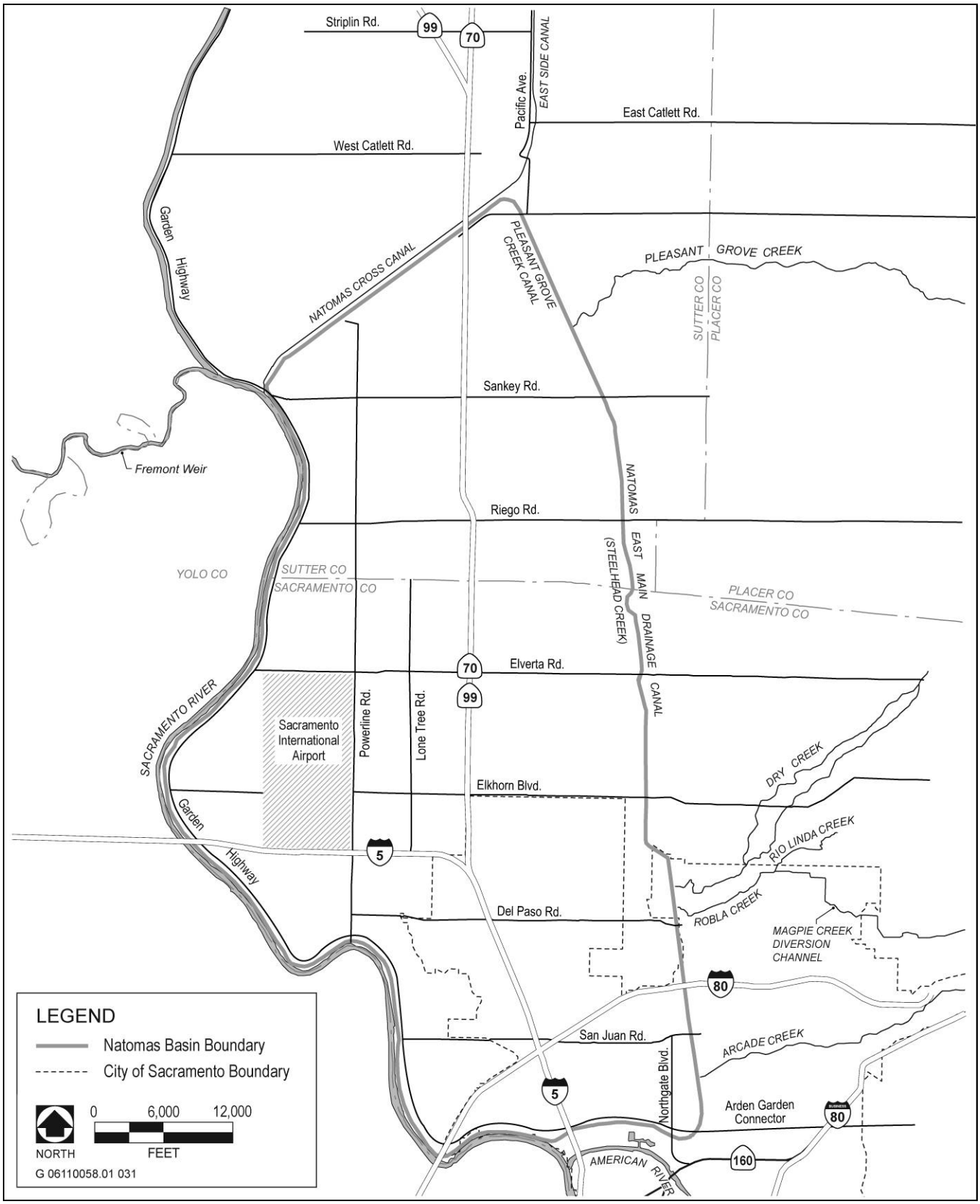


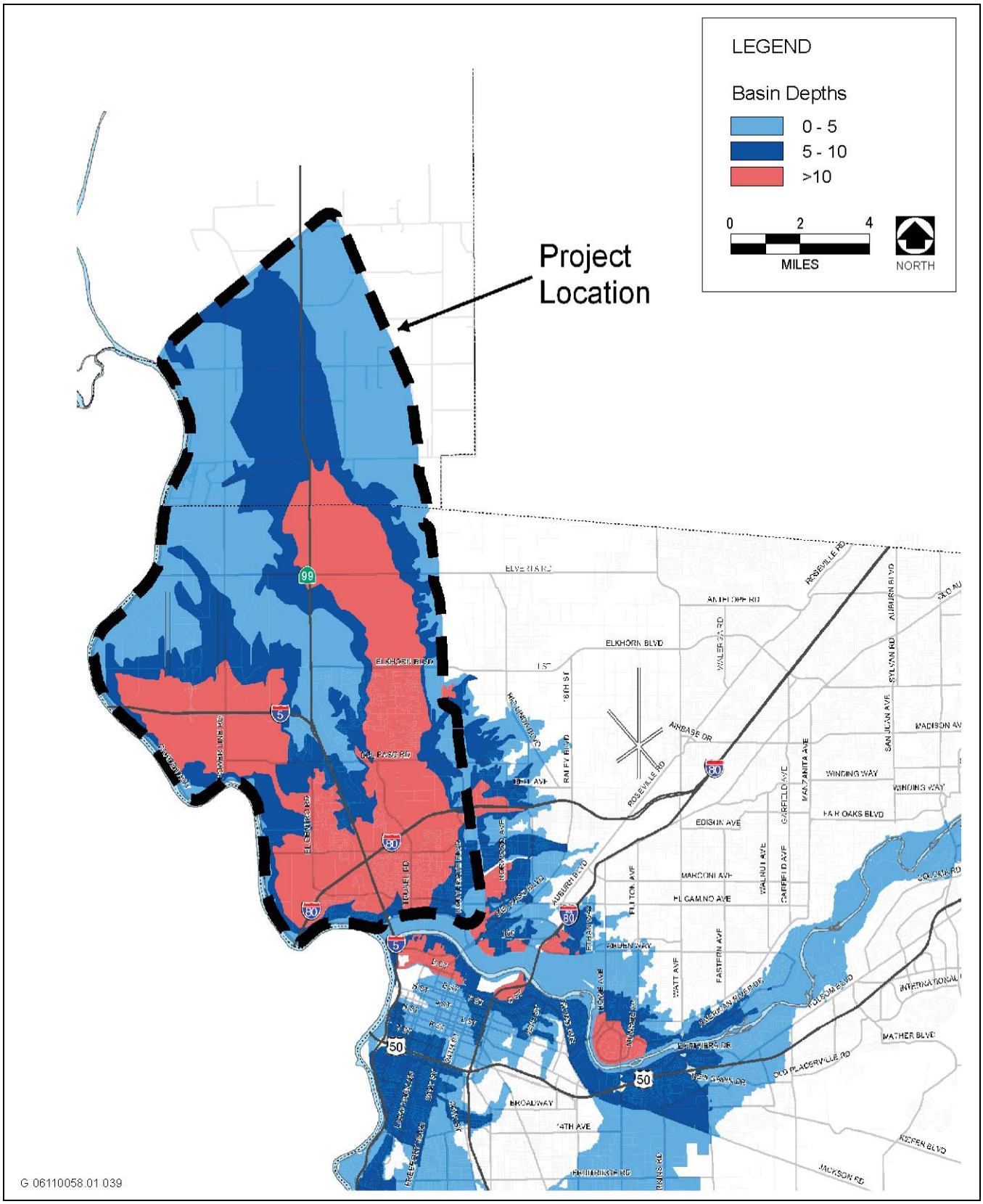
Source: CaSil, Adapted by EDAW in 2007

Project Location **Exhibit 2-1**



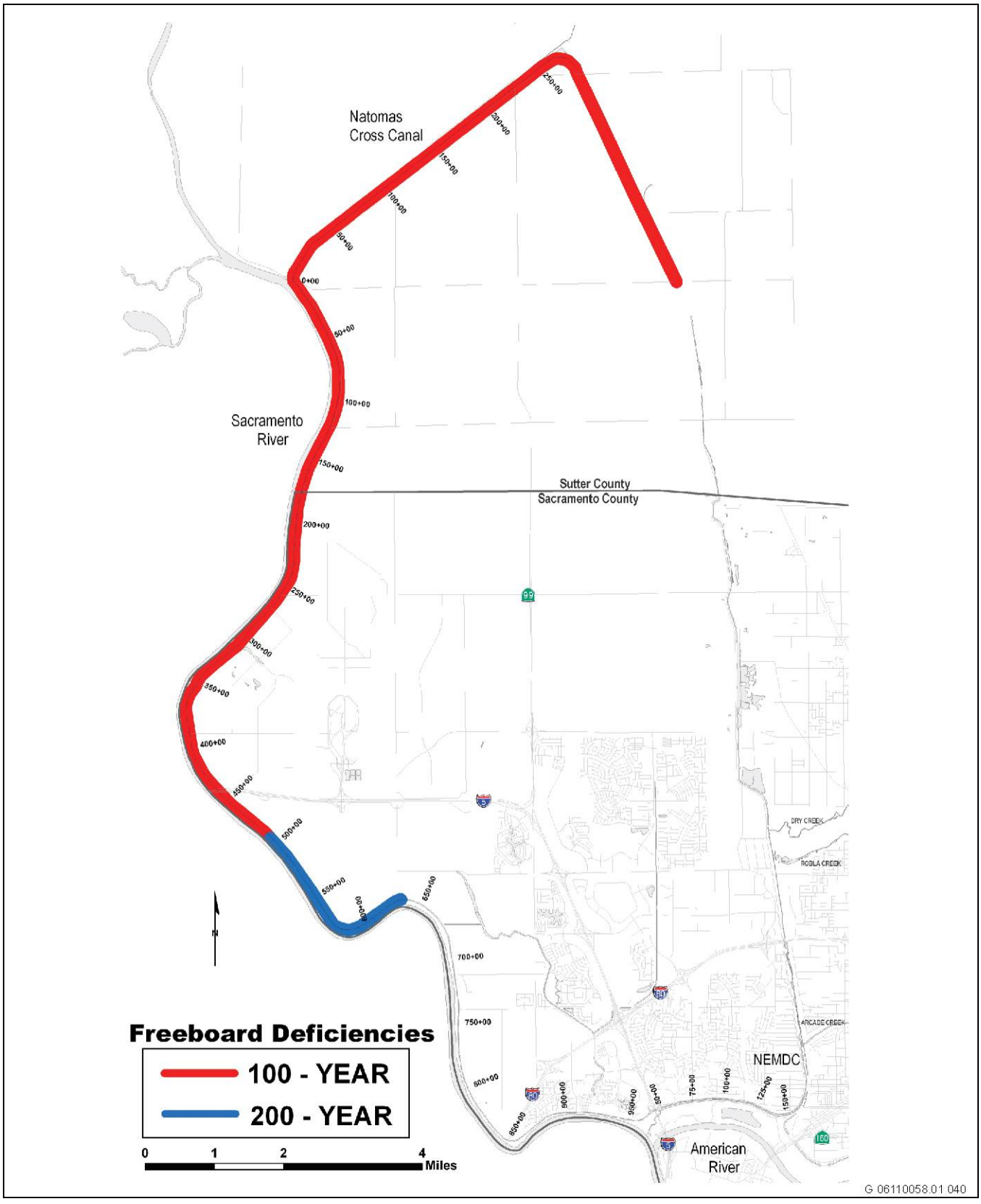
Source: CalSil; SACOG 2007; Adapted by EDAW in 2007

Project Vicinity **Exhibit 2-2**



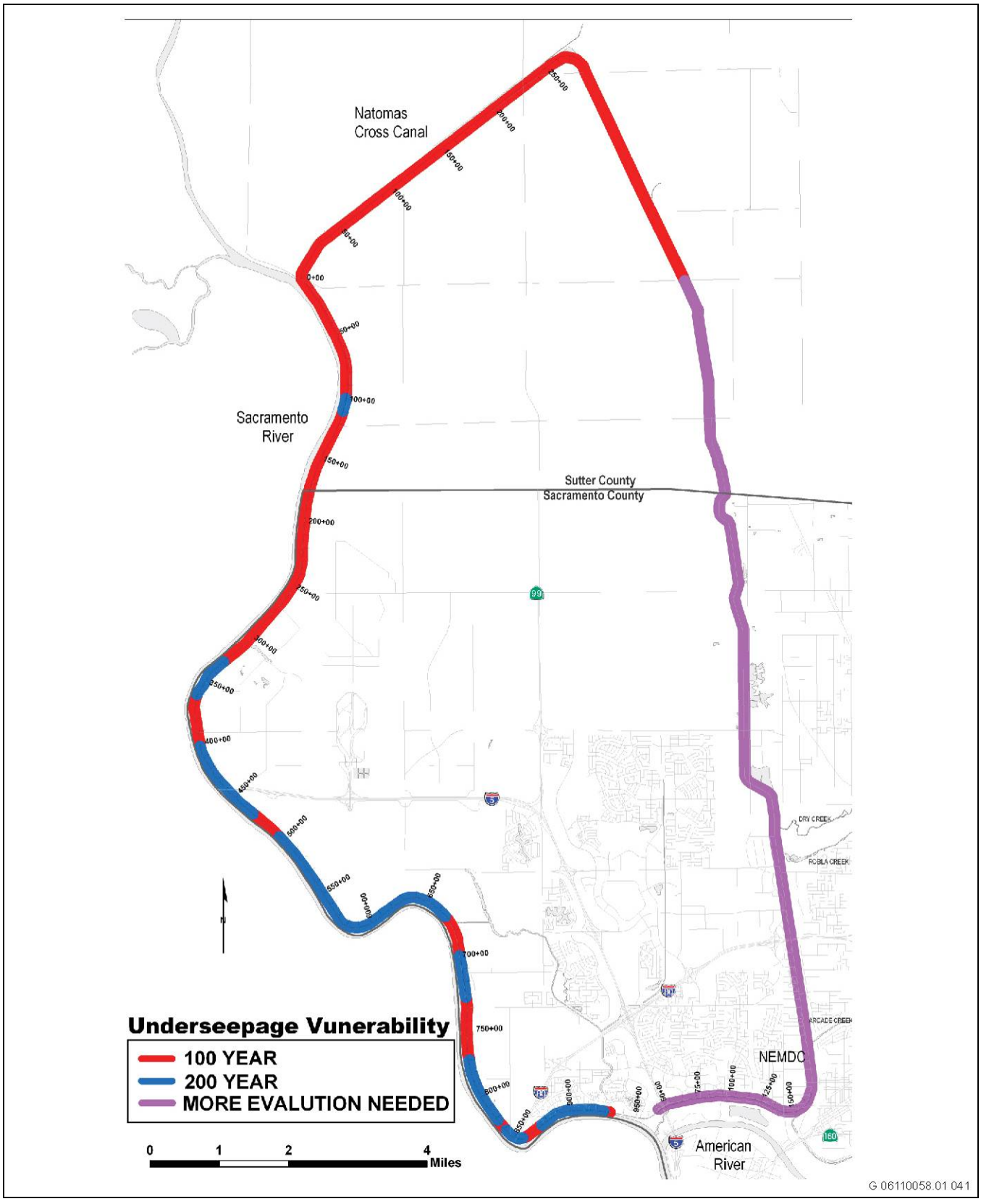
Source: Prepared by PB Americas in 2007

Potential Inundation Areas **Exhibit 2-3**



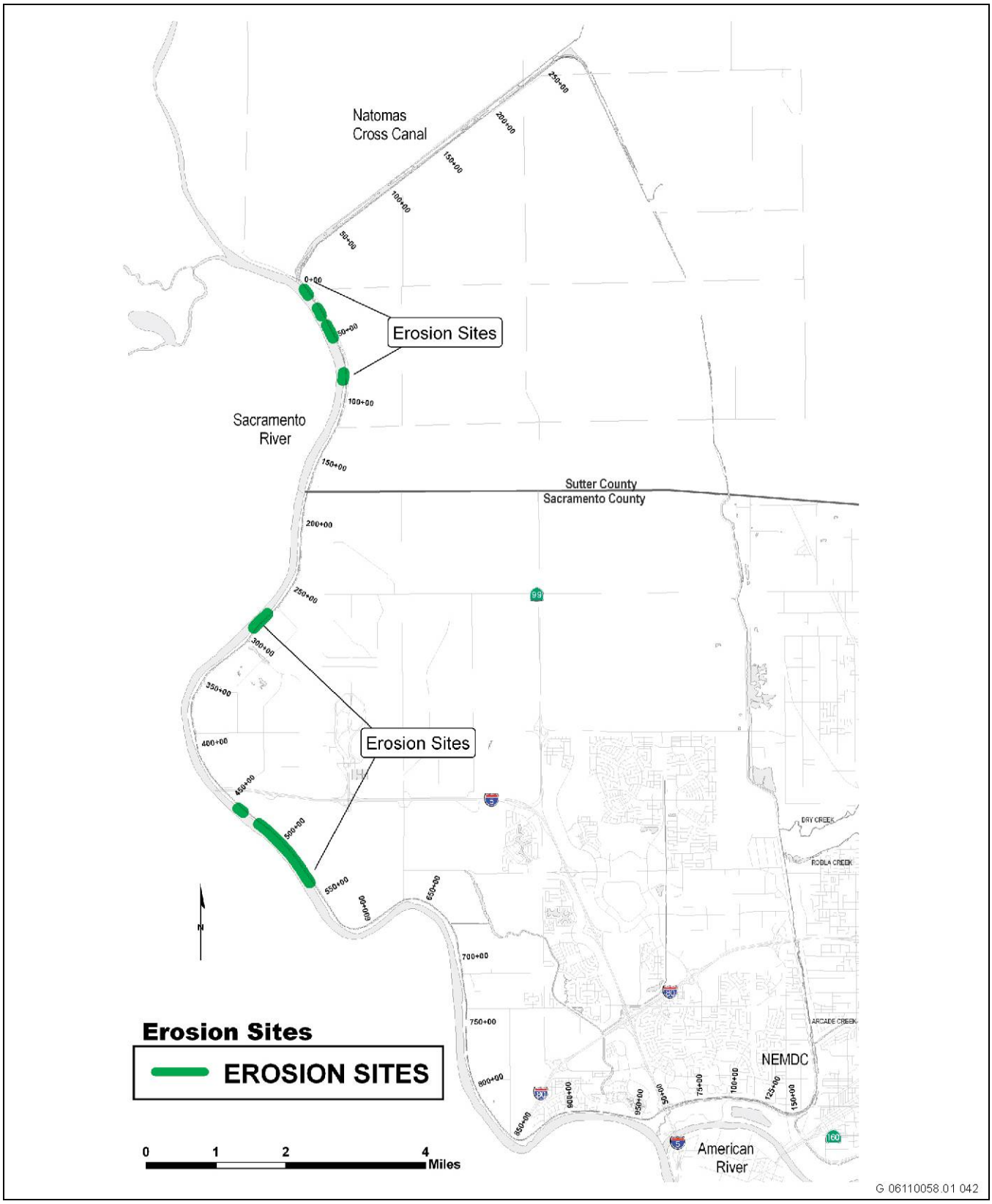
Source: Prepared by PB Americas in 2007

Levee Reaches with Freeboard Deficiencies **Exhibit 2-4**



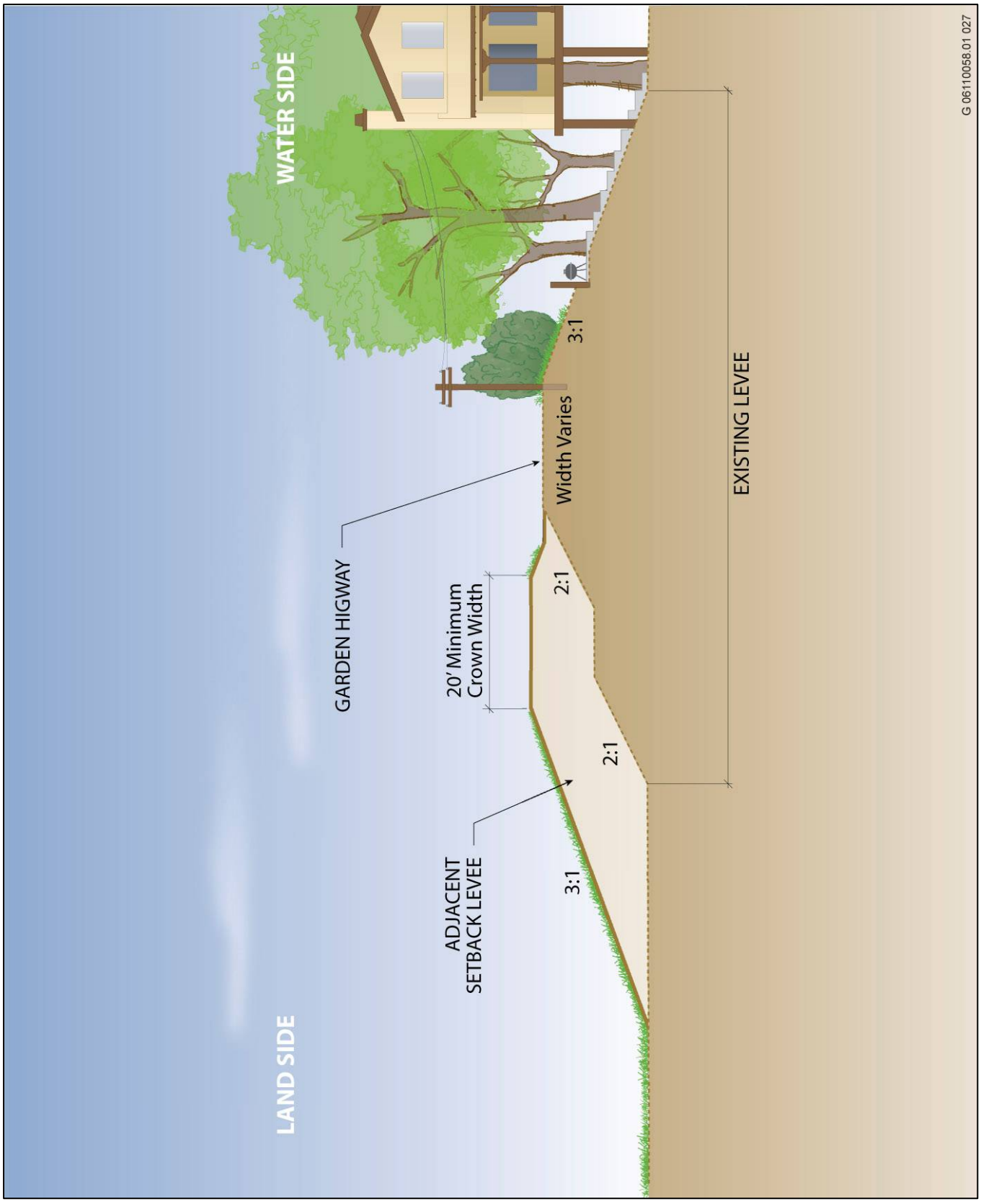
Source: Prepared by PB Americas in 2007

Levee Reaches Requiring Underseepage Remediation **Exhibit 2-5**



Source: Prepared by PB Americas in 2007

Bank Erosion Sites **Exhibit 2-6**



Source: HDR 2007, Adapted by EDAW in 2007

Adjacent Setback Levee Concept **Exhibit 2-7**

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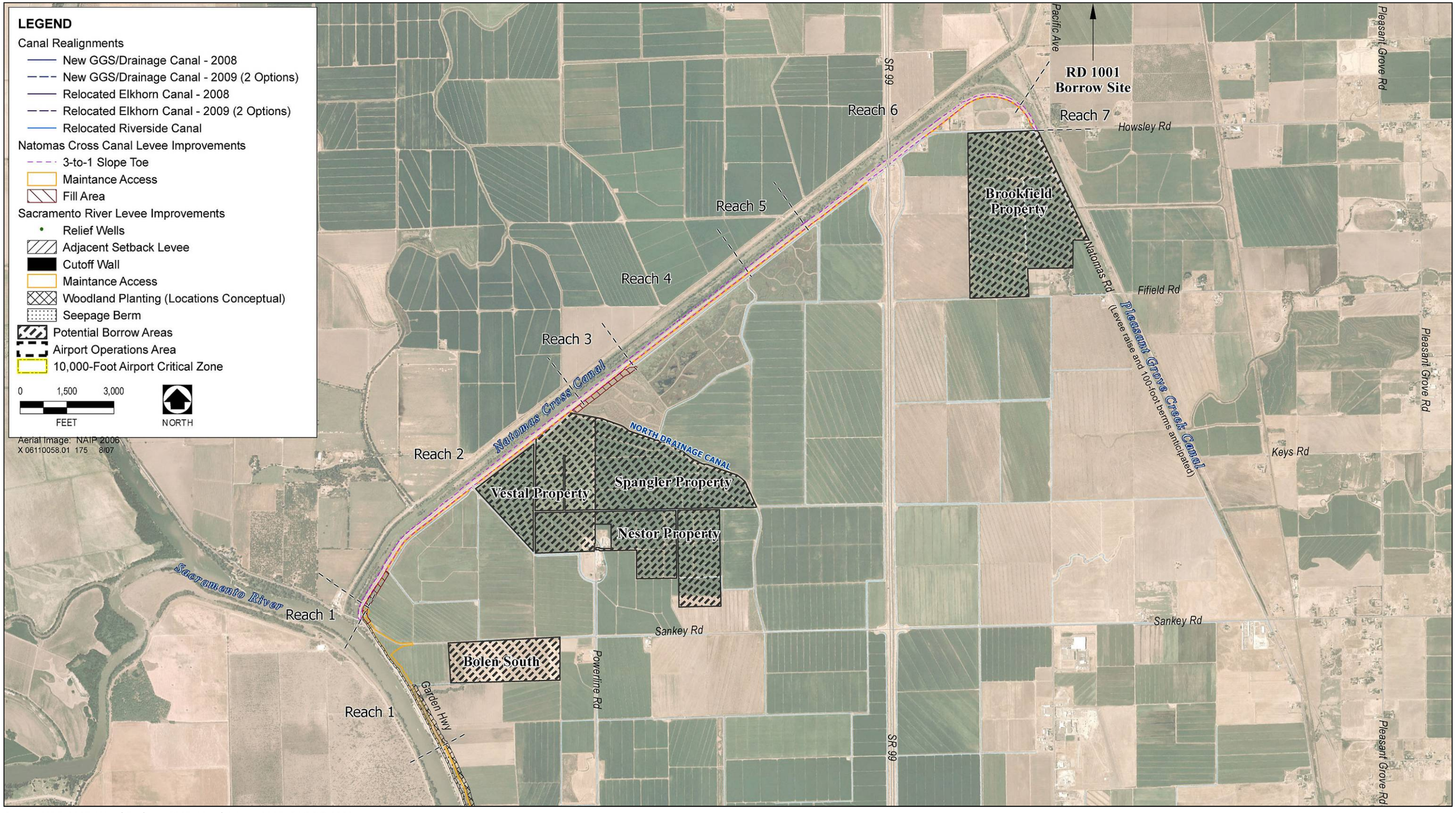
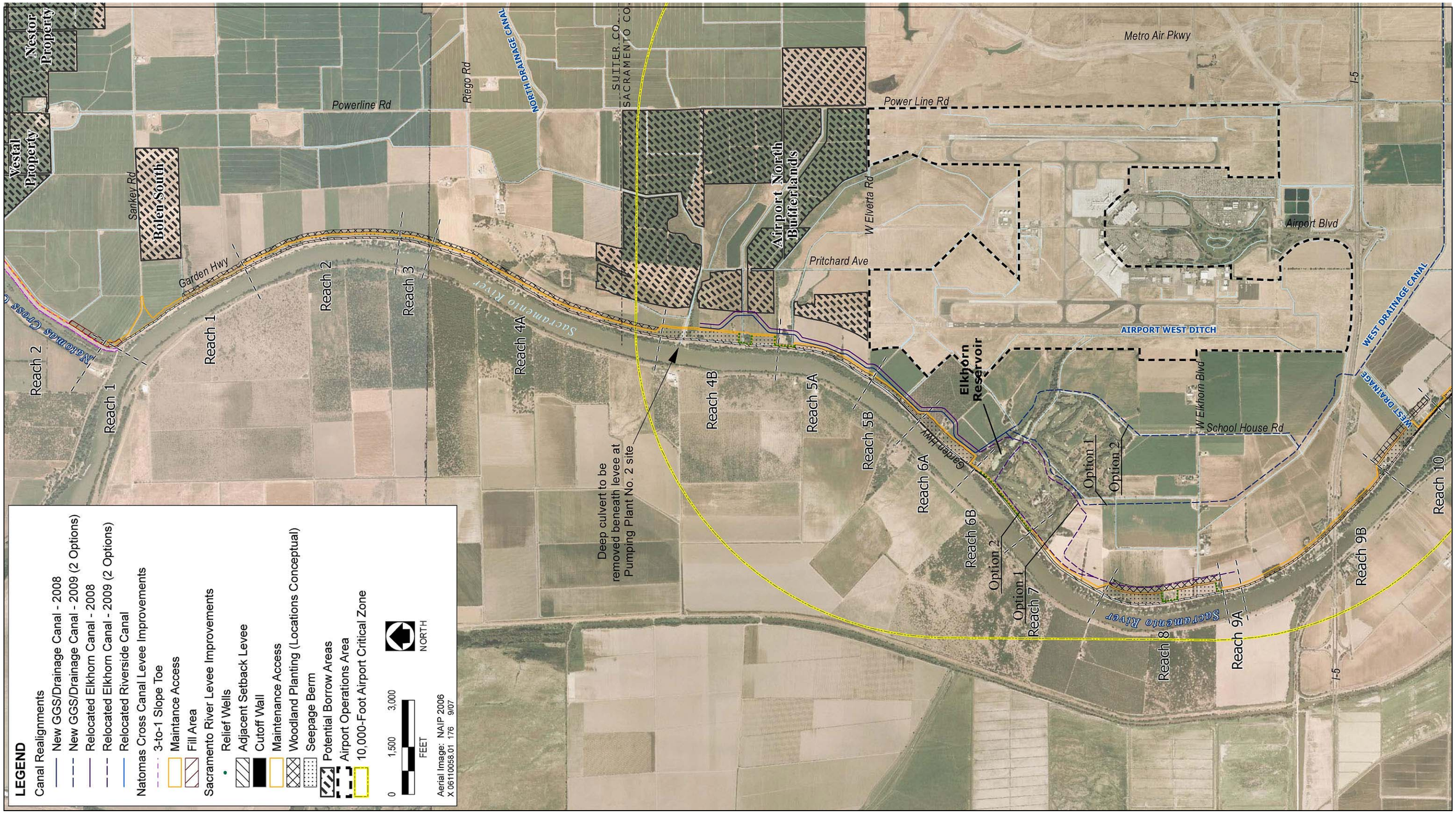


Source: HDR 2007, Wood Rodgers 2007, Mead & Hunt 2007, SACOG 2006

Overview of Proposed Project Features (2008-2010 Construction) – Map 1 of 3 **Exhibit 2-8a**



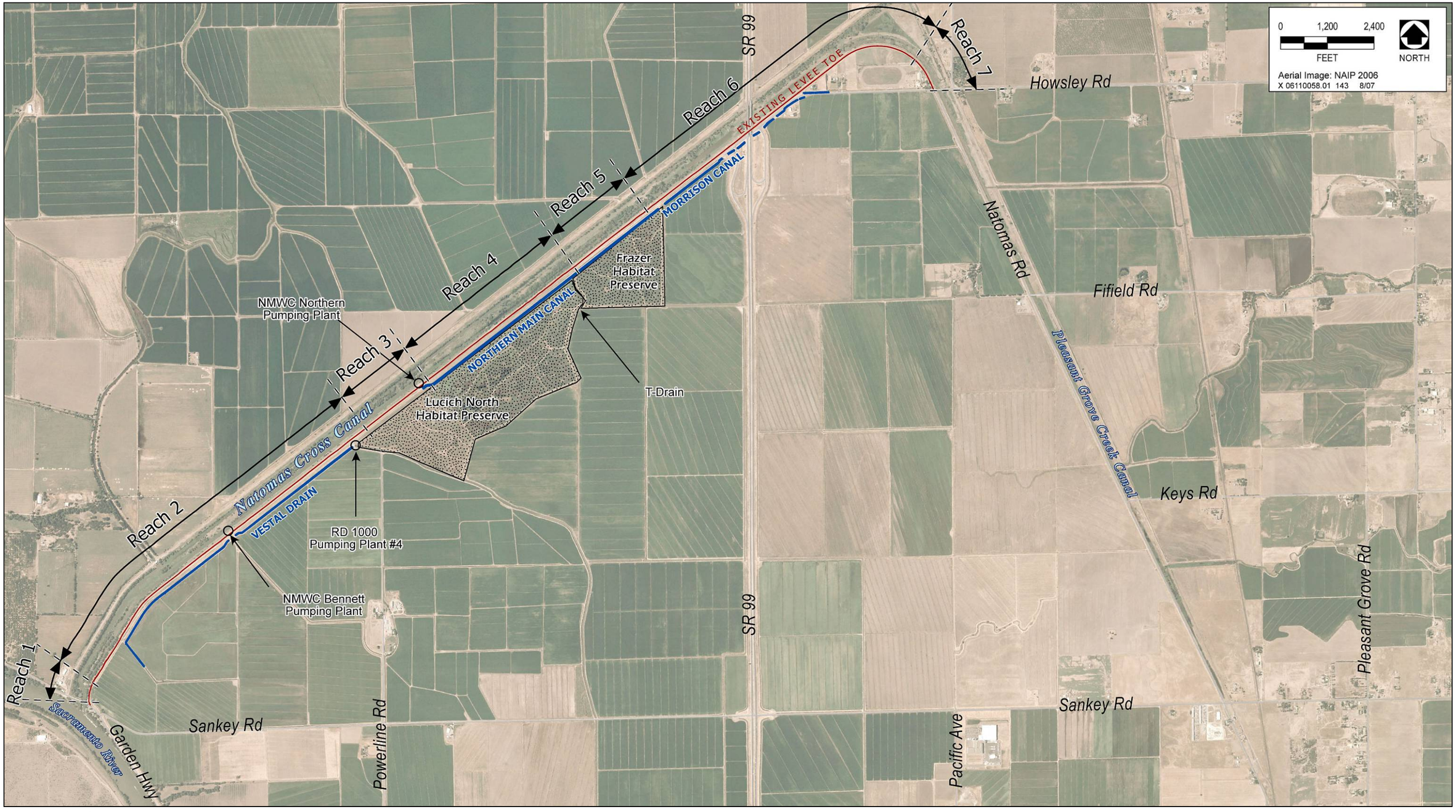
Source: HDR 2007, Wood Rodgers 2007, Mead & Hunt 2007, SACOG 2006

Overview of Proposed Project Features (2008-2010 Construction) – Map 2 of 3

Exhibit 2-8b

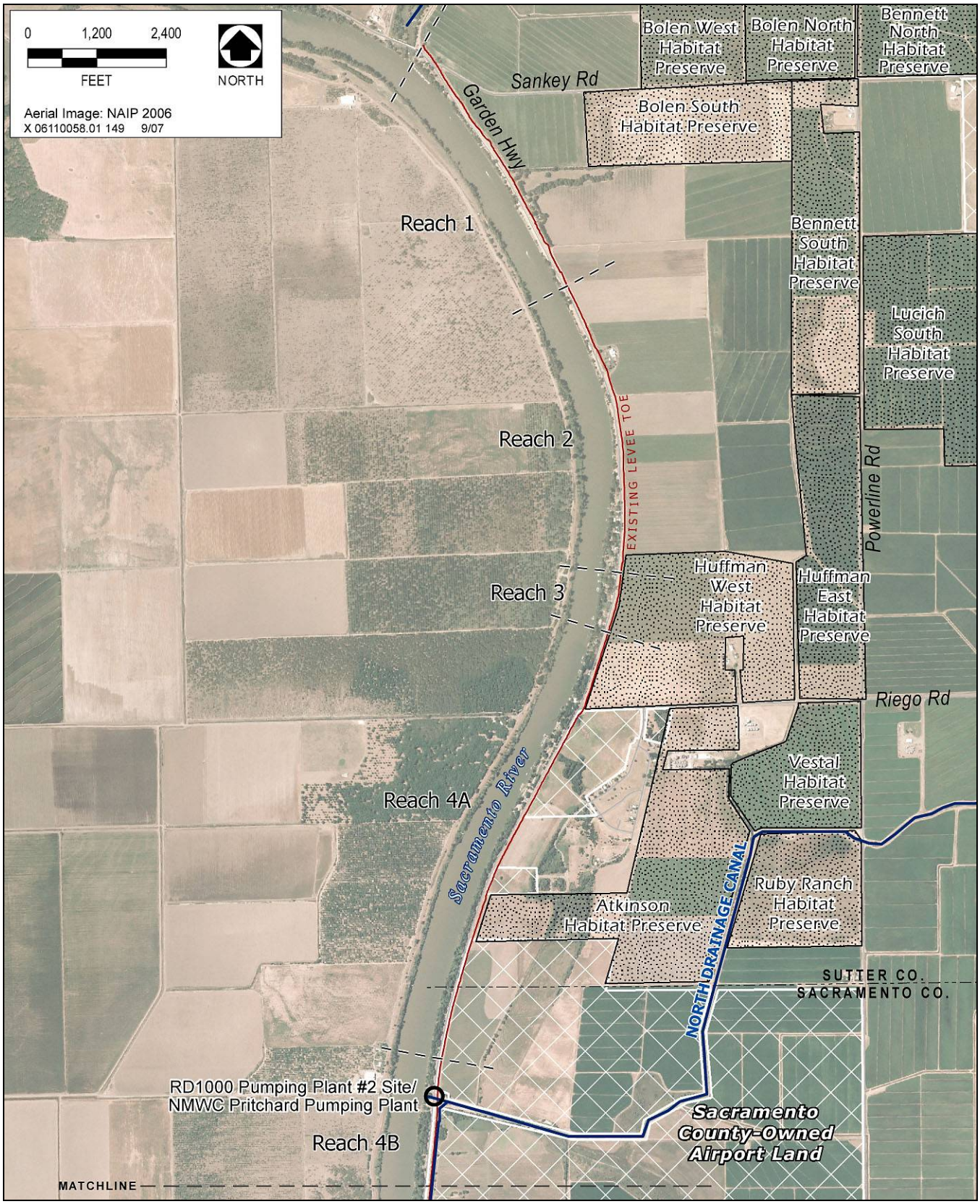
Source: HDR 2007, Wood Rodgers 2007, Mead & Hunt 2007, SACOG 2006

Overview of Proposed Project Features (2008-2010 Construction) – Map 3 of 3 **Exhibit 2-8c**



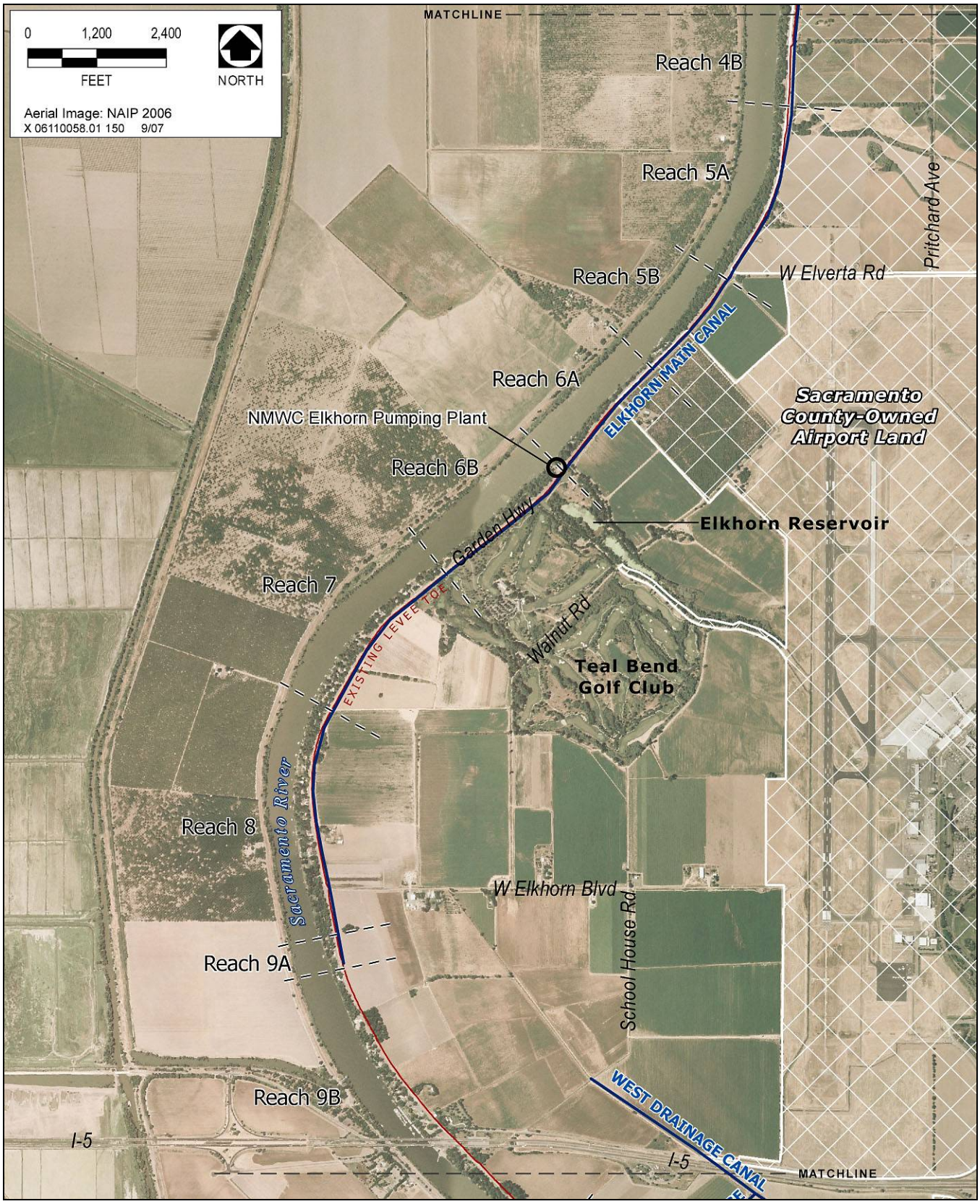
Source: Wood Rodgers 2007

Setting of the Natomas Cross Canal South Levee and Pleasant Grove Creek Canal West Levee **Exhibit 2-9**



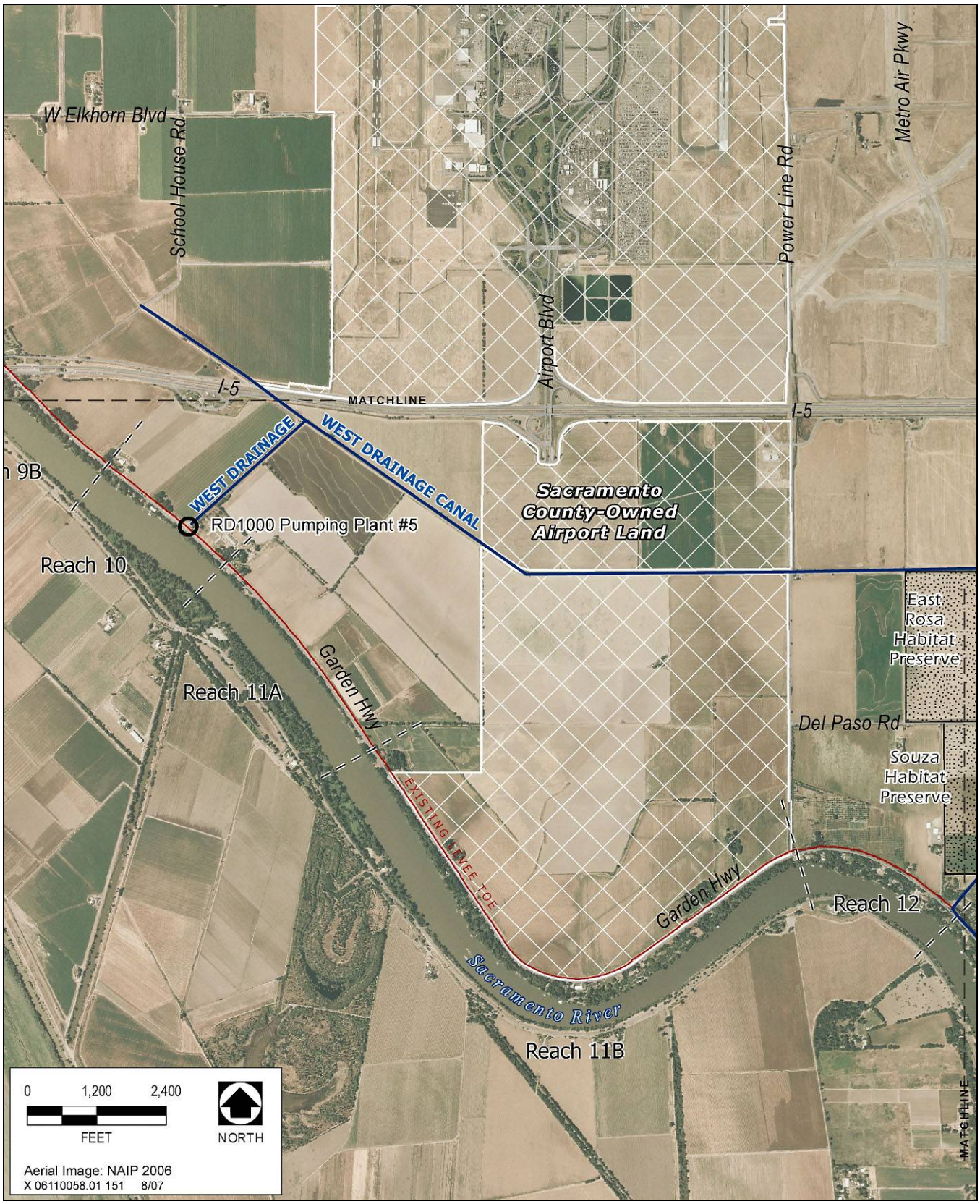
Source: HDR 2007, EDAW 2007

Setting of the Sacramento River East Levee – Map 1 of 4 **Exhibit 2-10a**



Source: HDR 2007, EDAW 2007

Setting of the Sacramento River East Levee – Map 2 of 4 **Exhibit 2-10b**

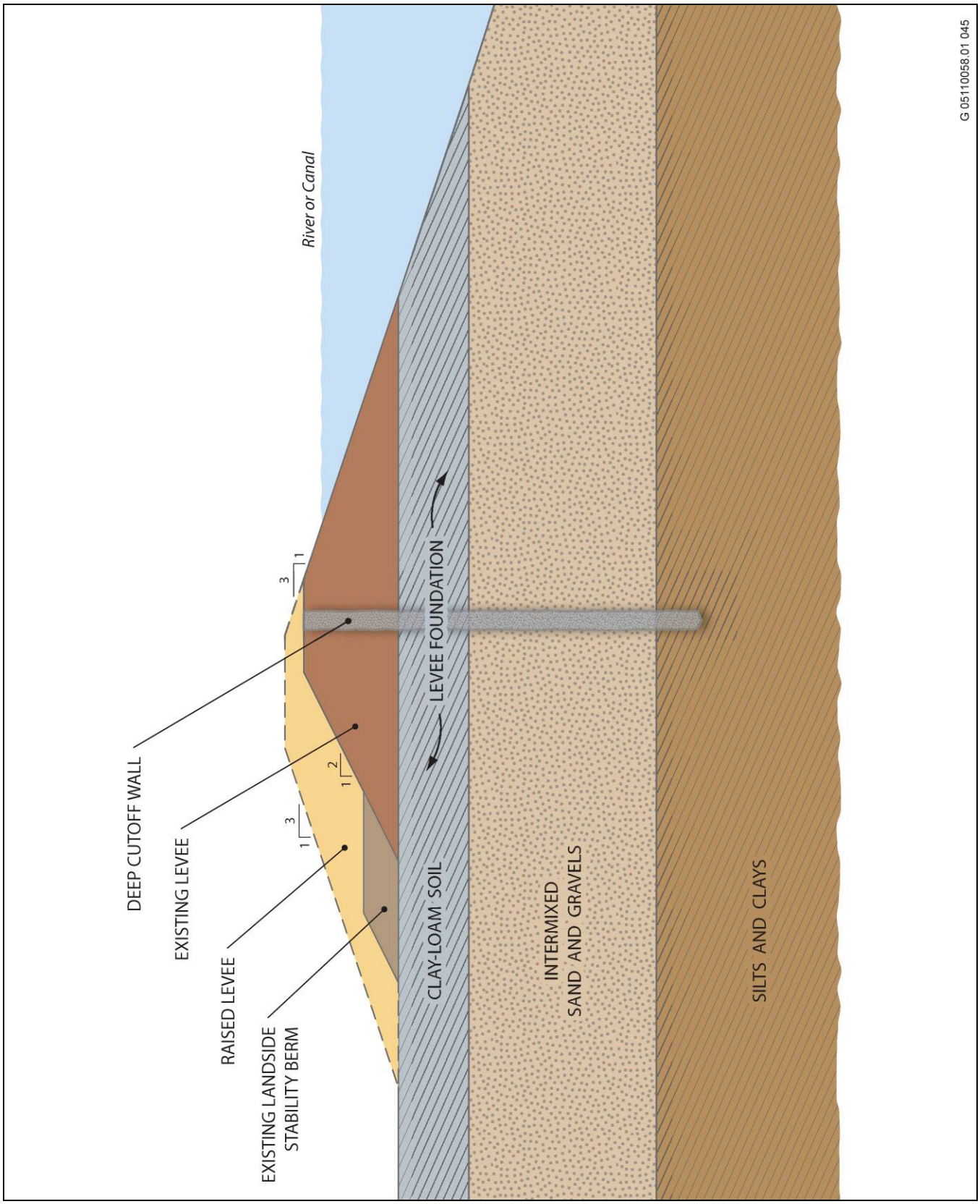


Source: HDR 2007, EDAW 2007

Setting of the Sacramento River East Levee – Map 3 of 4 **Exhibit 2-10c**

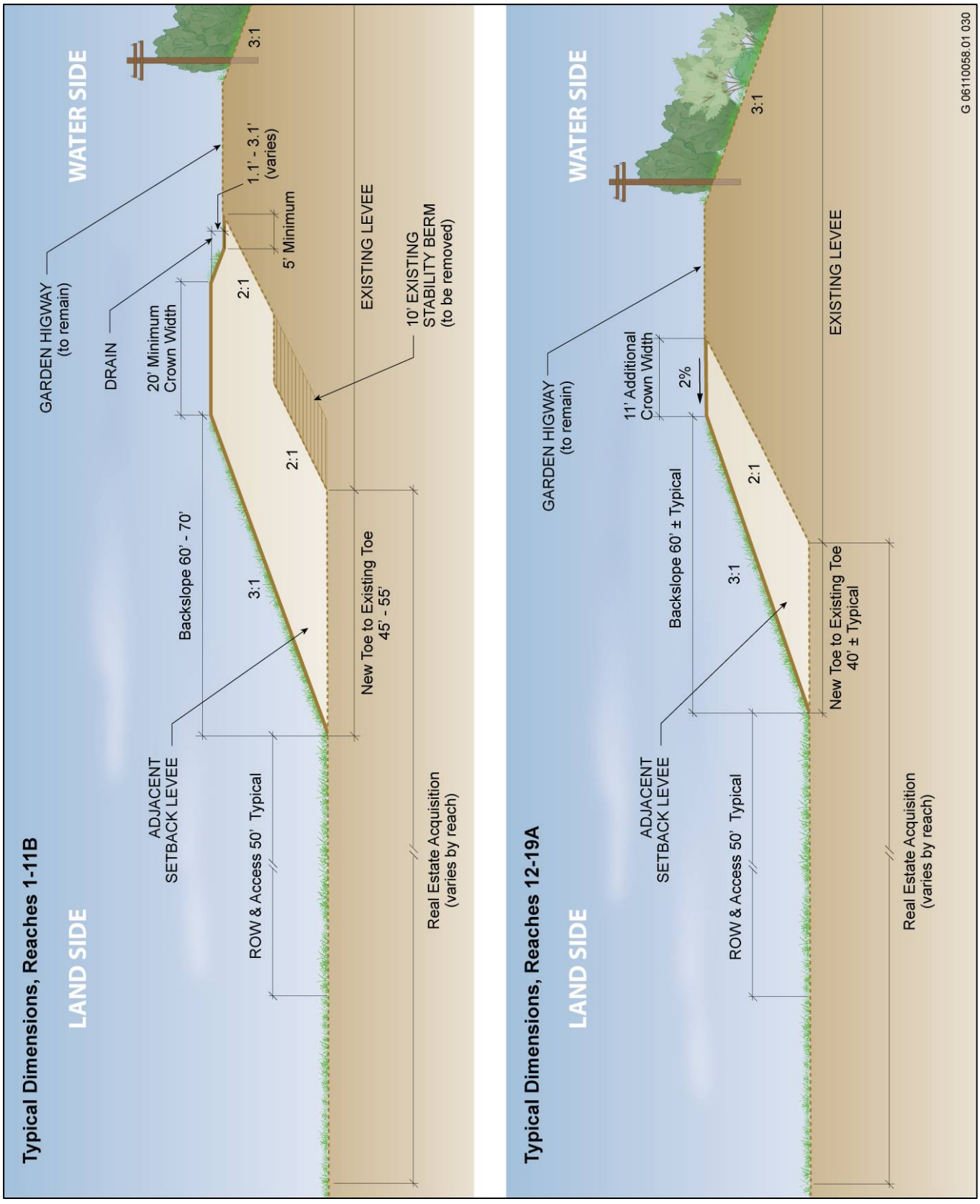
Source: HDR 2007, EDAW 2007

Setting of the Sacramento River East Levee – Map 4 of 4 **Exhibit 2-10d**



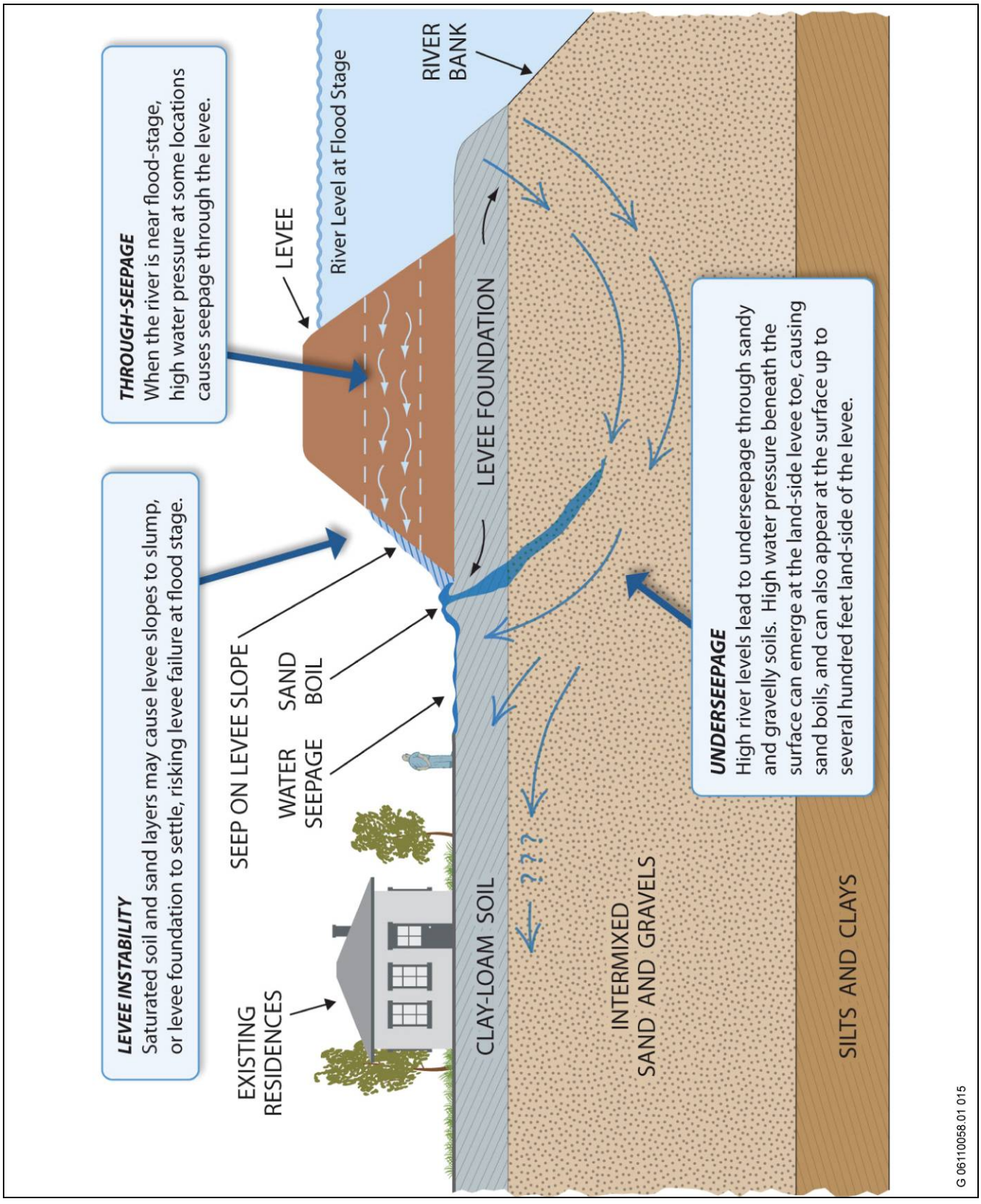
Source: Prepared by Jones & Stokes in 2007

Typical Levee Raise, Flattening of Landside Levee Slope, and Seepage Cutoff Wall **Exhibit 2-11**



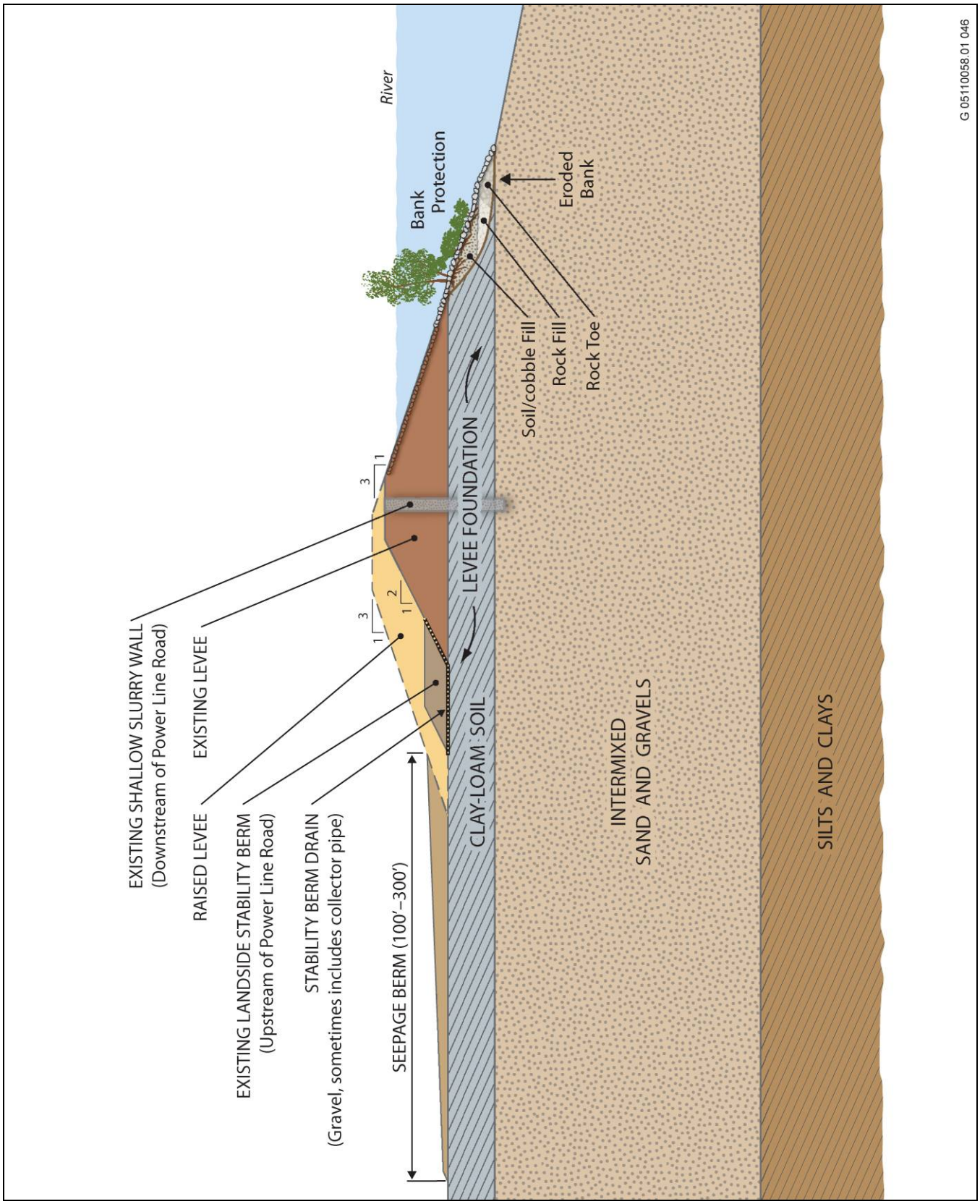
Source: HDR 2007, Adapted by EDAW in 2007

Proposed Adjacent Setback Levee Dimensions **Exhibit 2-12**



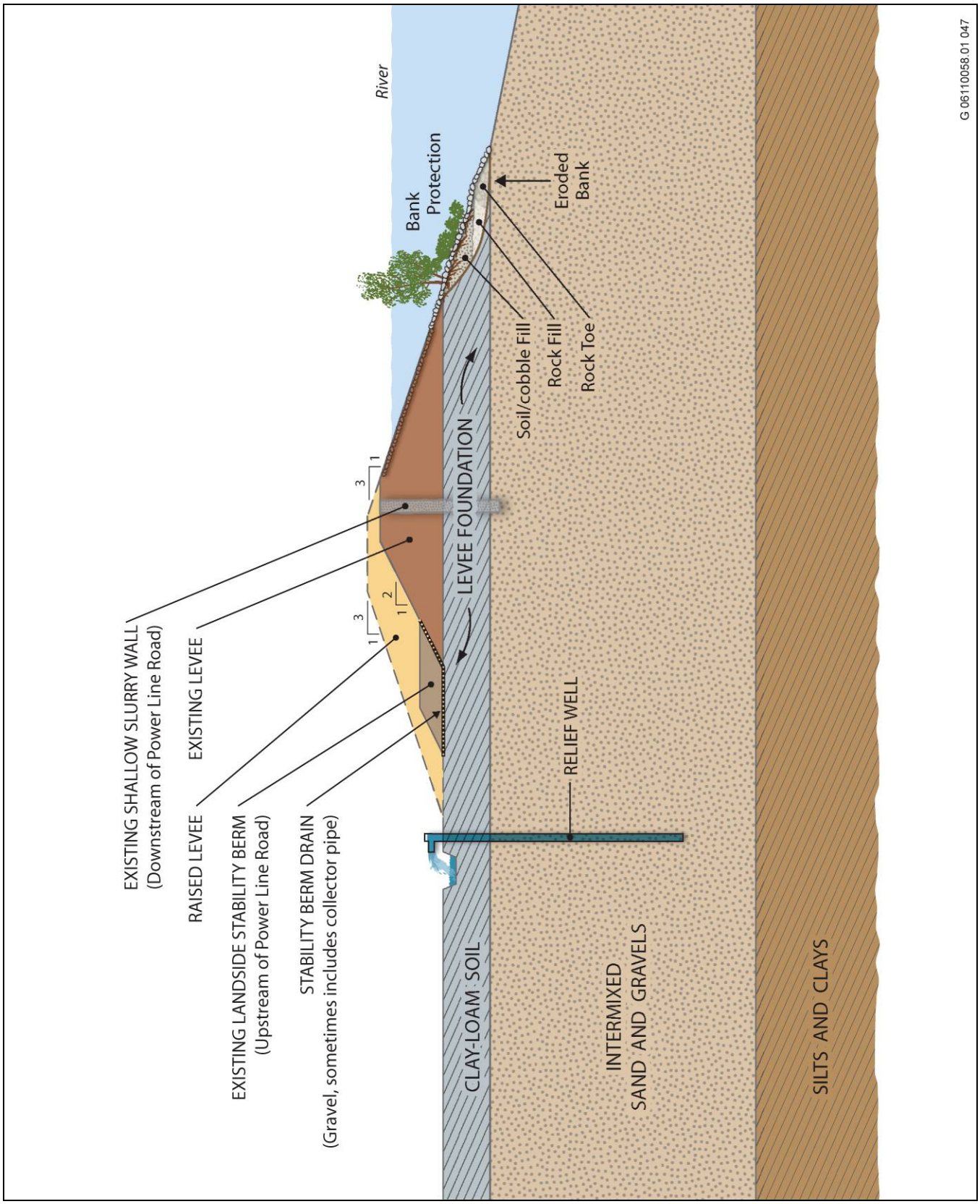
Source: Prepared by Jones & Stokes in 2007

Levee Seepage Mechanisms **Exhibit 2-13**



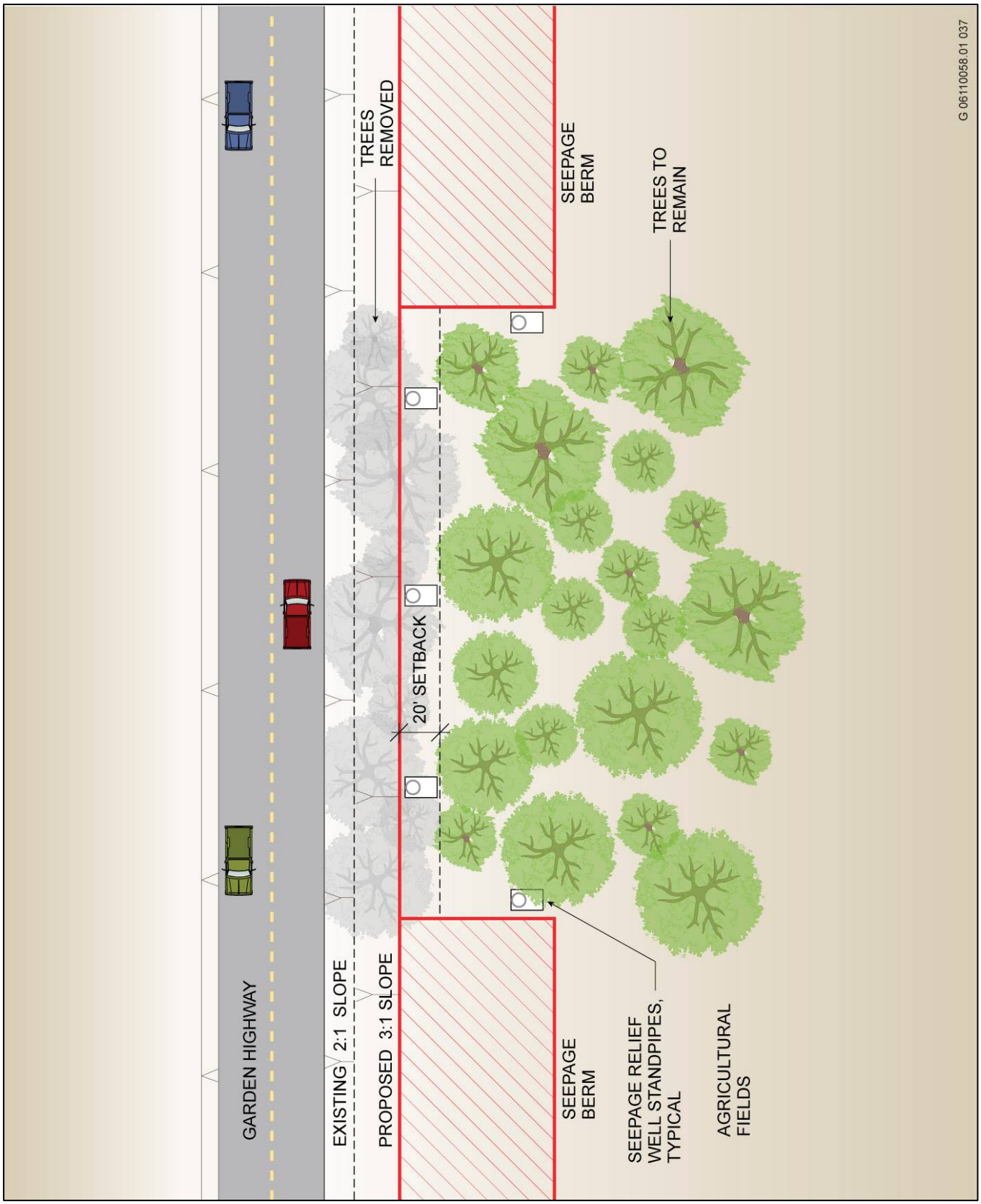
Source: Prepared by Jones & Stokes in 2007

Typical Seepage Berm **Exhibit 2-14**



Source: Prepared by Jones & Stokes in 2007

Typical Relief Well **Exhibit 2-15**



Source: Prepared by EDAW in 2007

Proposed Strategy to Reduce Impacts on Woodlands **Exhibit 2-16**

Source: HDR 2007

DSM Auger

Source: HDR 2007

DSM Equipment

Source: HDR 2007

DSM Batch Plant

Source: HDR 2007

TRD Equipment

Typical Equipment Used in Cutoff Wall Construction **Exhibit 2-17**

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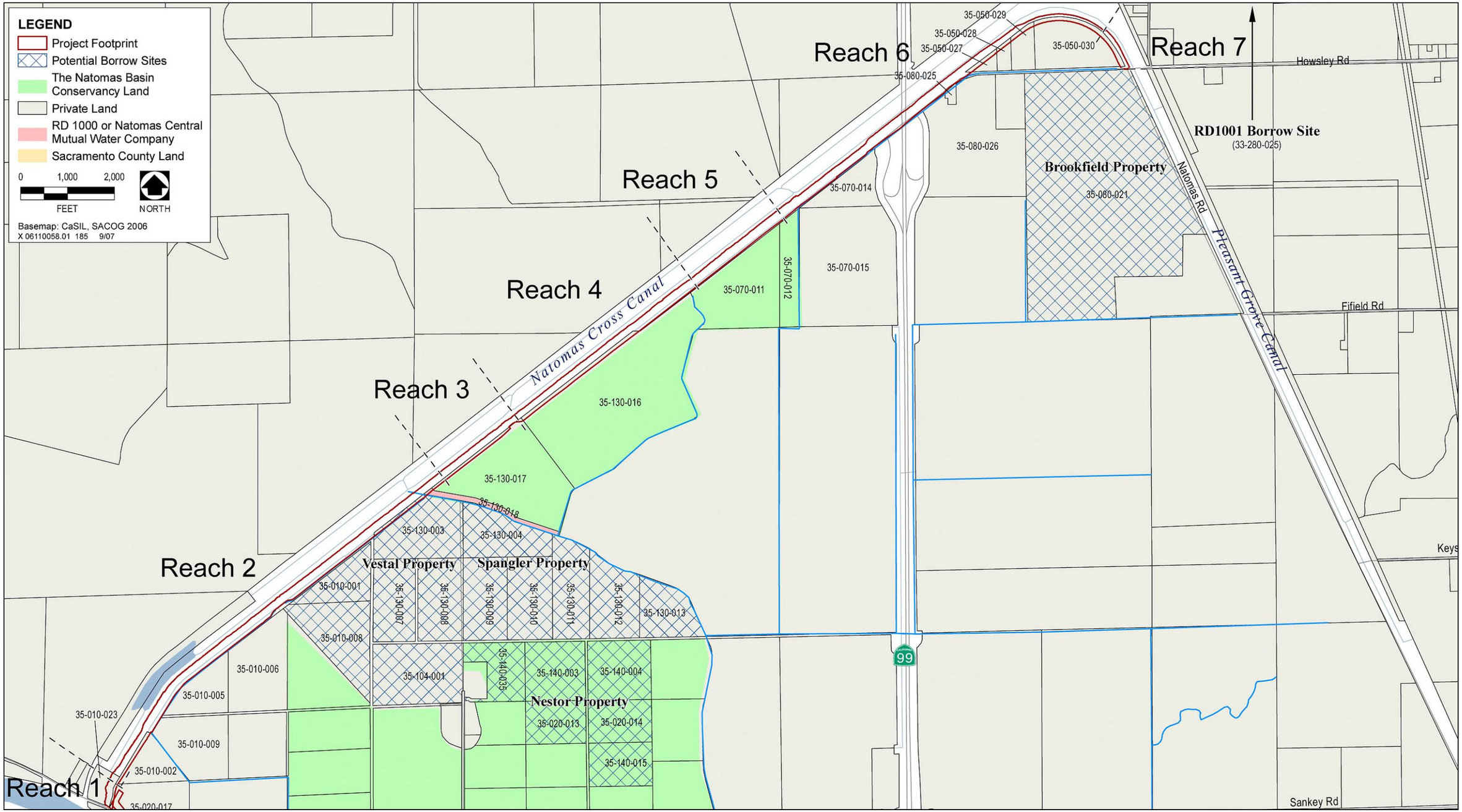
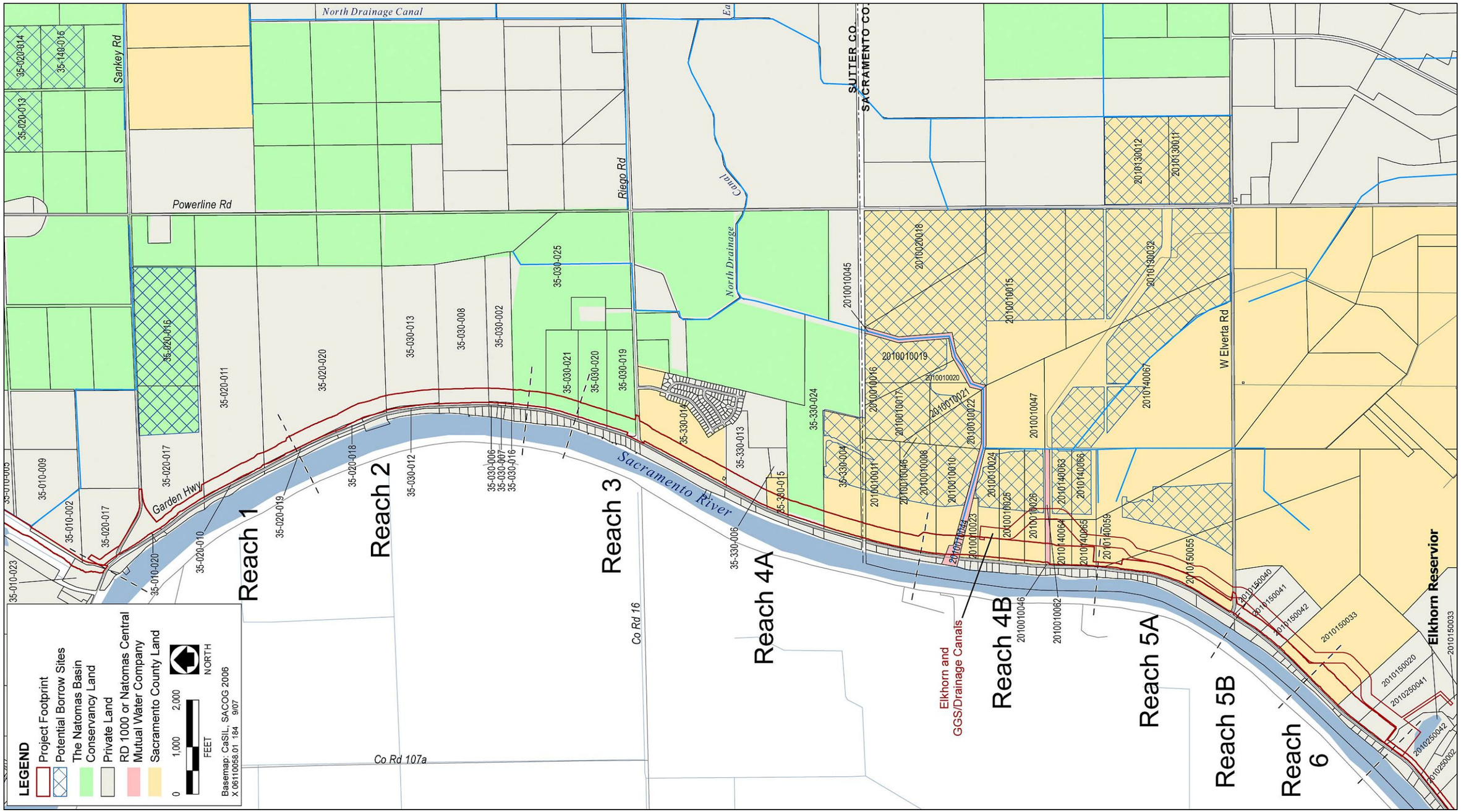


Source: SACOG 2006, Wood Rodgers 2007, HDR 2007, EDAW 2007

Land Ownership in the Proposed Project Footprint for 2008 Construction (Natomas Cross Canal) **Exhibit 2-18a**



Source: SACOG 2006, Wood Rodgers 2007, HDR 2007, EDAW 2007

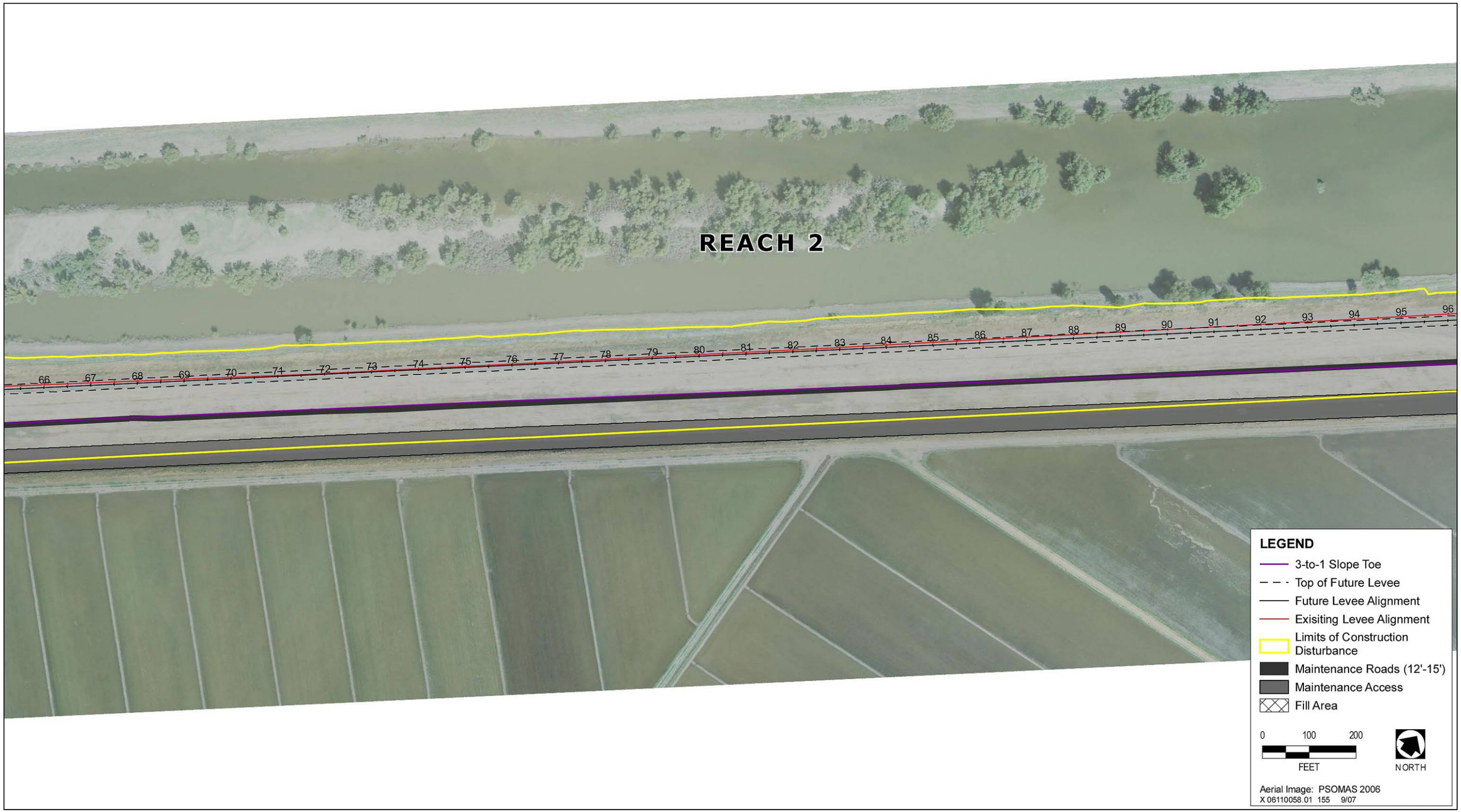
Land Ownership in the Proposed Project Footprint for 2008 Construction (Sacramento River) **Exhibit 2-18b**

Source: Wood Rodgers 2007

Proposed Project Features along the Natomas Cross Canal South Levee (2008 Construction) – Map 1 of 9 **Exhibit 2-19a**

Source: Wood Rodgers 2007

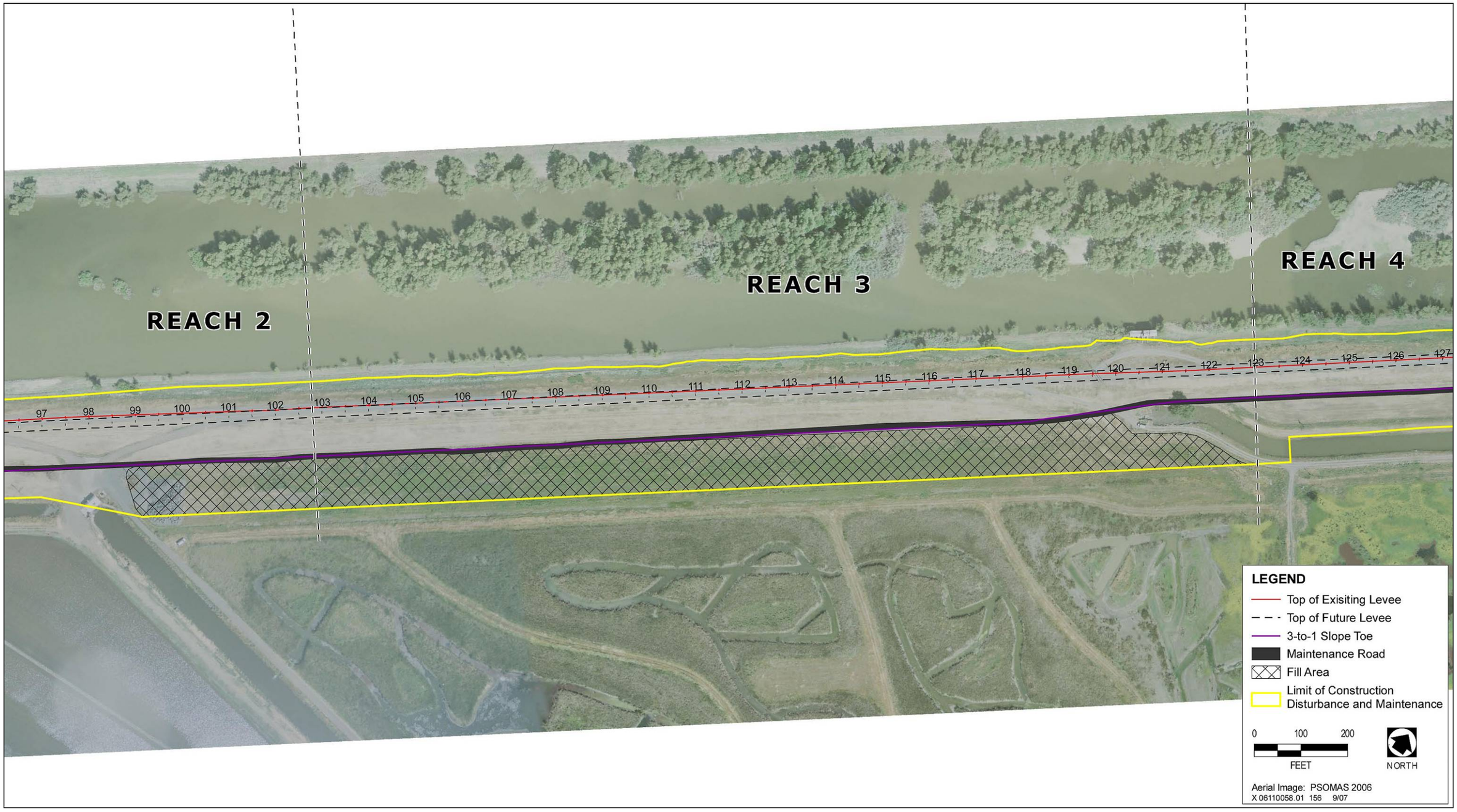
Proposed Project Features along the Natomas Cross Canal South Levee (2008 Construction) – Map 2 of 9 **Exhibit 2-19b**



Source: Wood Rodgers 2007

Proposed Project Features along the Natomas Cross Canal South Levee (2008 Construction) – Map 3 of 9

Exhibit 2-19c

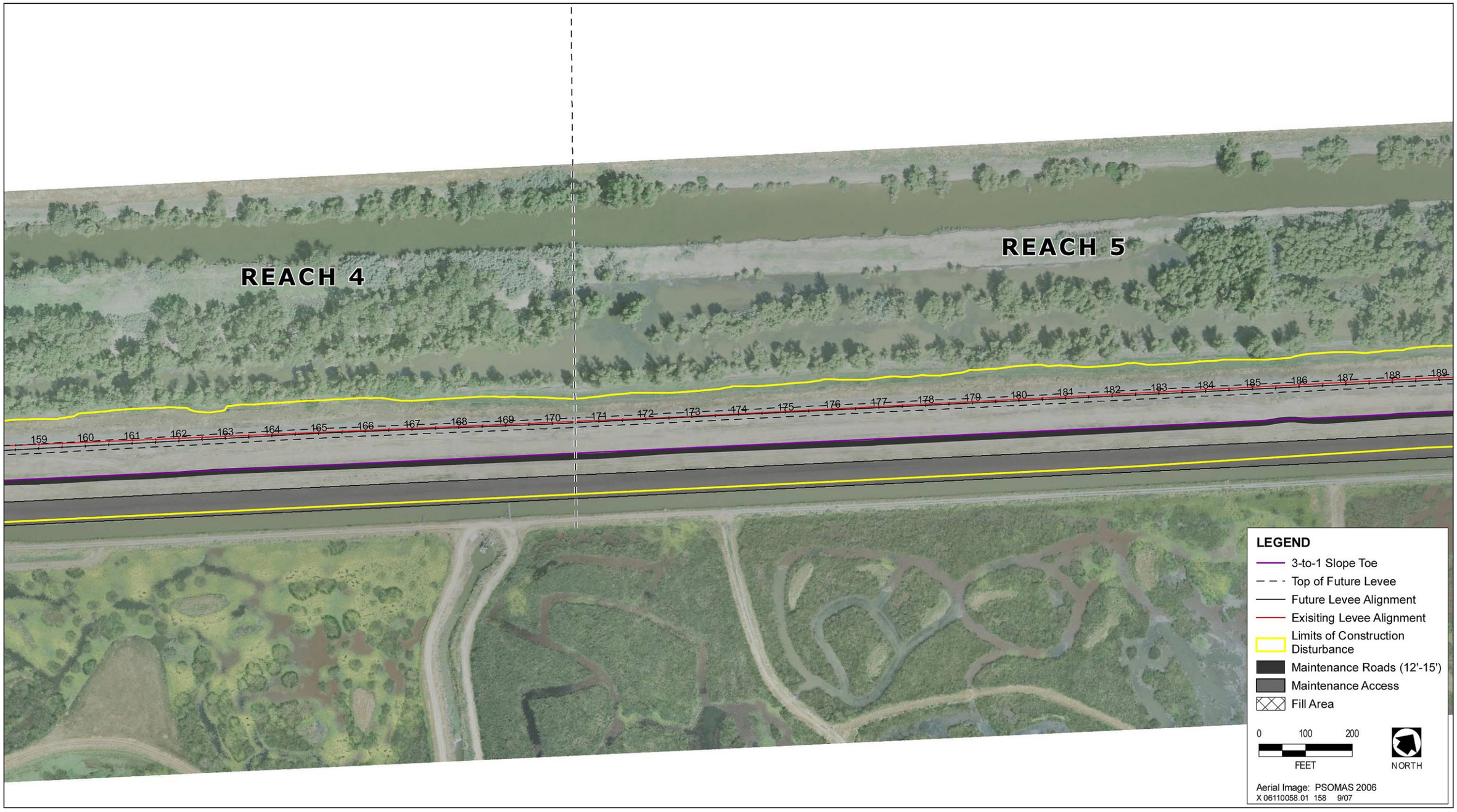


Source: Wood Rodgers 2007

Proposed Project Features along the Natomas Cross Canal South Levee (2008 Construction) – Map 4 of 9 **Exhibit 2-19d**

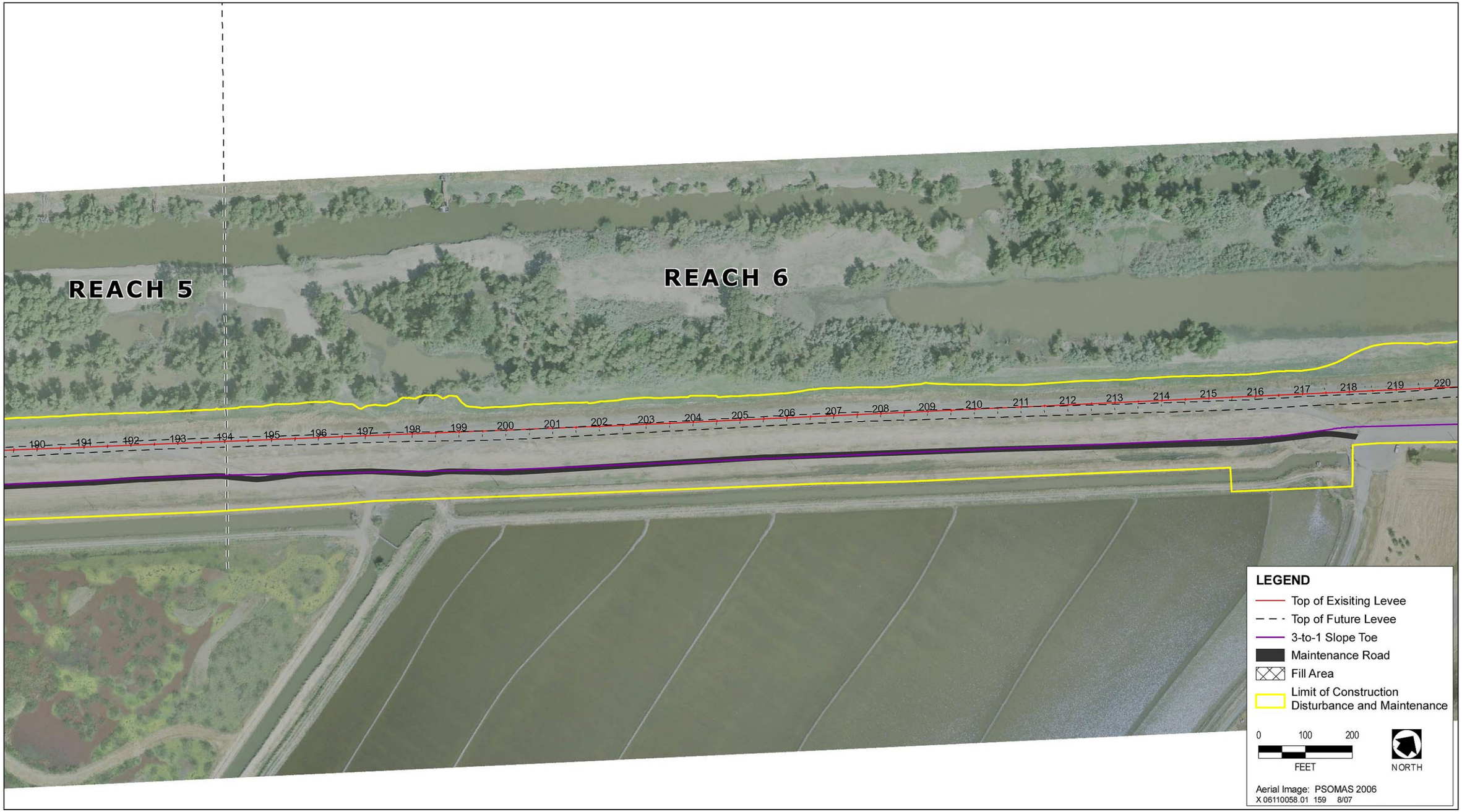
Source: Wood Rodgers 2007

Proposed Project Features along the Natomas Cross Canal South Levee (2008 Construction) – Map 5 of 9 **Exhibit 2-19e**



Source: Wood Rodgers 2007

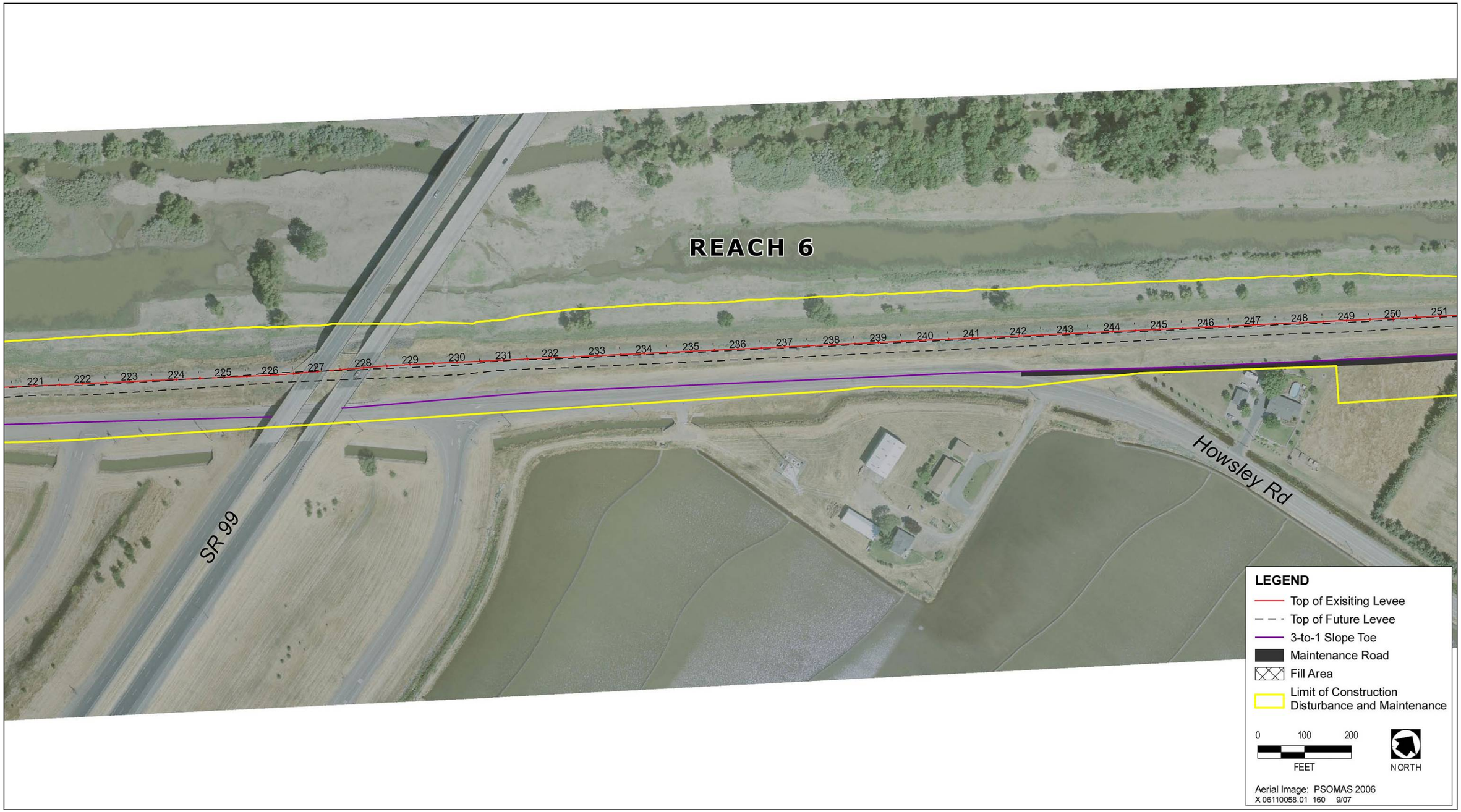
Proposed Project Features along the Natomas Cross Canal South Levee (2008 Construction) – Map 6 of 9 **Exhibit 2-19f**



Source: Wood Rodgers 2007

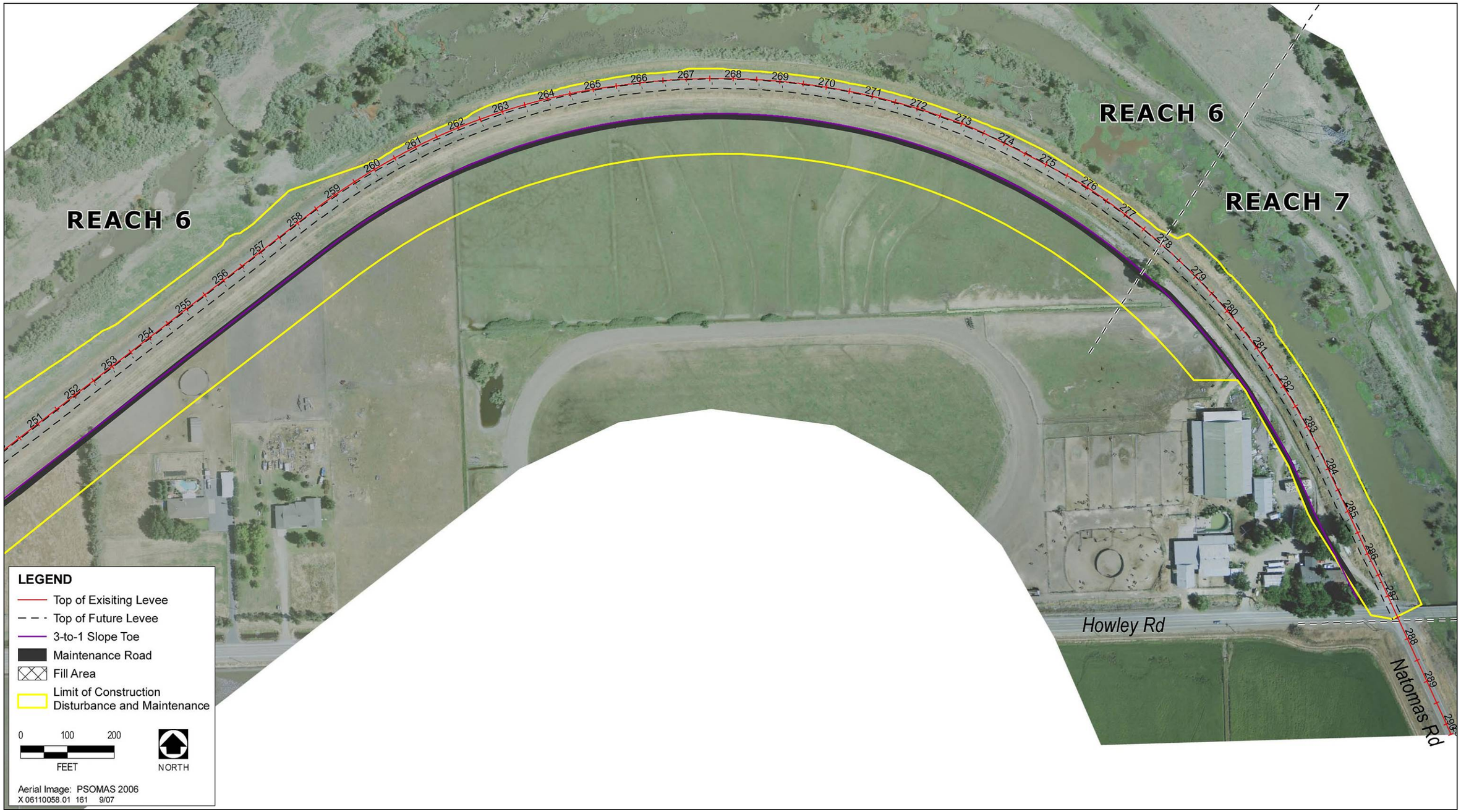
Proposed Project Features along the Natomas Cross Canal South Levee (2008 Construction) – Map 7 of 9

Exhibit 2-19g



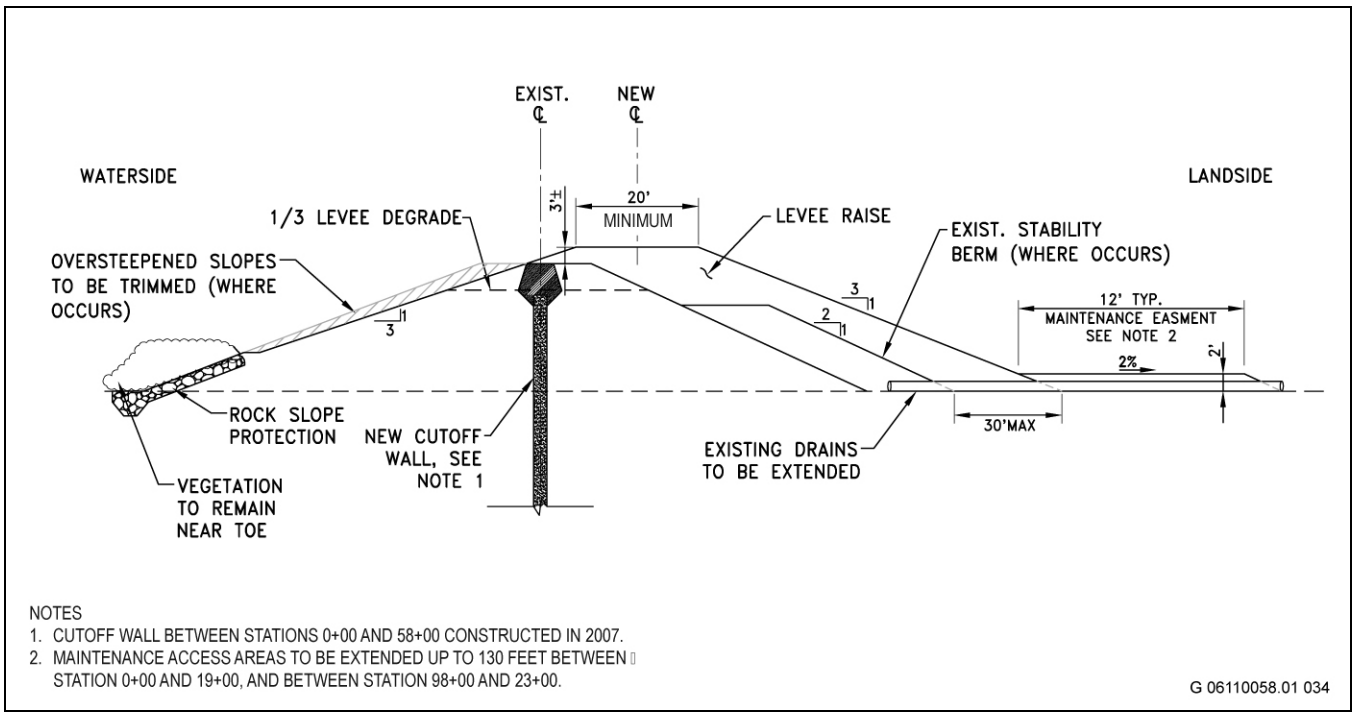
Source: Wood Rodgers 2007

Proposed Project Features along the Natomas Cross Canal South Levee (2008 Construction) – Map 8 of 9 **Exhibit 2-19h**



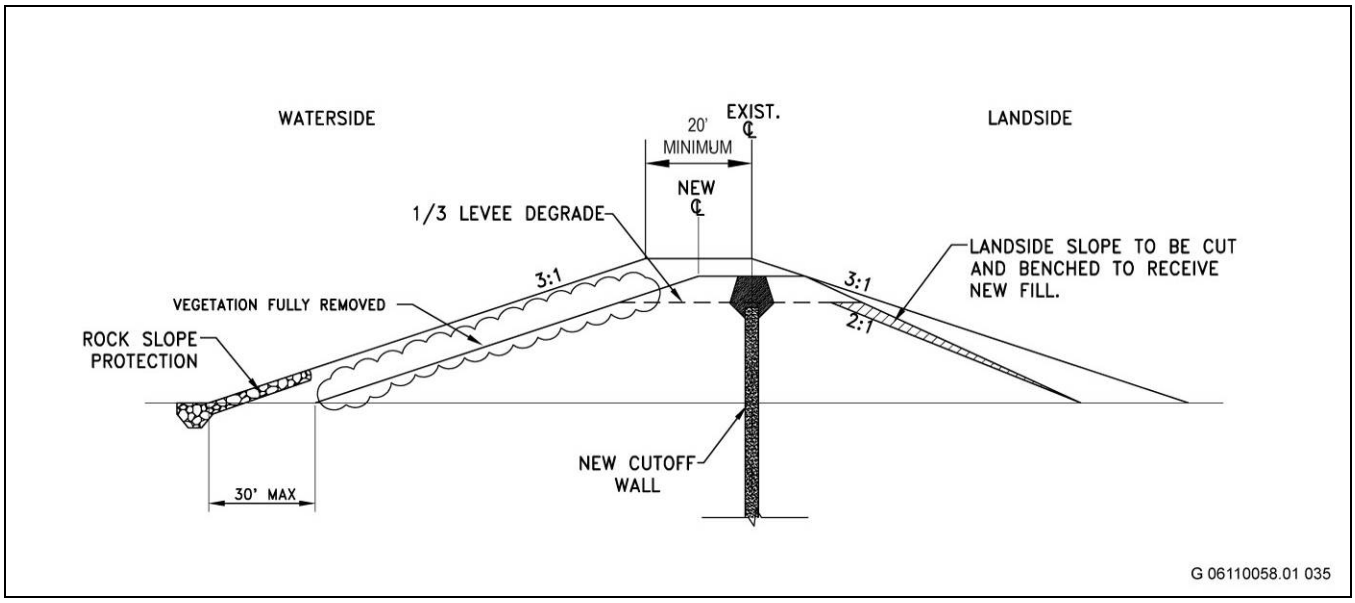
Source: Wood Rodgers 2007

Proposed Project Features along the Natomas Cross Canal South Levee (2008 Construction) – Map 9 of 9 **Exhibit 2-19i**



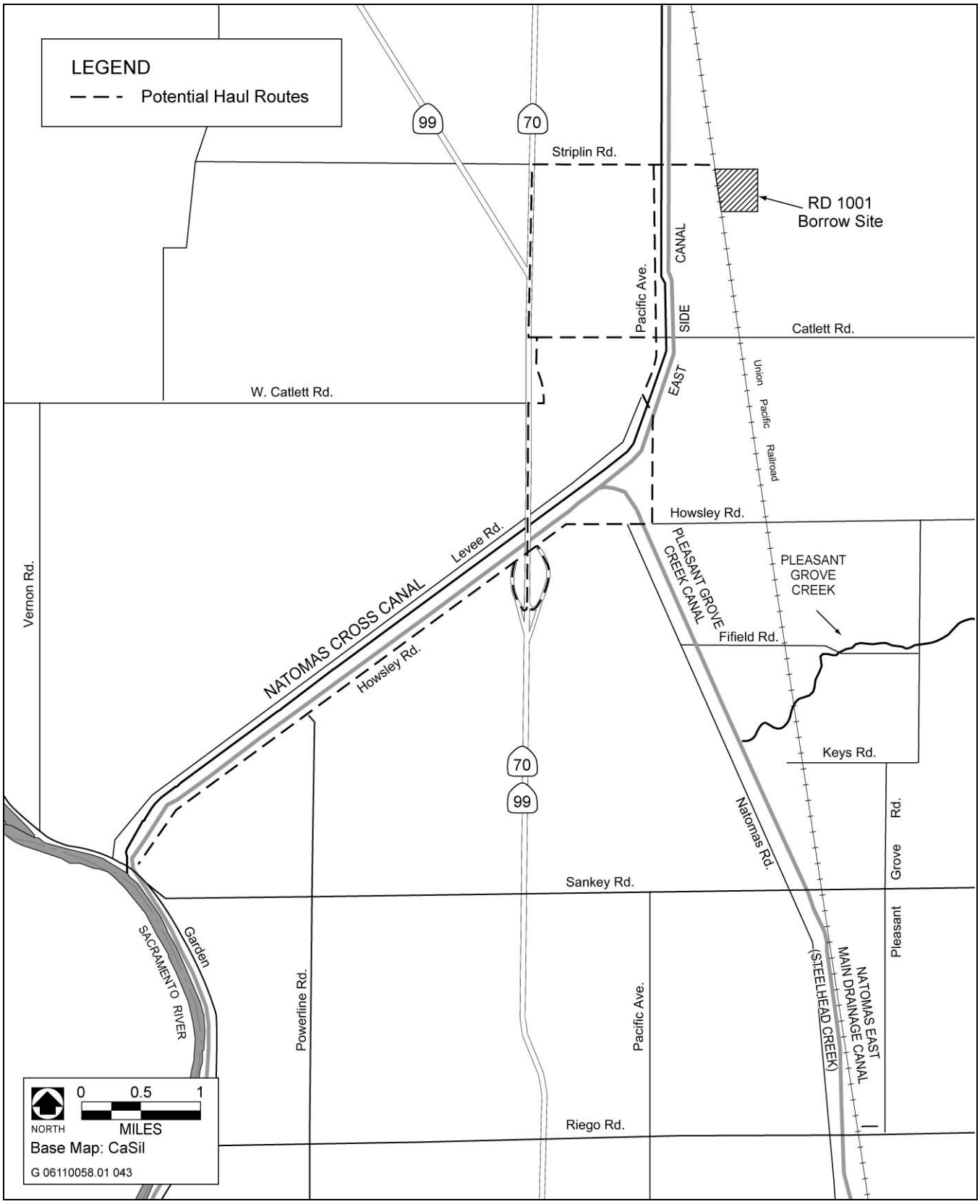
Source: Prepared by Wood Rodgers in 2007

Cross Section of Landside Raise of the Natomas Cross Canal South Levee (2008 Construction) **Exhibit 2-20**



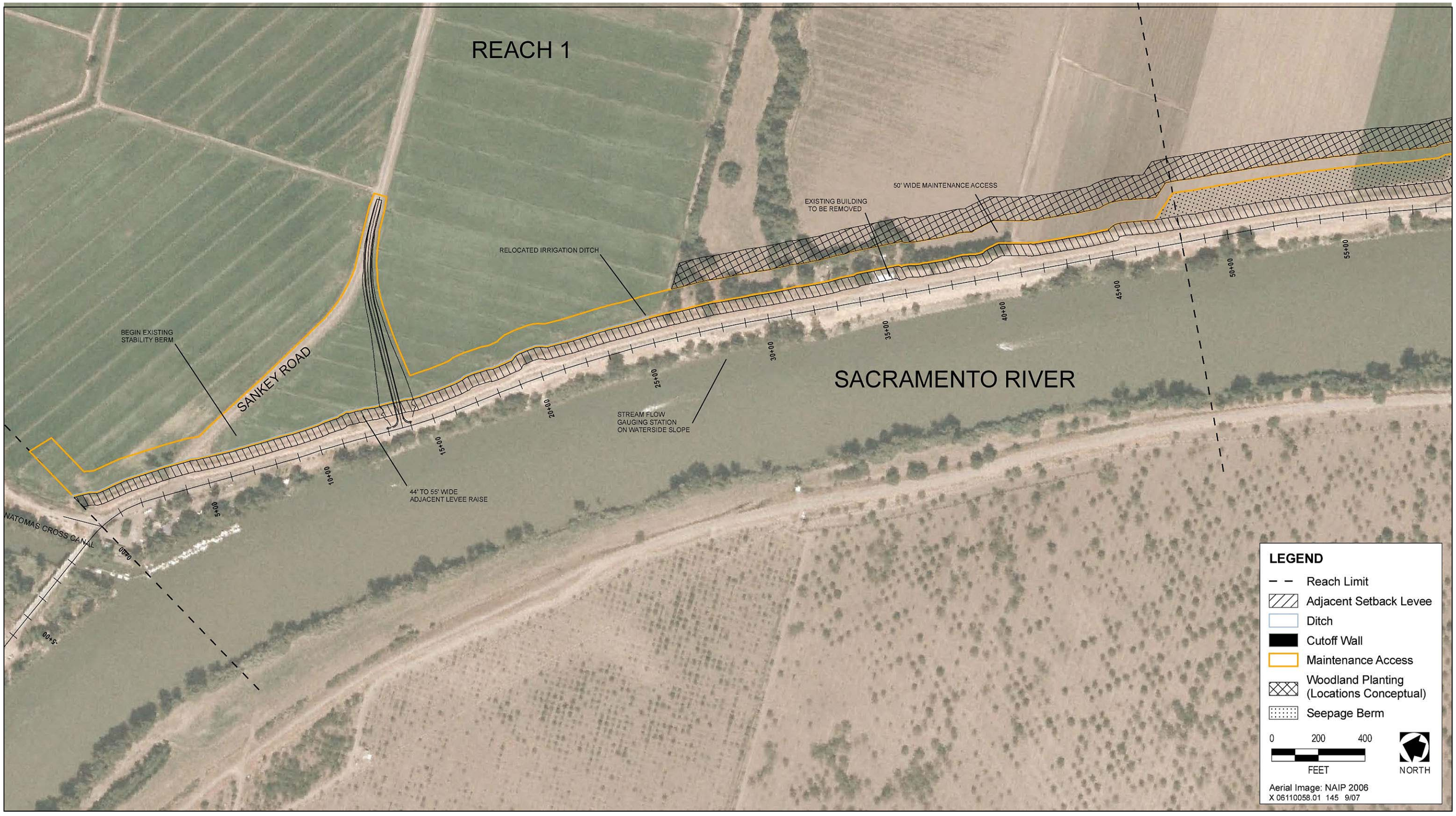
Source: Prepared by Wood Rodgers in 2007

Cross Section of Waterside Raise of the Natomas Cross Canal South Levee (2008 Construction) **Exhibit 2-21**



Source: Adapted by EDAW in 2007

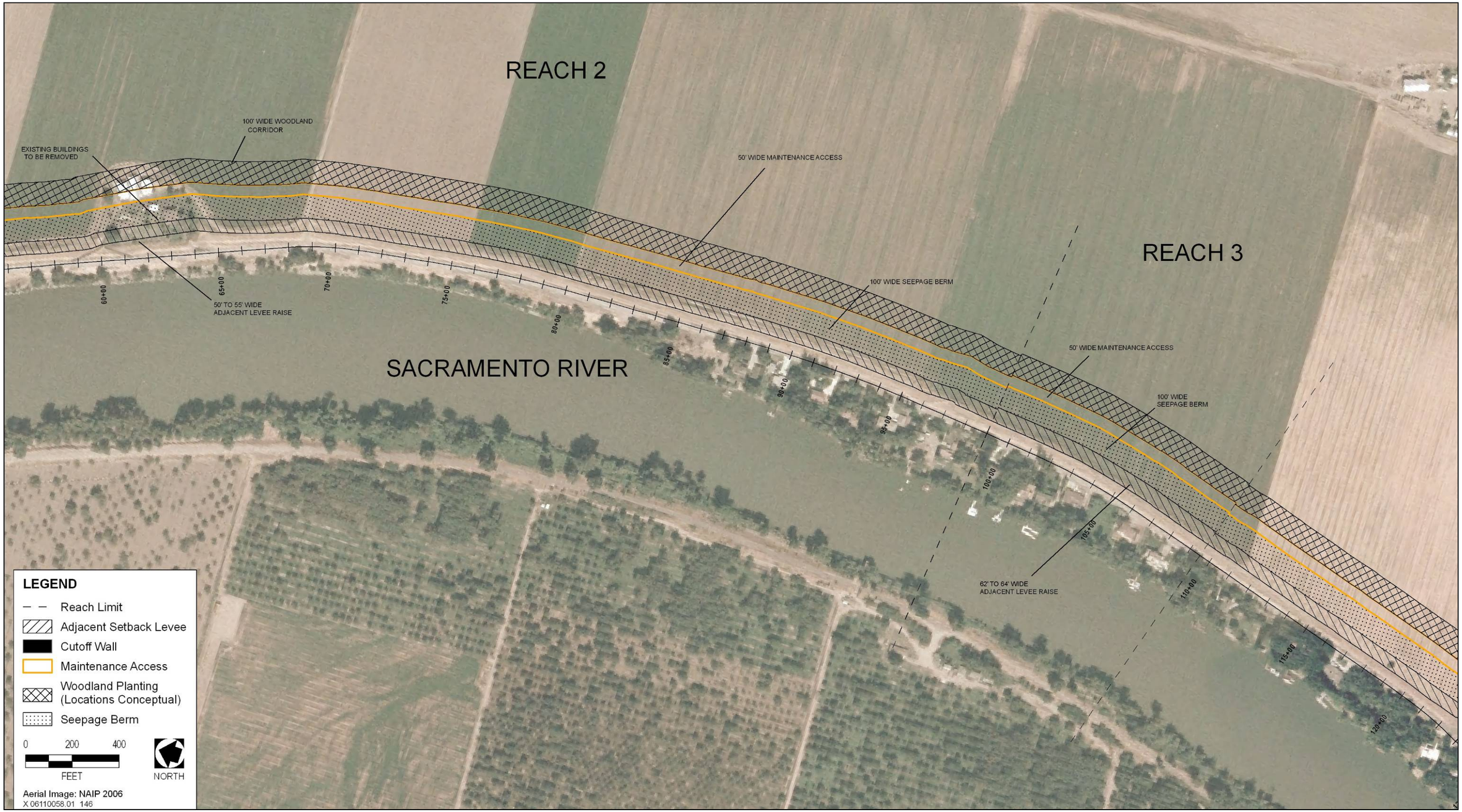
RD 1001 Soil Borrow Site and Potential Haul Routes for Natomas Cross Canal South Levee Improvements (2008 Construction) **Exhibit 2-22**



Source: HDR 2007

Proposed Project Features along Sacramento River East Levee Reaches 1–4B (2008 Construction) – Map 1 of 4

Exhibit 2-23a



Source: HDR 2007

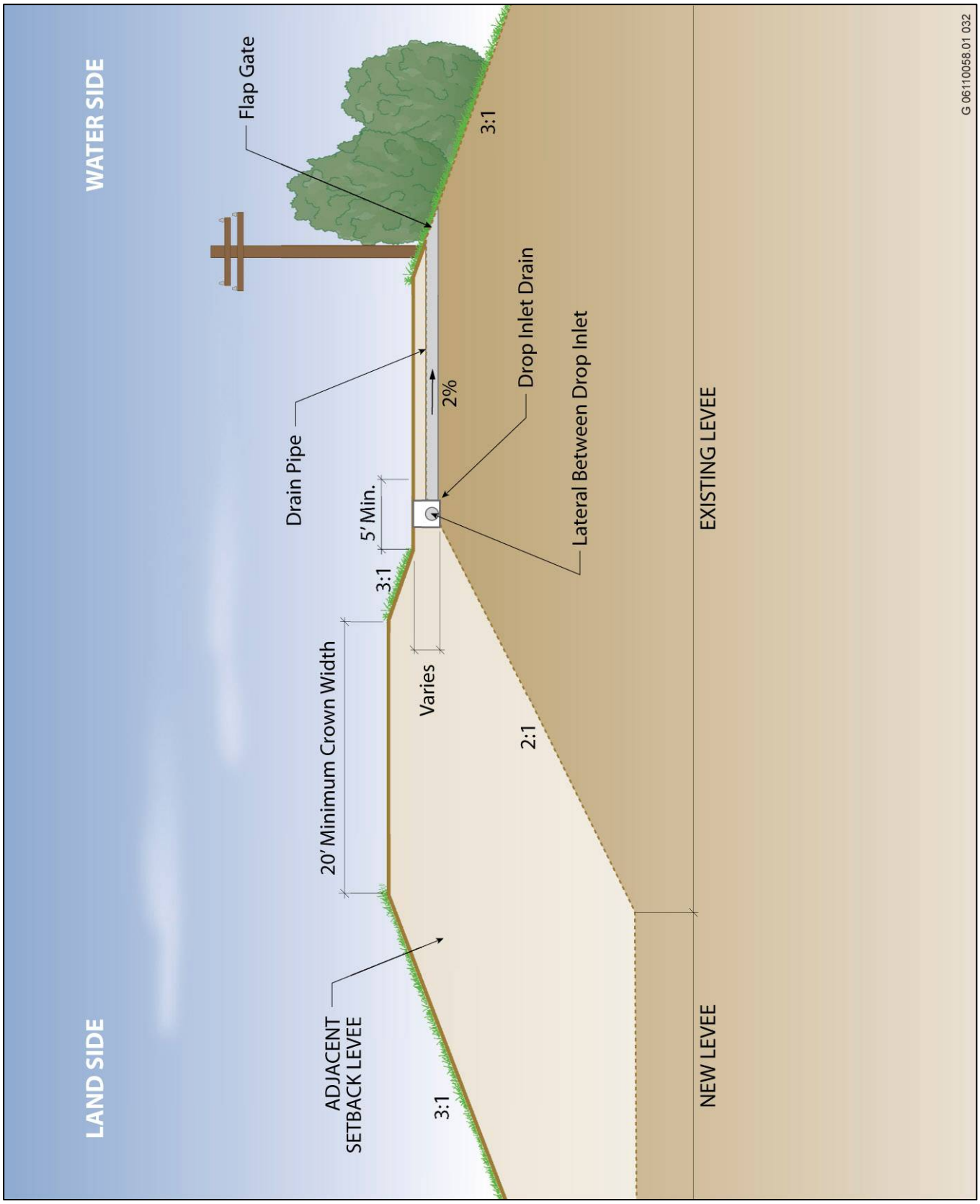
Proposed Project Features along Sacramento River East Levee Reaches 1–4B (2008 Construction) – Map 2 of 4 **Exhibit 2-23b**

Source: HDR 2007

Proposed Project Features along Sacramento River East Levee Reaches 1–4B (2008 Construction) – Map 3 of 4 **Exhibit 2-23c**

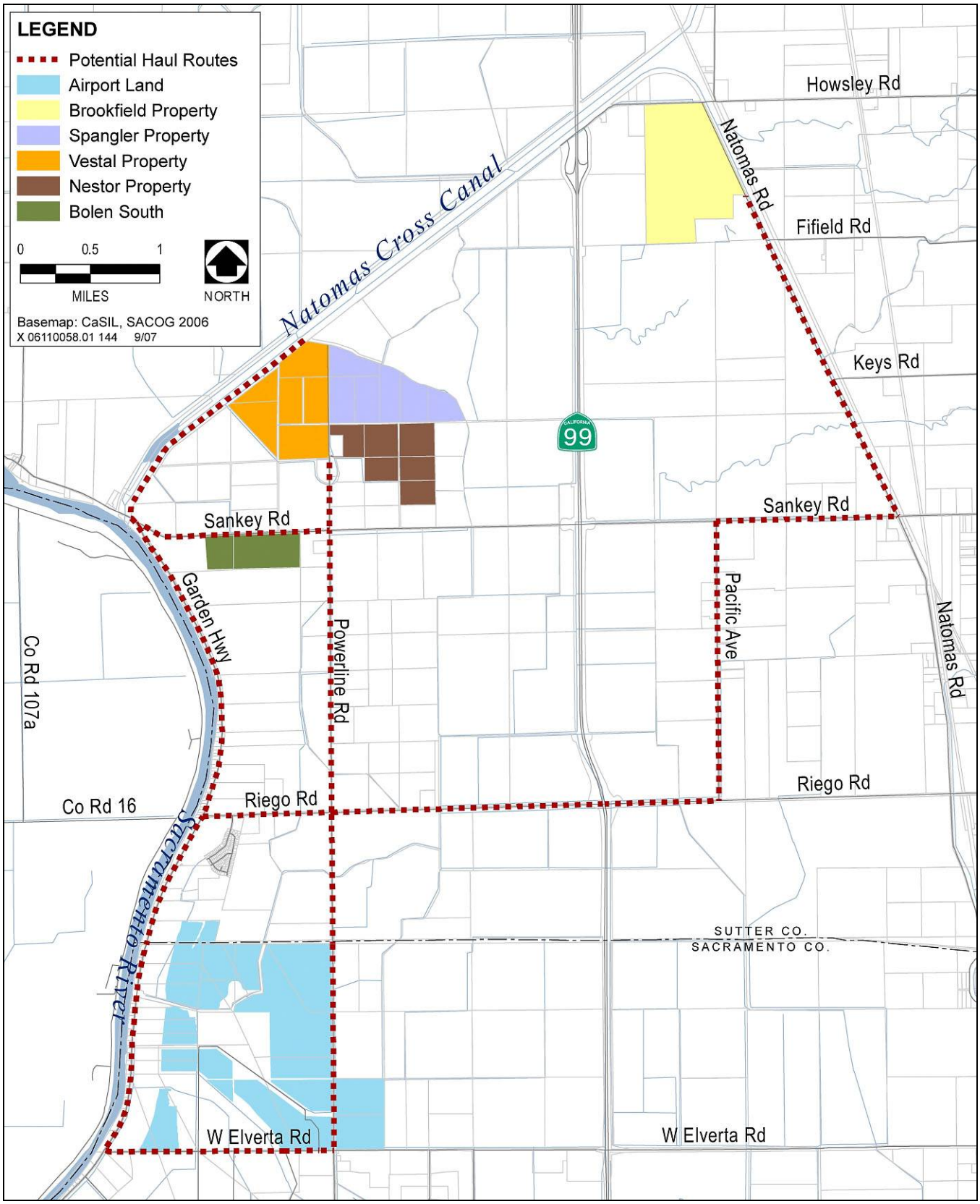
Source: HDR 2007

Proposed Project Features along Sacramento River East Levee Reaches 1–4B (2008 Construction) – Map 4 of 4 **Exhibit 2-23d**



Source: HDR 2007, Adapted by EDAW in 2007

Concept Plan for Garden Highway Drainage Collection System (2008-2010 Construction) Exhibit 2-24



EDAW 2007, Mead & Hunt 2007

Soil Borrow Sites and Potential Haul Routes for Sacramento River East Levee Improvements in Reaches 1–4B (2008 Construction) **Exhibit 2-25**

Source: HDR 2007

Proposed Project Features along Sacramento River East Levee Reaches 4B–20 (2009–2010 Construction) – Map 1 of 6 **Exhibit 2-26a**

Source: HDR 2007

Proposed Project Features along Sacramento River East Levee Reaches 4B–20 (2009–2010 Construction) – Map 2 of 6 **Exhibit 2-26b**

Source: HDR 2007

Proposed Project Features along Sacramento River East Levee Reaches 4B–20 (2009–2010 Construction) – Map 3 of 6 **Exhibit 2-26c**

Source: HDR 2007

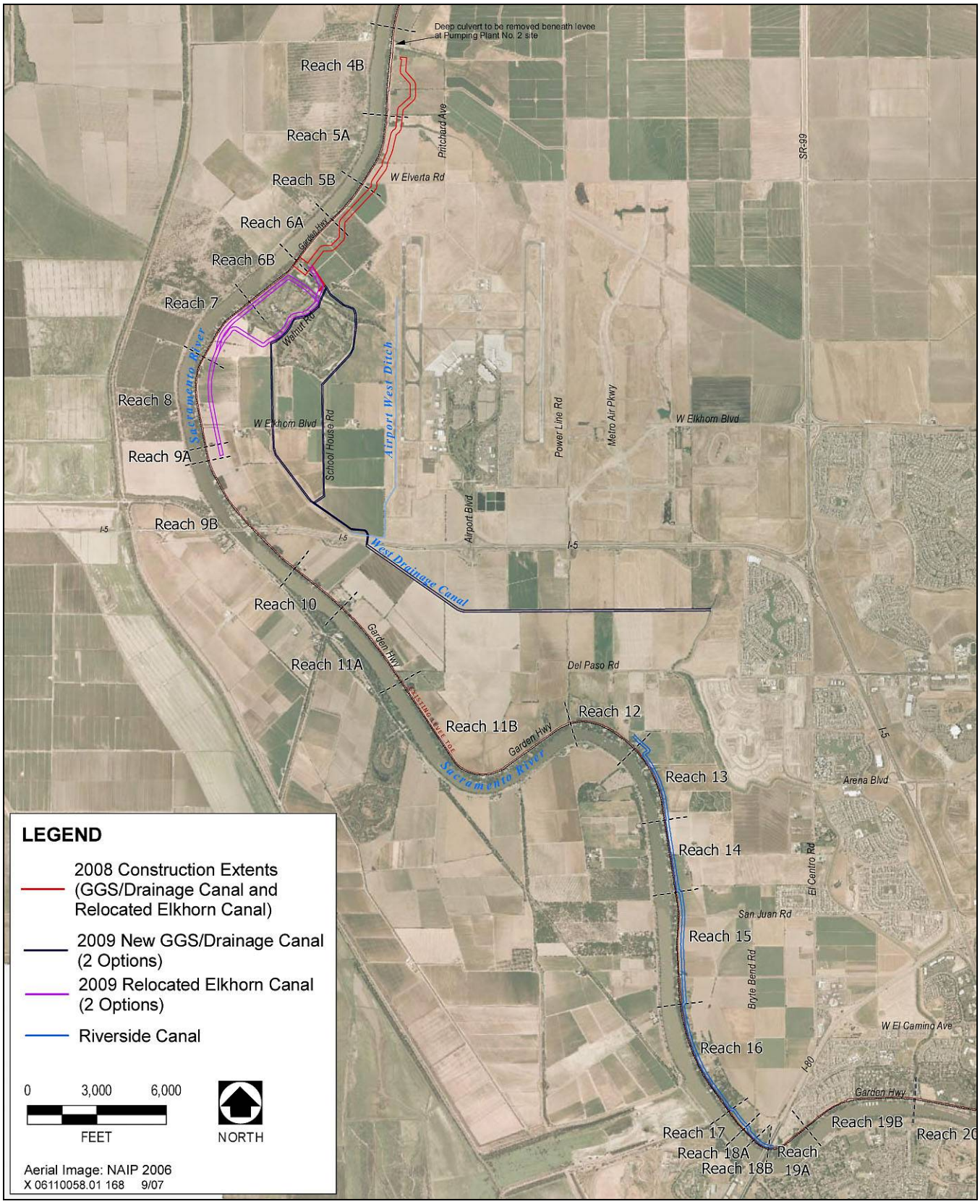
Proposed Project Features along Sacramento River East Levee Reaches 4B–20 (2009–2010 Construction) – Map 4 of 6 **Exhibit 2-26d**

Source: HDR 2007

Proposed Project Features along Sacramento River East Levee Reaches 4B–20 (2009–2010 Construction) – Map 5 of 6 **Exhibit 2-26e**

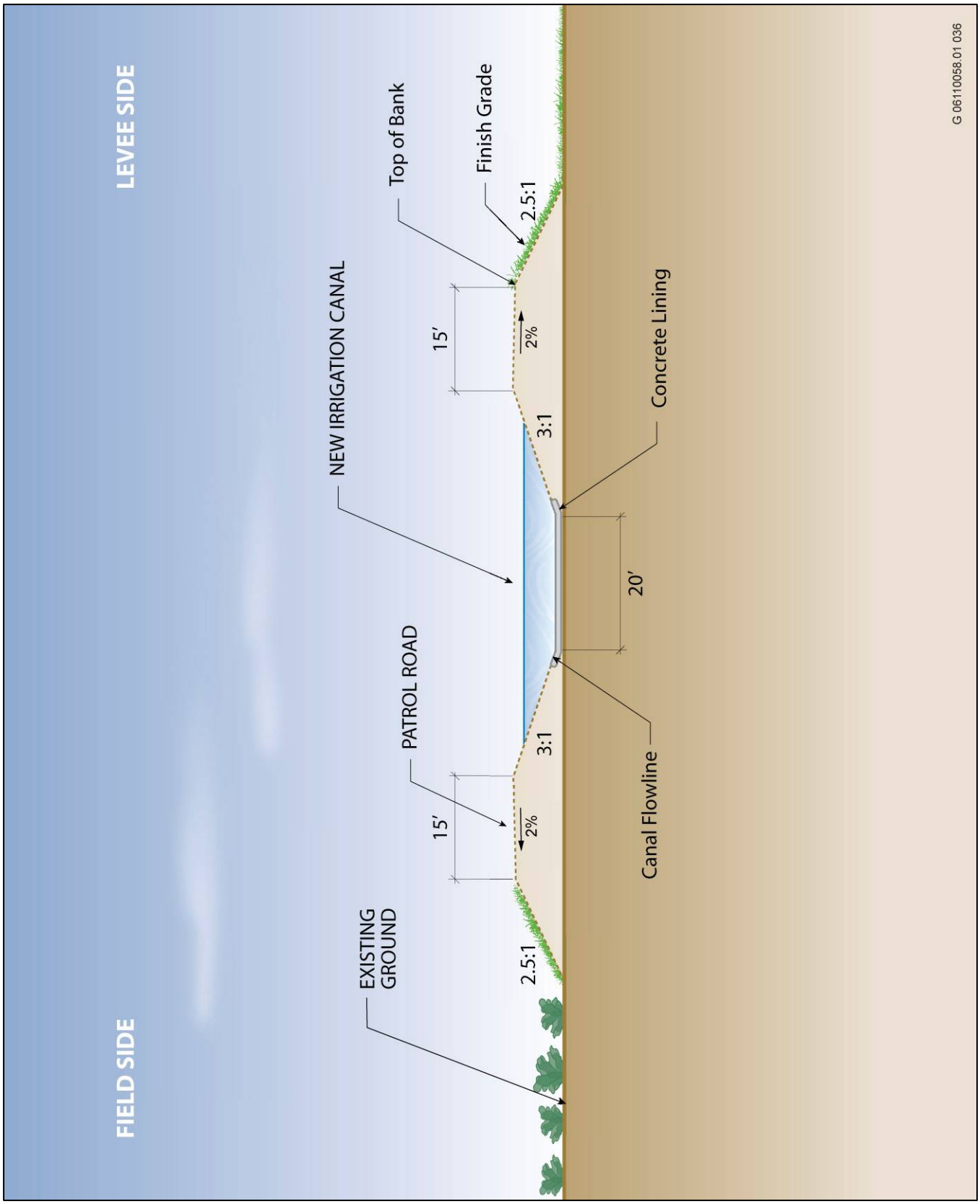
Source: HDR 2007

Proposed Project Features along Sacramento River East Levee Reaches 4B–20 (2009–2010 Construction) – Map 6 of 6 **Exhibit 2-26f**



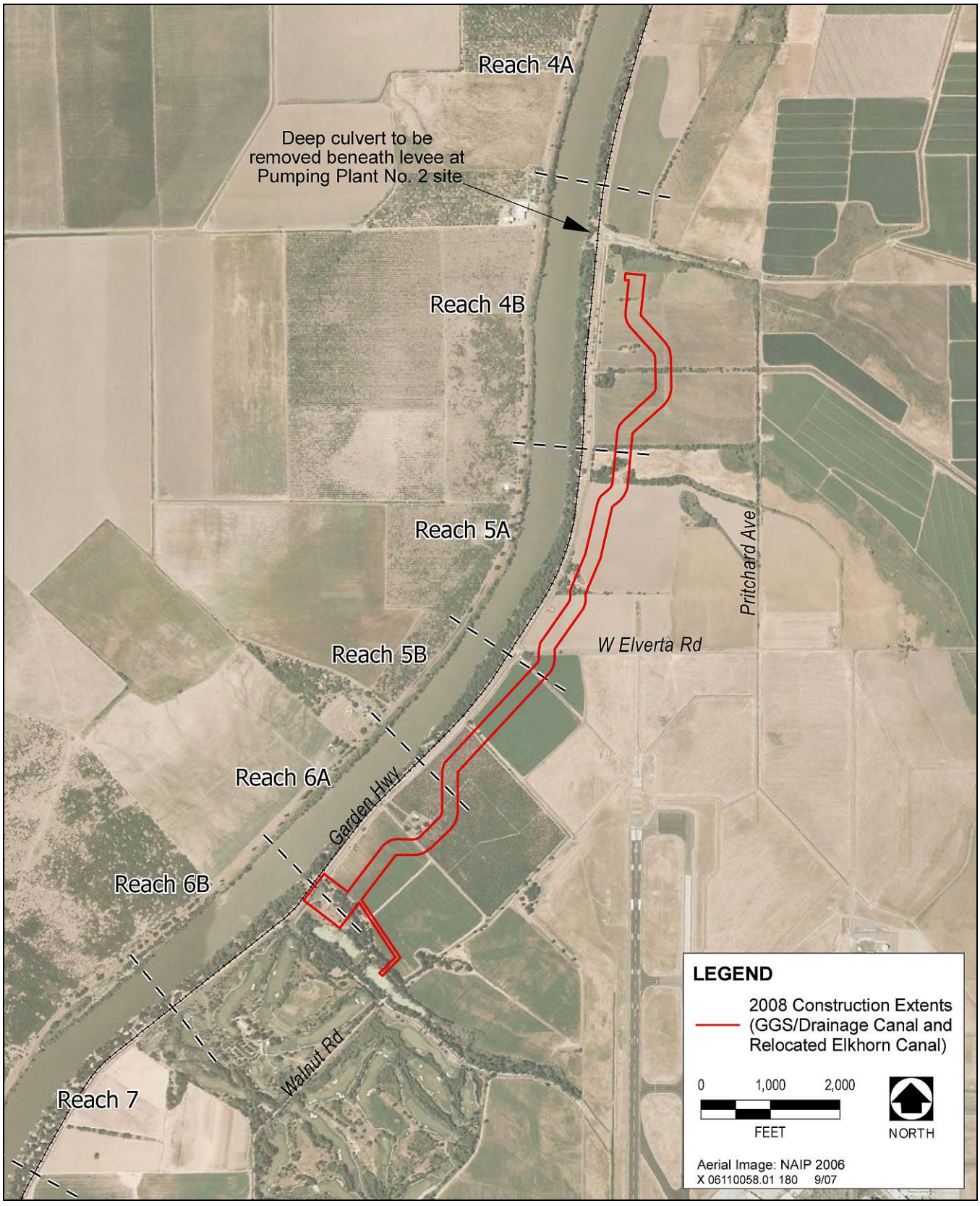
Source: Mead & Hunt 2007, EDAW 2007

Proposed Improvements to Major Irrigation and Drainage Infrastructure (2008-2010 Construction) **Exhibit 2-27**



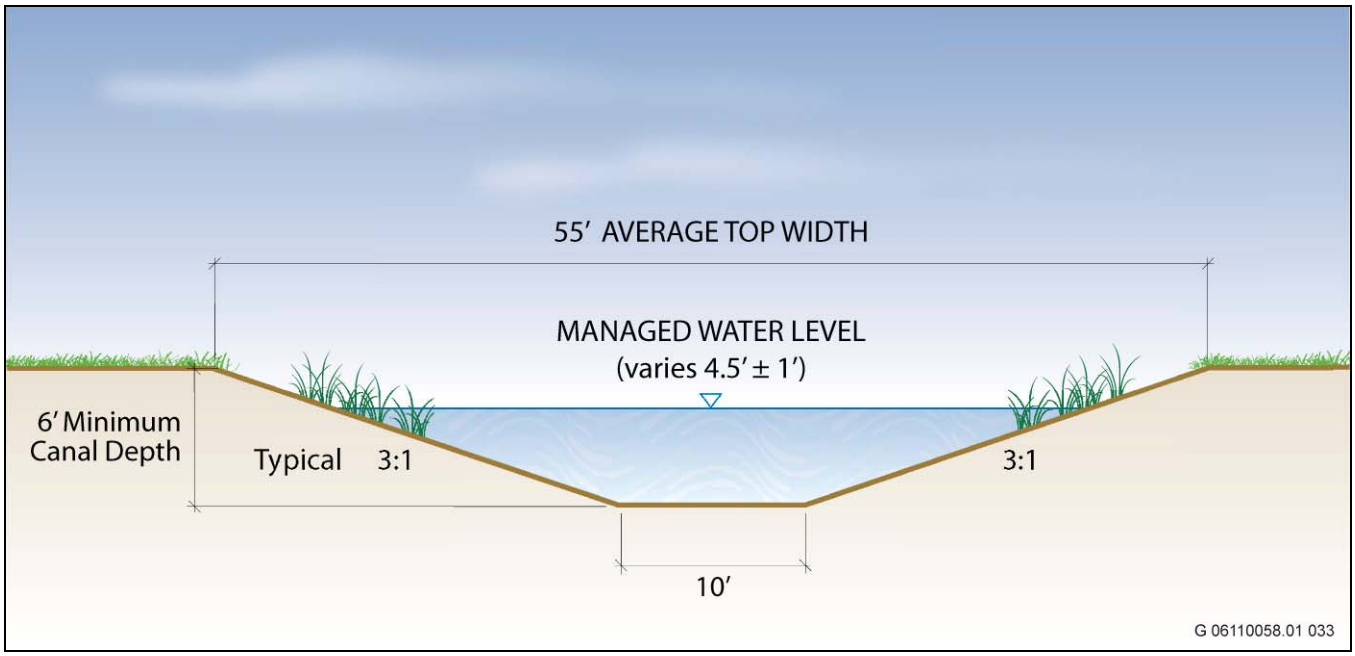
Source: Mead & Hunt 2007, Adapted by EDAW in 2007

Typical Cross Section of the Proposed Elkhorn Canal Replacement between the North Drainage Canal and Elkhorn Reservoir (2008 Construction) **Exhibit 2-28**



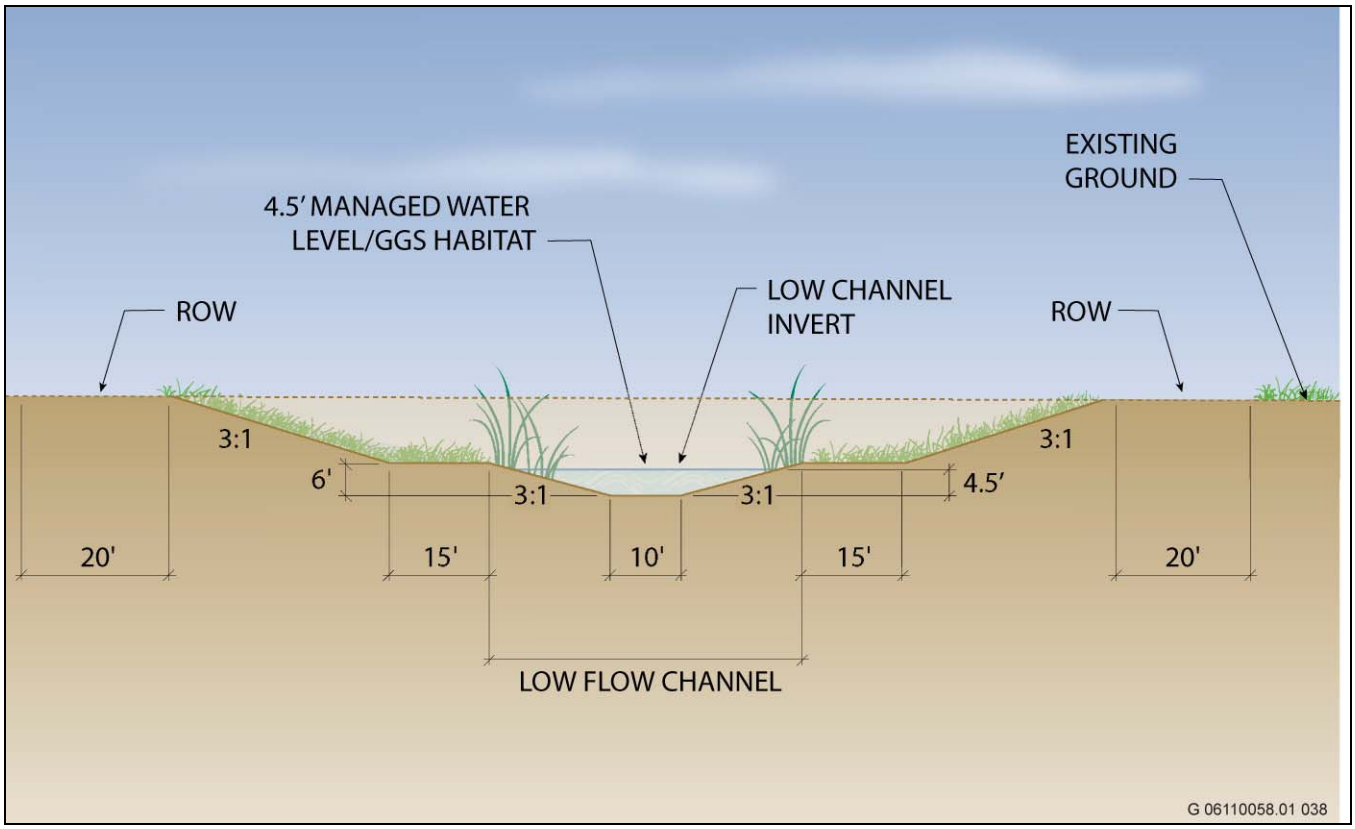
Source: Mead & Hunt 2007, EDAW 2007

Proposed Alignments of the Relocated Elkhorn Canal and the New GGS/Drainage Canal between the North Drainage Canal and Elkhorn Reservoir (2008 Construction) **Exhibit 2-29**



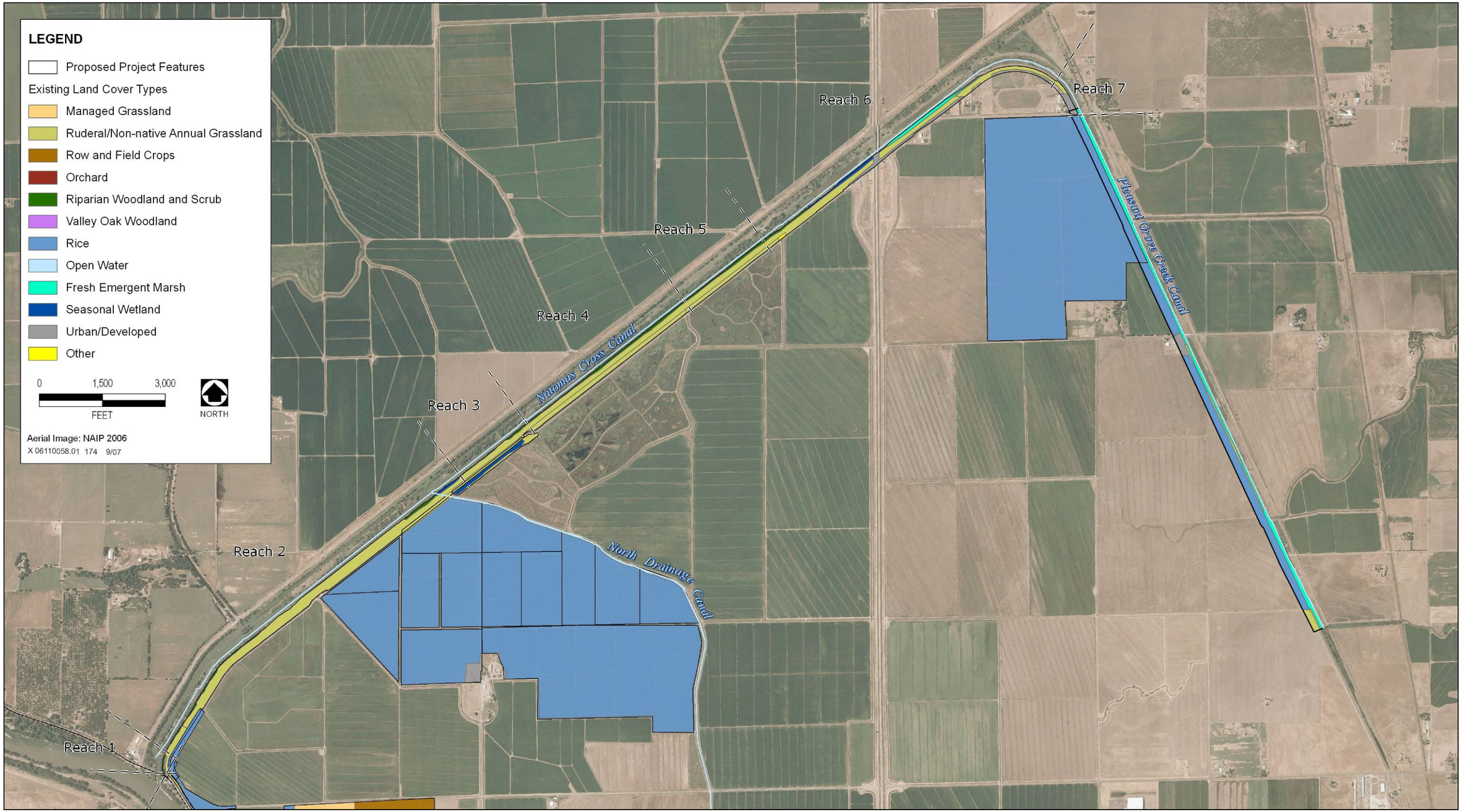
Source: Mead & Hunt 2007, Adapted by EDAW in 2007

Typical Cross Section of the New GGS/Drainage Canal North of Reservoir Road (2008 Construction) **Exhibit 2-30**



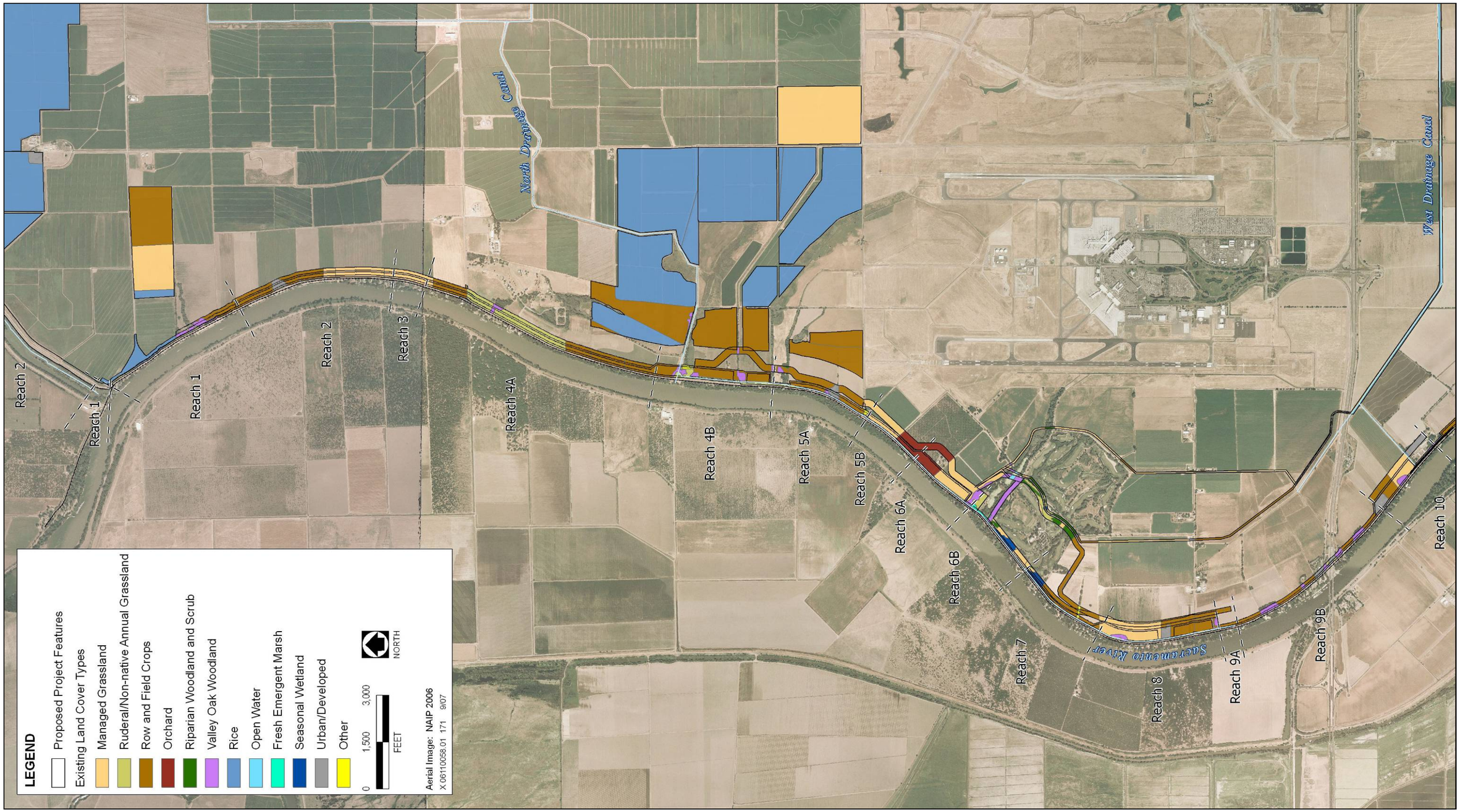
Source: Mead & Hunt, Adapted by EDAW in 2007

Typical Cross Section of the New GGS/Drainage Canal South of Teal Bend Golf Club and North of I-5 (2009 Construction) **Exhibit 2-31**



Source: JSA 2006, HDR 2007, Wood Rogers 2007, Mead & Hunt 2007

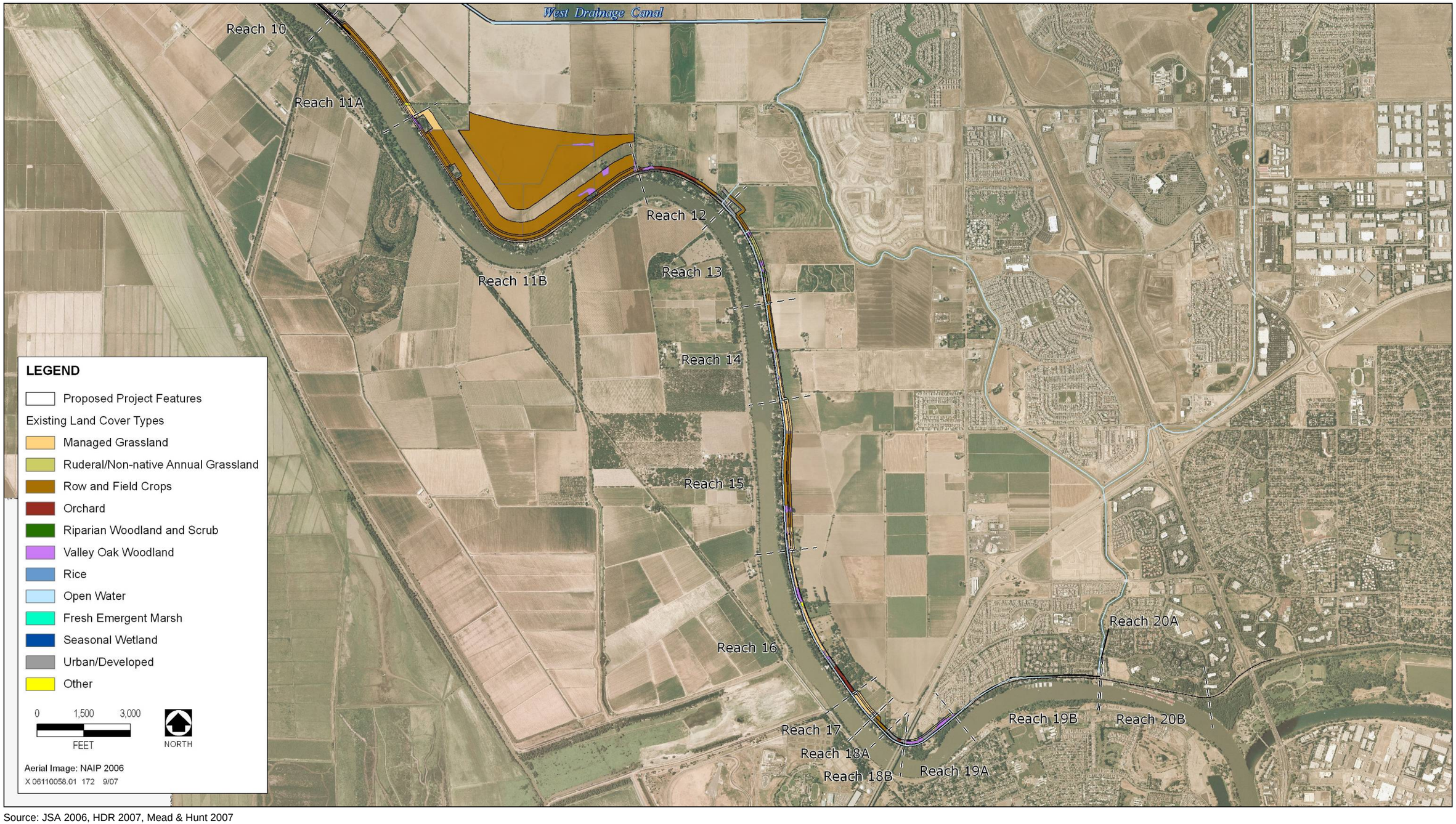
Pre-Construction Land Cover Types in the Proposed Project Footprint – Map 1 of 3 **Exhibit 2-32a**



Source: JSA 2006

Pre-Construction Land Cover Types in the Proposed Project Footprint – Map 2 of 3

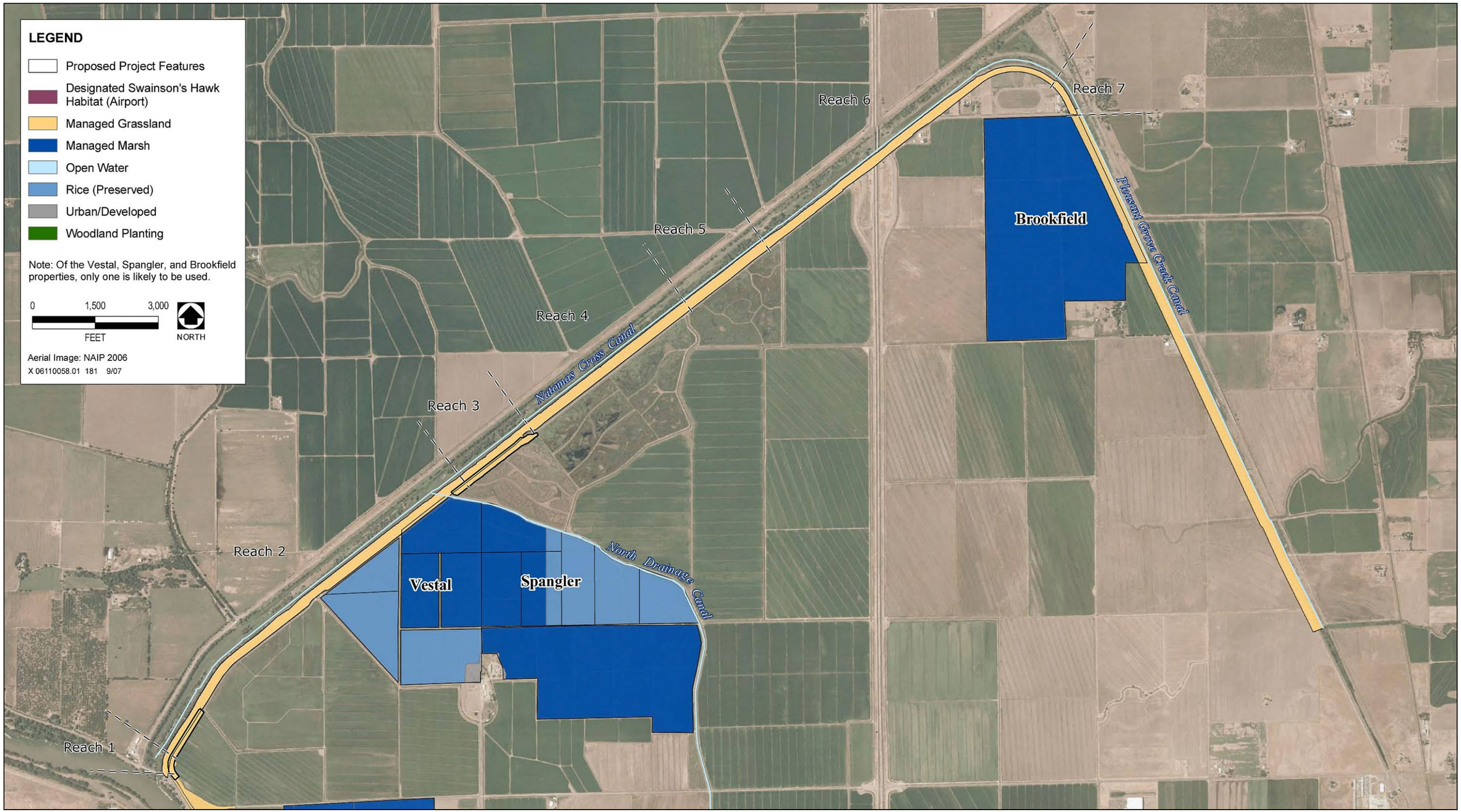
Exhibit 2-32b



Source: JSA 2006, HDR 2007, Mead & Hunt 2007

Pre-Construction Land Cover Types in the Proposed Project Footprint – Map 3 of 3

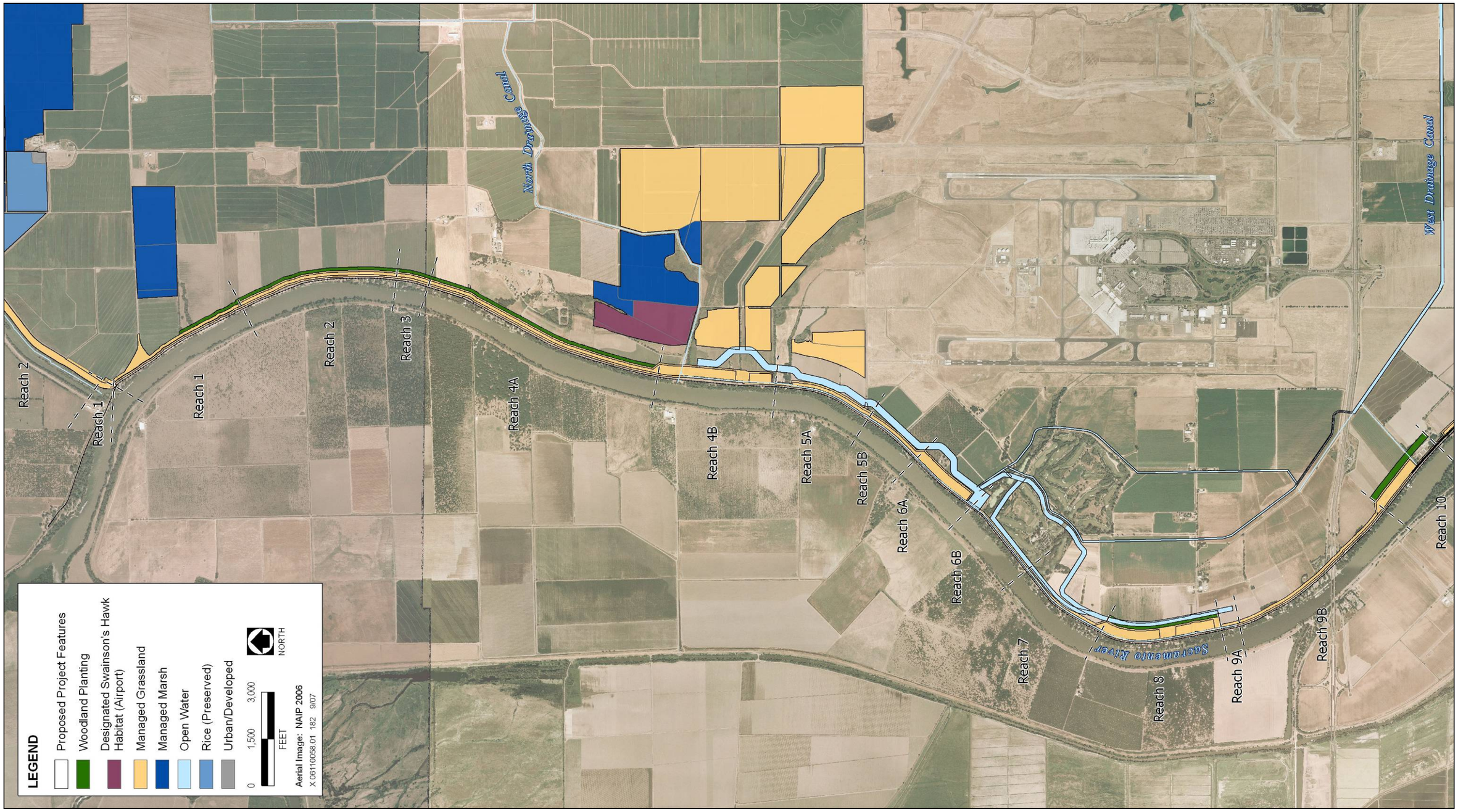
Exhibit 2-32c



Source: JSA 2006, HDR 2007, Wood Rogers 2007, Mead & Hunt 2007

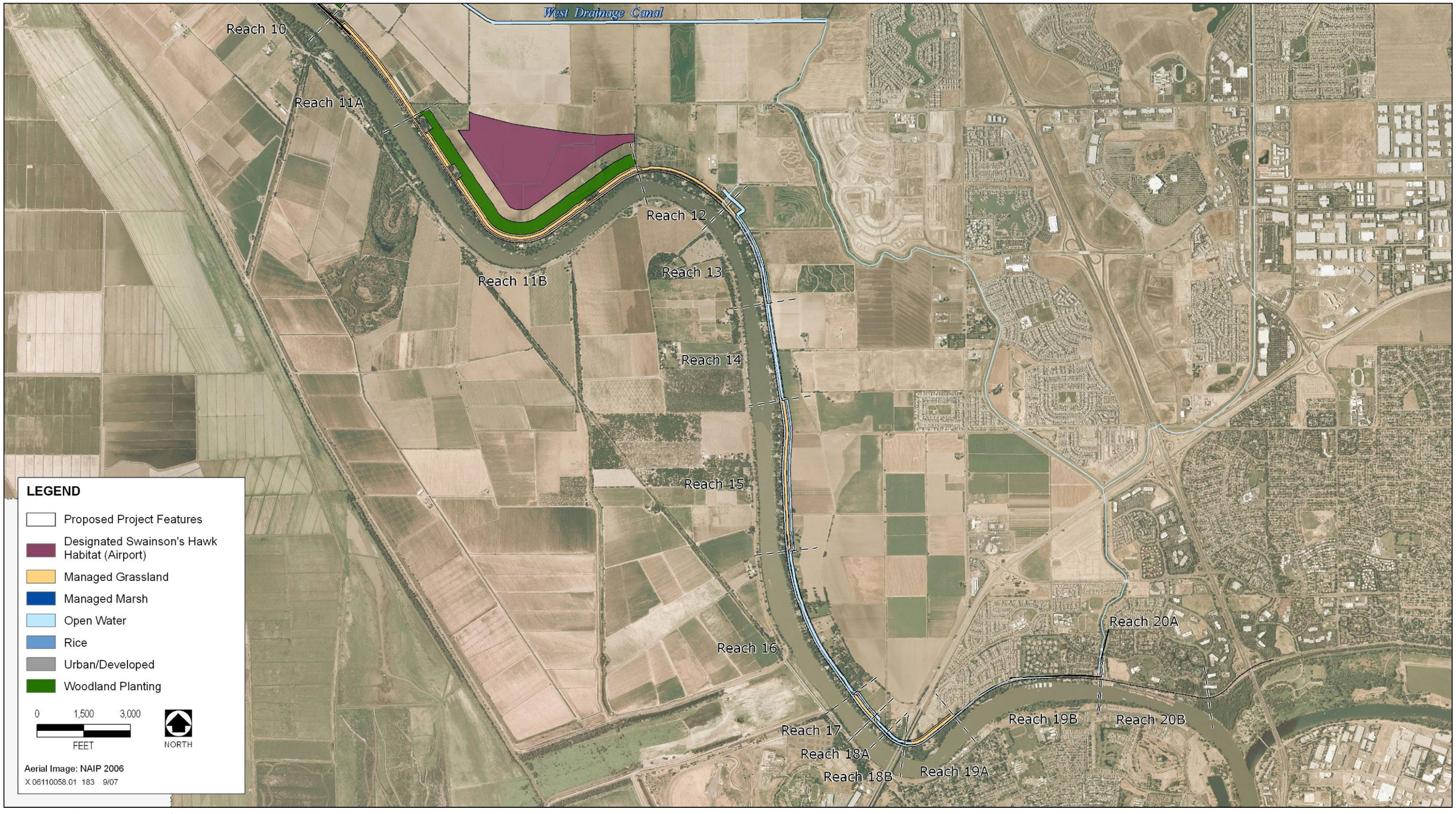
Post-Construction Land Cover Types Proposed for the Project Footprint – Map 1 of 3

Exhibit 2-33a



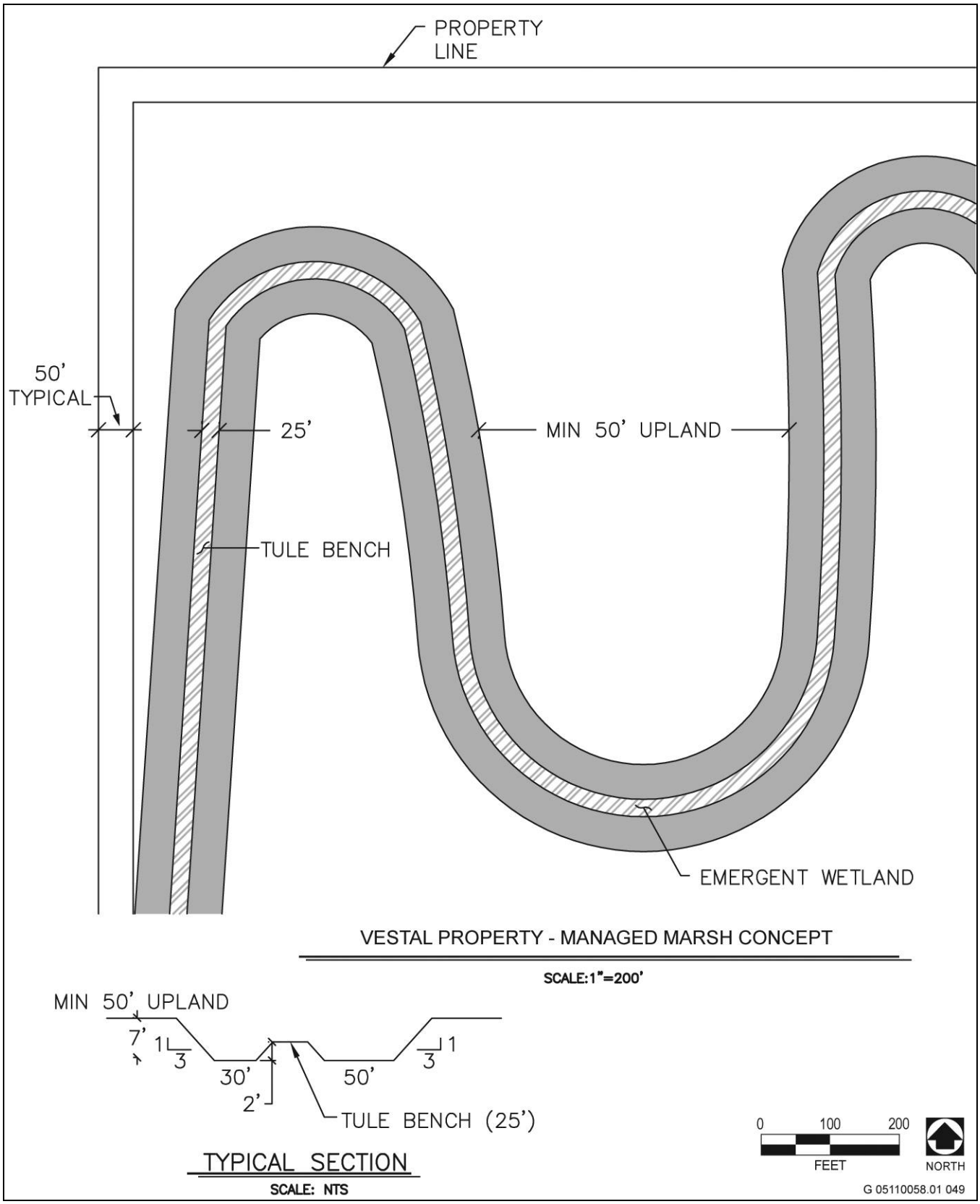
Source: JSA 2006

Post-Construction Land Cover Types Proposed for the Project Footprint – Map 2 of 3 **Exhibit 2-33b**



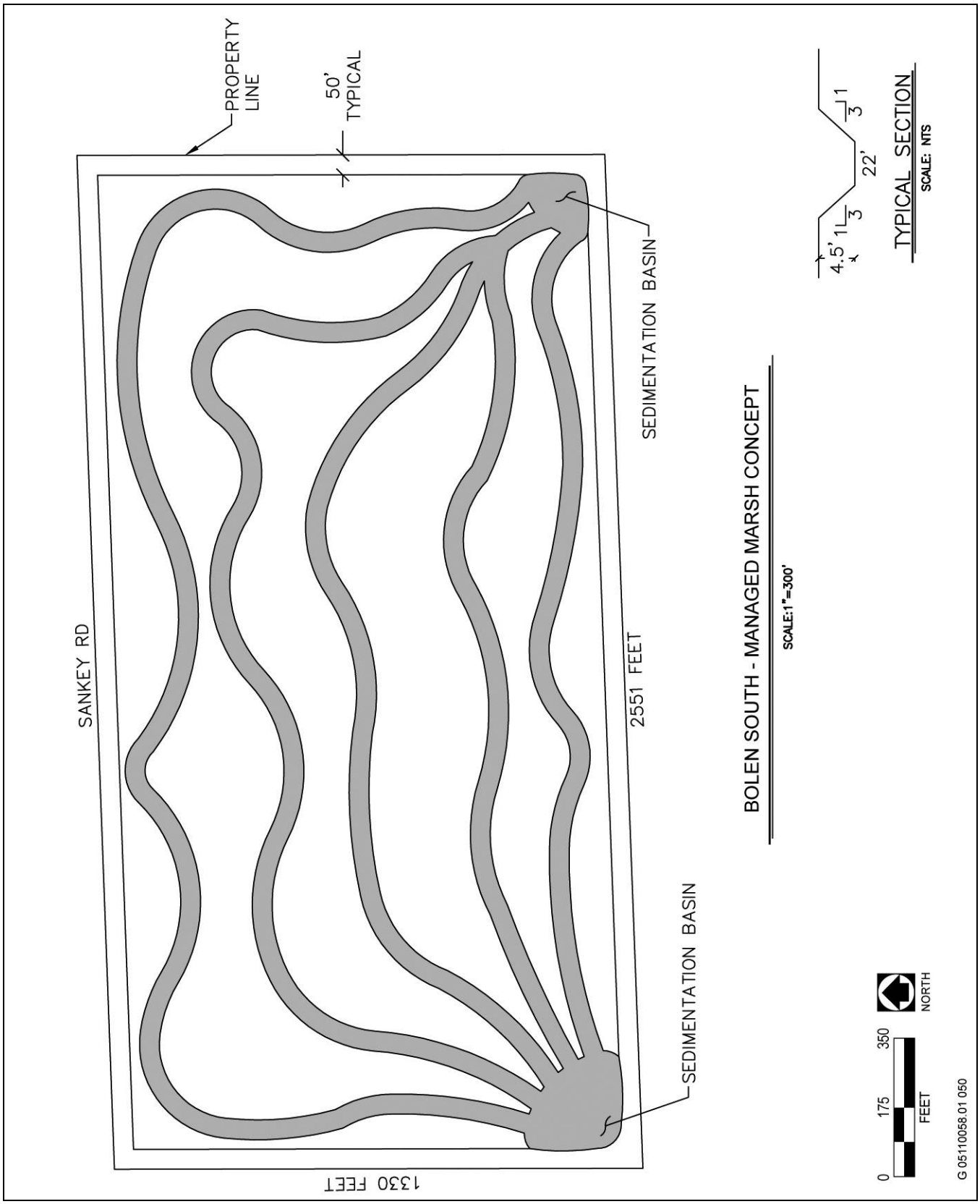
Source: JSA 2006, HDR 2007, Mead & Hunt 2007

Post-Construction Land Cover Types Proposed for the Project Footprint – Map 3 of 3 **Exhibit 2-33c**



Source: Prepared by Mead & Hunt in 2007

Managed Marsh Concept **Exhibit 2-34a**



Source: Prepared by Mead & Hunt in 2007

Managed Marsh Concept **Exhibit 2-34b**

Legend:

- Open Water Channel - greater than 4-feet deep.
- Tule Bench - periodically inundated, Wetland graded 24 - to 36 - inches below water line, wetland area to be densely planted with tules to reduce open water effect
- Upland - grassland/shrub plantings above wetland inundation areas (24 - to 36 - inches above top of water elevation)
- 75 - Foot Upland Buffer - above wetland inundation areas
- 170 - Foot Upland Buffer - above wetland inundation areas
- All Weather Access Road - aggregate base road, accessible year-round, 15 -feet wide - enhance existing road wherever possible
- Access Control Gate for animals and vehicles - connected to barbed wire fence
- Water Supply Well - well will be enclosed with chain-link fence and slats. Well pad to be extended at least 5-feet around well equipment, and 2-feet above adjacent water level.
- Culvert - 48 inch diameter, corrugated plastic set below grade, with angular rock basking areas at each end (provides snakes a corridor that will be day-lighted and only ⅓ filled with water at any given time). The purpose of the culverts is to allow for water flow through the habitat system, allow for maintenance access, and to facilitate monitoring study. Culvert diameter to be confirmed during detailed design.
- Replace Existing Riser with Double Board Riser
- Double Board Riser Field Drain
- Direction of Water Flow
- Valley Oak Tree *(Quercus lobata)* Planting - 15 gallon container
- 60" Post, 10-strand barbed wire fence; provide 3-foot setback from road edges (see Section, this sheet)
- Basking Area Rocks - greater than 12" Diameter size and set above water line
- Expanded Staging Area - for maintenance operations

0 200 400
FEET
NORTH

SACRAMENTO COUNTY AIRPORT SYSTEM | EDAW | WEST YOST & ASSOCIATES | ERIC C. HANSEN CONSULTING ENVIRONMENTAL BIOLOGIST

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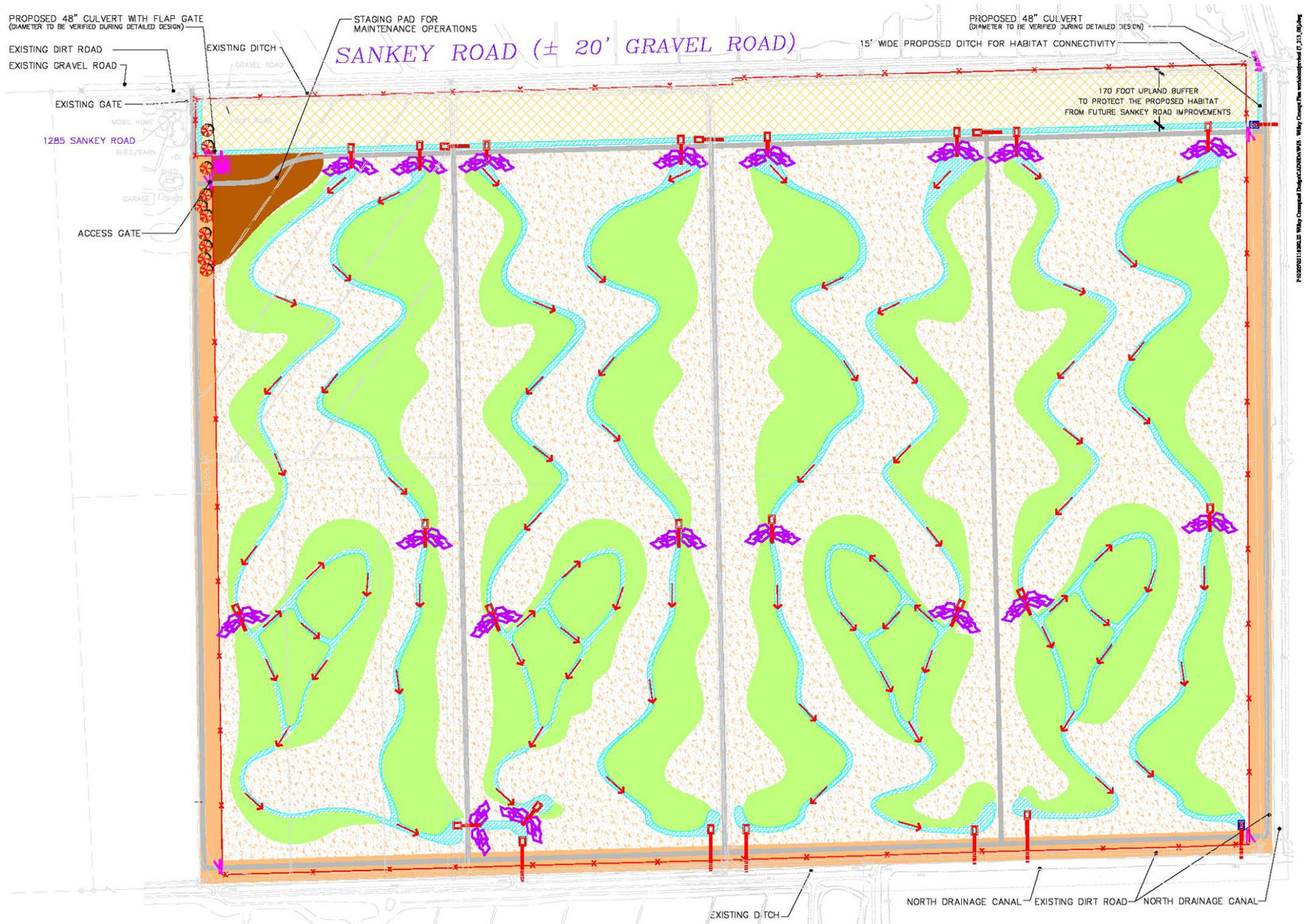


Source: EDAW 2006

Typical Design for Natomas Basin Marsh Habitat (Preliminary Preserve Design) **Exhibit 2-35**

3 ENVIRONMENTAL SETTING, IMPACTS, AND MITIGATION

This chapter describes the general approach to the environmental analysis, relevant setting information, and the results of the analysis of direct and indirect significant environmental impacts of the proposed project. Cumulative impacts and growth-inducing effects are discussed in Chapter 4, "Cumulative Impacts," and Chapter 5, "Other CEQA-Required Sections."

Section 3.1 discusses the general approach to the environmental impact analysis. The remainder of the chapter, Sections 3.2 through 3.16, describes by resource topic the regulatory and environmental setting, significance criteria, and impacts and mitigation measures.

3.1 APPROACH TO THE ENVIRONMENTAL ANALYSIS

In accordance with Section 15126.2 of the State CEQA Guidelines, this EIR identifies and focuses on the significant direct and indirect environmental effects of the proposed project, giving due consideration to both its short-term and its long-term effects. Short-term effects are generally those associated with construction, and long-term effects are generally those associated with operation of flood control facilities.

As explained in Section 1.3.2, "Combined Program and Project EIR," the 2008 Natomas Levee Improvement Program (NLIP) construction components that are summarized in Section 1.2 are described in detail and analyzed at a project level in this document. The 2009 and 2010 construction components that are summarized in Section 1.2 are described more generally and are analyzed in this EIR at a general, program level. This level of analysis is sufficient to provide SAFCA with the environmental information needed to support its decision whether to authorize the NLIP Landside Improvements Project. The 2009 and 2010 components will be analyzed at a project level of detail in one or more additional CEQA documents.

Chapter 3 addresses the following resource topics:

- Section 3.2, Agriculture and Land Use
- Section 3.3, Geology and Soils
- Section 3.4, Hydrology and Hydraulics
- Section 3.5, Water Quality
- Section 3.6, Fisheries and Aquatic Resources
- Section 3.7, Terrestrial Biological Resources
- Section 3.8, Cultural Resources
- Section 3.9, Paleontological Resources
- Section 3.10, Transportation and Circulation
- Section 3.11, Air Quality
- Section 3.12, Noise
- Section 3.13, Recreation
- Section 3.14, Visual Resources
- Section 3.15, Utilities and Service Systems
- Section 3.16, Hazards and Hazardous Materials

Sections 3.2 through 3.16 follow the same general format:

"Regulatory Setting" identifies the plans, policies, laws, and regulations that are relevant to each topic.

"Environmental Setting" provides, in accordance with State CEQA Guidelines Section 15125, an overview of the existing physical conditions in the project area at the time the notice of preparation was published that could be affected by implementation of the proposed project.

"Environmental Impacts and Mitigation Measures" lists the significance criteria used in the impact analysis and identifies the direct and indirect impacts of the proposed project on the environment, in accordance with State CEQA Guidelines Sections 15126, 15126.2, and 15143. The significance criteria (sometimes called "thresholds of significance") used in this EIR are based on the checklist presented in Appendix G of the State CEQA Guidelines; best available data; and regulatory standards of federal, state, and local agencies. The level of each impact is determined by comparing the effects of the proposed project to the environmental setting.

The EIR must describe any feasible measures that could avoid, minimize, rectify, reduce, or compensate for significant adverse impacts, and the measures are to be fully enforceable through incorporation into the project (Public Resources Code Section 21081.6[b]). Mitigation measures are not required for effects that are found to be less than significant. Where feasible mitigation for a significant impact is available, it is described following the impact. Each identified mitigation measure is labeled numerically to correspond with the number of the impact that would be mitigated by the measure. Where sufficient feasible mitigation is not available to reduce impacts to a less-than-significant level, the impacts are identified as remaining "significant and unavoidable."

3.2 AGRICULTURE AND LAND USE

This section addresses the effects of components of the proposed project on agricultural land uses. It also addresses consistency of the project with existing land uses in the project area and with policies intended to express the planning goals of applicable jurisdictions.

3.2.1 REGULATORY SETTING

3.2.1.1 FEDERAL

Farmland Protection Policy Act of 1981

The Farmland Protection Policy Act (FPPA) is intended to minimize the impact of federal programs with respect to the conversion of farmland to nonagricultural uses. It ensures that, to the extent possible, federal programs are administered to be compatible with state, local, and private programs and policies to protect farmland. The Natural Resources Conservation Service (NRCS) is the agency primarily responsible for implementing the FPPA.

The FPPA established the Farmland Protection Program (FPP) and the Land Evaluation and Site Assessment (LESA) system, which are discussed below in further detail. NRCS administers the FPP, which is a voluntary program that provides funds to help purchase development rights to keep productive farmland in agricultural uses. The program provides matching funds to state, local, and tribal government entities and nongovernmental organizations with existing farmland protection programs to purchase conservation easements. Participating landowners agree not to convert the land to nonagricultural uses and retain all rights to the property for future agriculture. A minimum 30-year term is required for conservation easements, and priority is given to applications with perpetual easements. NRCS provides up to 50% of the fair market value of the easement (NRCS 2007).

The LESA system is a tool used to rank lands for suitability and inclusion in the FPP. LESA evaluates several factors, including soil potential for agriculture, location, market access, and adjacent land use. These factors are used to rank land parcels for inclusion in the FPP based on local resource evaluation and site considerations (NRCS 2007).

3.2.1.2 STATE

California Surface Mining and Reclamation Act

The state Surface Mining and Reclamation Act of 1975 (PRC Section 2710 et seq.) (SMARA) addresses surface mining of minerals and requires mitigation to reduce adverse impacts on public health, property, and the environment. SMARA applies to an individual or entity that would disturb more than 1 acre or remove more than 1,000 cubic yards of material through surface mining activities, including the excavation of borrow pits for soil material. SMARA is implemented through ordinances for permitting developed by local government "lead agencies" that provide the regulatory framework under which local mining and reclamation activities are conducted. The State Mining and Geology Board reviews the local ordinances to ensure that they meet the procedures established by SMARA. The general process consists of obtaining a permit to mine material, implementing a reclamation plan to return the land to a useable condition, and providing financial assurances to ensure the feasibility of the reclamation plan. The process of reclamation includes maintaining water and air quality and minimizing flooding, erosion, and damage to wildlife and aquatic habitats caused by surface mining. The final step in this process is often replacement of topsoil and revegetation with suitable plant species.

The Counties of Sutter and Sacramento would be the lead agencies for borrow excavation operations for the proposed project that are determined to require SMARA permits. In general, SMARA permitting requires lead agency approval of a permit and a reclamation plan and the posting of approved financial assurance for the reclamation of the mined land.

California Important Farmland Inventory System and Farmland Mapping and Monitoring Program

The California Department of Conservation, Office of Land Conservation, maintains a statewide inventory of farmlands. These lands are mapped by the Division of Land Resource Protection as part of the Farmland Mapping and Monitoring Program (FMMP). The maps are updated every 2 years with the use of aerial photographs, a computer mapping system, public review, and field reconnaissance. Farmlands are divided into the following five categories based on their suitability for agriculture:

- **Prime Farmland**—land that has the best combination of physical and chemical characteristics for crop production. It has the soil quality, growing season, and moisture supply needed to produce sustained high yields of crops when treated and managed.
- **Farmland of Statewide Importance**—land other than Prime Farmland that has a good combination of physical and chemical characteristics for crop production.
- **Unique Farmland**—land that does not meet the criteria for Prime Farmland or Farmland of Statewide Importance, but that has been used for the production of specific crops with high economic value.
- **Farmland of Local Importance**—land that is either currently producing crops or has the capability of production, but that does not meet the criteria of the categories above.
- **Grazing Land**—land on which the vegetation is suited to the grazing of livestock.

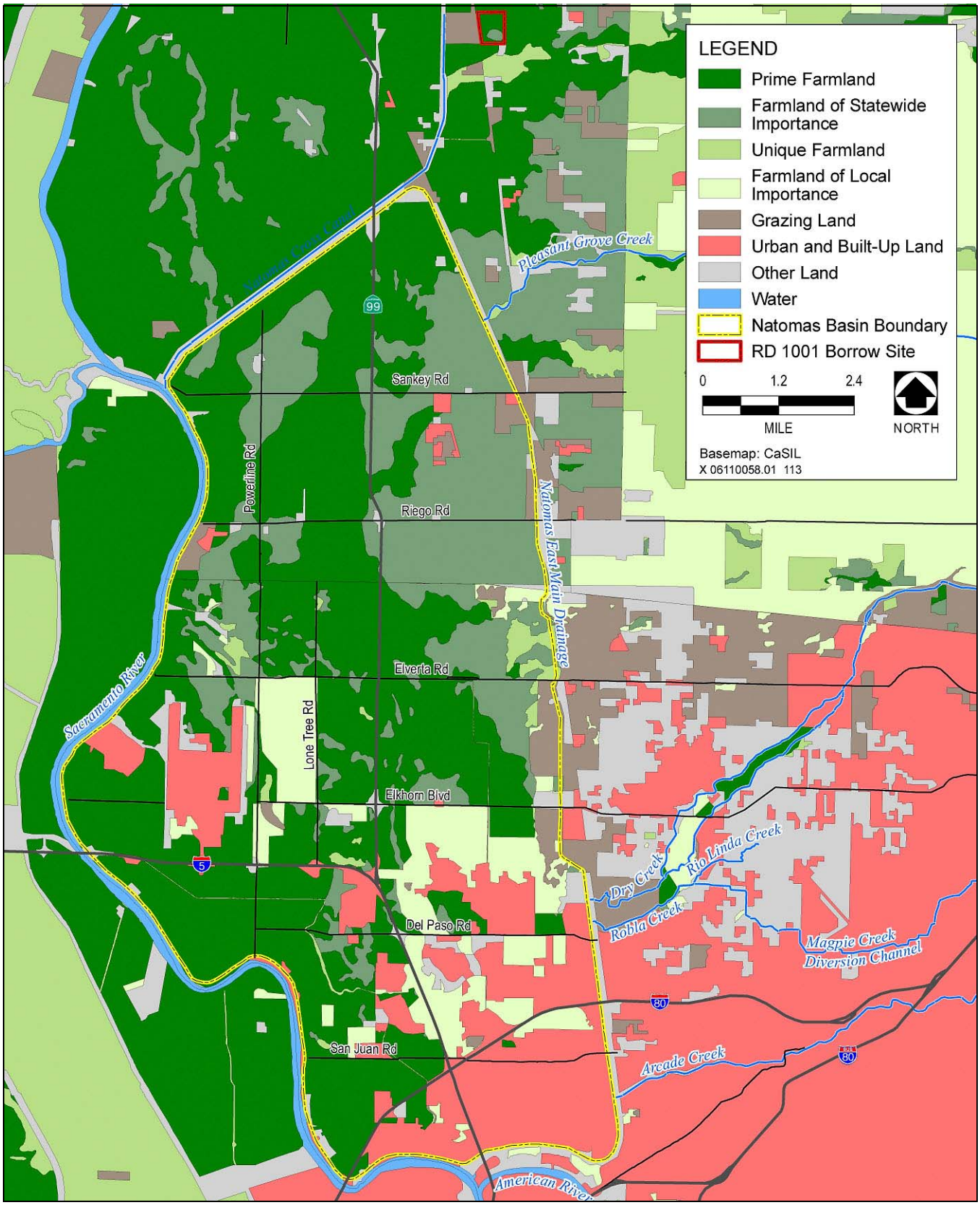
These categories are sometimes referred to as Important Farmland. Other categories used in the FMMP mapping system are “urban and built-up lands,” “lands committed to nonagricultural use,” and “other lands” (land that does not meet the criteria of any of the other categories).

Much of the farmland in the Natomas Basin is designated by the FMMP as Prime Farmland and Farmland of Statewide Importance (California Department of Conservation 2006). Exhibit 3.2-1 and Table 3.2-1 show the designated farmland according to the latest data available from FMMP within the Natomas Basin and the area northeast of the basin, where the Reclamation District (RD) 1001 borrow site is located.

Williamson Act Contract Land

The California Land Conservation Act of 1965, commonly known as the Williamson Act, enables local governments to enter into contracts with private landowners for the purpose of promoting the continued use of the relevant land in agricultural or related open space use. In return, landowners receive property tax assessments that are based on farming and open space uses instead of full market value. Local governments receive an annual subvention (subsidy) of forgone property tax revenues from the state via the Open Space Subvention Act of 1971.

The Williamson Act empowers local governments to establish “agricultural preserves” consisting of lands devoted to agricultural uses and other compatible uses. Upon establishment of such preserves, the locality may offer to owners of included agricultural land the opportunity to enter into annually renewable contracts that restrict the land to agricultural use for at least 10 years (i.e., the contract continues to run for 10 years following the first date upon which the contract is not renewed). In return, the landowner is guaranteed a relatively stable tax rate, based on the value of the land for agricultural/open space use only and unaffected by its development potential.



California Department of Conservation 2004

Important Farmland in the Project Area **Exhibit 3.2-1**

Cancellation of a Williamson Act contract involves an extensive review and approval process, in addition to payment of fees of up to 12.5% of the property value. The local jurisdiction approving the cancellation must find that the cancellation is consistent with the purpose of the California Land Conservation Act or is in the public interest. Several subfindings must be made to support either finding, as defined in California Government Code Section 51282. However, when a public agency acquires a property covered by a Williamson Act contract, the contract is automatically cancelled on the area acquired.

Much of the farmland in the Natomas Basin is currently held in a Williamson Act Contract (Exhibit 3.2-2). Table 3.2-2 shows the categories of designated farmland under Williamson Act contracts according to California Department of Conservation data.

3.2.1.3 GENERAL PLANS AND LAND USE PLANS

The land use diagrams in the general plans assign land use designations, which define appropriate land uses in the designated areas. The zoning codes are used to implement the policies and provisions of the general plans of the different jurisdictions. Flood control works are consistent with the general plans' designated land uses. The general plans that pertain to the project area contain land use goals and policies intended to guide development and discourage incompatible land uses.

Sutter County General Plan

The Land Use Element of the *Sutter County General Plan* (Sutter County 1996) designates the proposed general distribution, location, and extent of all uses of land, including land for agriculture, and includes the following agricultural resource goal and policy that may be relevant to this analysis.

- **Goal 6.A.** To preserve high-quality agricultural land for agricultural purposes.

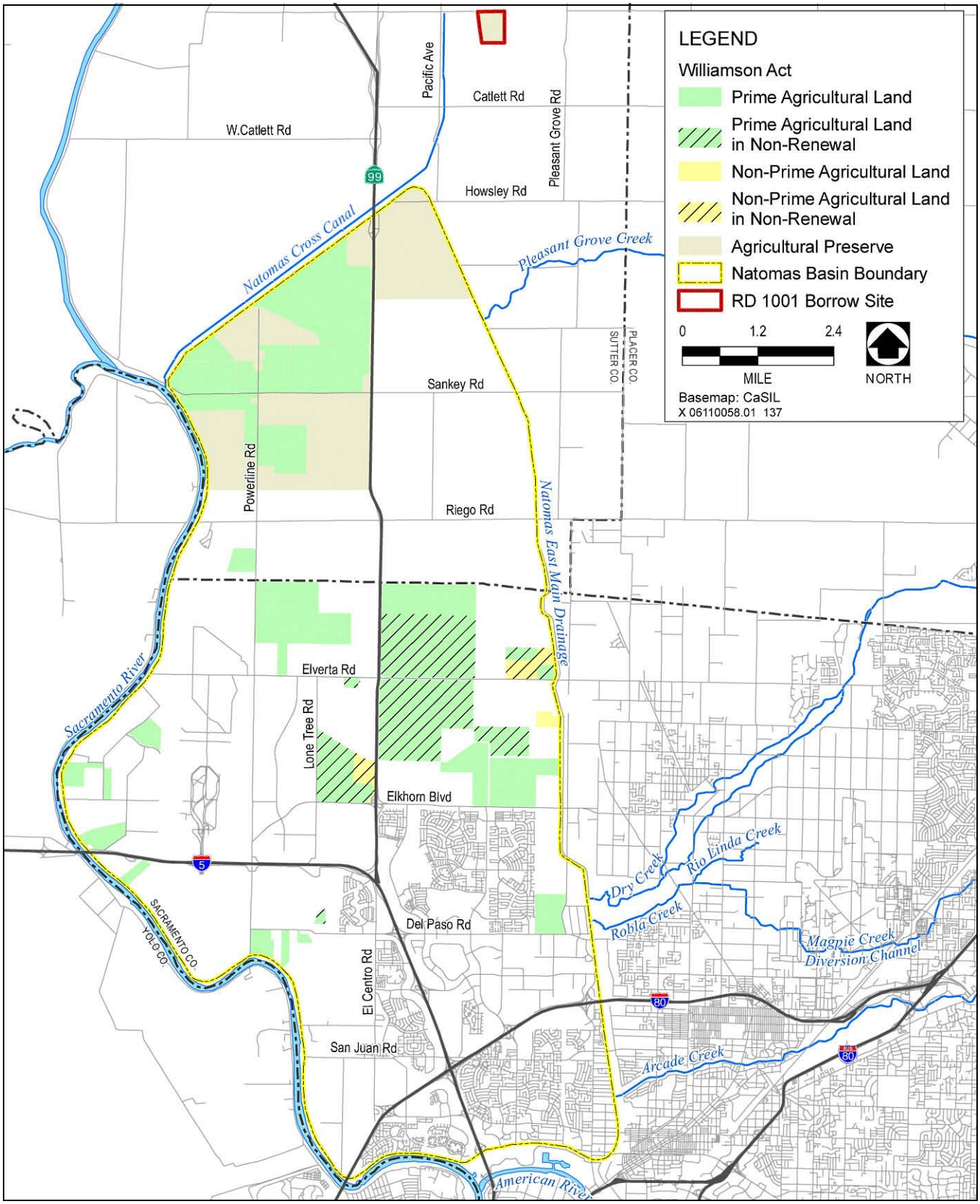
    - **Policy 6.B-3.** The County shall encourage the continued operation and expansion of existing agricultural industries.

Sutter County Zoning Code—General Agriculture District

Chapter 1500-1410 of the Sutter County Zoning code states that the General Agriculture District (AG District) is established to provide areas for general farming, low-density uses, open spaces, and by use permit, limited retail service uses that the Planning Commission believes will support the local agricultural industry. The AG District classification may be applied to rural communities where the predominant land use is of a general agricultural nature but the needs of the agricultural community may require the location of retail, commercial, and service establishments. This district is consistent with the Agriculture–20 Acre Minimum Parcel Size (AG-20) or Agriculture–80 Acre Minimum Parcel Size (AG-80) and Agriculture–Rural Community (AG-RC) general plan land use designations.

Sacramento County General Plan

The *Sacramento County General Plan* is currently being updated. At the time that this EIR was written, Sacramento County had issued a public review draft, which will be subject to environmental review before final certification. The Agricultural Element of the current *Sacramento County General Plan* (Sacramento County 1993) describes the goals of this element as the challenge of "maintenance of the County's agricultural lands, [and] their agricultural productivity...." The following objective and policies of the current general plan may be relevant to this analysis.



California Department of Conservation 2005

Williamson Act Lands in the Project Area **Exhibit 3.2-2**

- **Objective:** Retain agricultural land holdings in units large enough to guarantee future and continued agricultural use.

    - **Policy AG-7.** Agricultural zoning district boundaries shall be rational and shall respect parcel boundaries.

    - **Policy AG-8.** Agricultural land divisions shall not adversely affect the integrity of agricultural pursuits. Agricultural land divisions may be denied if the reviewing authority finds that the division of land is likely to create circumstances inconsistent with this policy.

City of Sacramento General Plan

The *City of Sacramento General Plan 2030* is currently being drafted. The *City of Sacramento General Plan 2006* contains goals and policies related to flood control and the phased conversion of agricultural properties, as well as the provision of sufficient housing and commercial and economic opportunities (City of Sacramento 1998). The City of Sacramento (City) has a program with SAFCA and the U.S. Army Corps of Engineers in which it works with SAFCA and other responsible agencies to resolve floodplain restrictions. The following policies may be relevant to this analysis.

Conservation and Open Space

- **Policy 10** To conserve and protect natural resources and planned open space areas and to phase the conversion of agricultural lands to planned urban uses.

    The City will provide open space for recreation. The American and Sacramento River Parkways will be conserved and protected. The City has other open space areas that can also be developed to their recreational use potential. These areas include utility easements, floodways and floodplains.

Resource Protection

- **Policy B.10** The City shall seek to minimize or avoid adverse impacts to historic and cultural resources from natural disasters. To this end, the City shall promote seismic safety, flood protection, and other building programs that preserve, enhance, and protect these resources.

Sacramento International Airport Comprehensive Land Use Plan

Some of the proposed project elements would be located within the "Critical Zone" of Sacramento International Airport (Airport), managed by Sacramento County Airport System (SCAS). The Airport has a comprehensive land use plan that includes policies to protect public health, safety, and welfare through the adoption of land use standards that minimize the public's exposure to safety hazards and excessive levels of noise, and prevent the encroachment of incompatible land uses around the Airport. Airport planning documents are described in more detail in Section 3.16, "Hazards and Hazardous Materials."

Natomas Basin Habitat Conservation Plan

The Natomas Basin Habitat Conservation Plan (NBHCP) (City of Sacramento, Sutter County, and The Natomas Basin Conservancy 2003) was developed to promote biological conservation in conjunction with economic and urban development in the Natomas Basin. The NBHCP establishes a multispecies conservation program to minimize and mitigate the expected loss of habitat values and incidental take of "covered species" that could result from urban development and operation and maintenance of irrigation and drainage systems. Mitigation lands established in the Natomas Basin in accordance with the NBHCP are managed by The Natomas Basin Conservancy (TNBC). The NBHCP is described in Section 3.7, "Terrestrial Biological Resources."

3.2.2 ENVIRONMENTAL SETTING

The Natomas Basin is in both Sacramento and Sutter Counties, and a portion is within the City of Sacramento (Exhibit 2-2). The Natomas Basin is the location of extensive recent development and planned and proposed new business and residential development in both counties. The southern part of the basin contains mostly urban commercial and residential land uses within the Sacramento city limits.

3.2.2.1 OVERVIEW OF LAND USE DESIGNATIONS AND ZONING

Sutter County

The portion of the project area adjacent to the Sacramento River east levee between the Sutter/Sacramento County line and the Natomas Cross Canal (NCC) has the land use designation of AG-20. Lands directly east of this area, which extend northeast toward the northern portion of the Pleasant Grove Creek Canal (PGCC), are designated AG-80. The RD 1001 borrow site north of the Natomas Basin is also designated AG-80. Industrial/commercial reserve land encompasses the remaining Sutter County parcels between the PGCC and the Sacramento River extending south to the county line.

The zoning for the area extending along the Sacramento River north to the NCC is AG-20. The land to the east along the PGCC and extending south to the county line is zoned AG-80. The RD 1001 borrow site is also zoned AG-80.

Sacramento County

The portion of the project area along much of the Sacramento River within Sacramento County has the land use designation of Agricultural Cropland. Parcels of land along the Sacramento River east levee are owned by Sacramento County and managed by the Airport) and are zoned Public/Quasi-Public.

The zoning in the Sacramento County portions of the project area consists of Permanent Agricultural–Extensive Land Use Zone (AG 80) in much of the northern portion of the Natomas Basin, as well as Agricultural-Residential Land Use Zones (AR-1, AR-2, AR-5, AR-10). The area near the Sacramento city limits includes Industrial Reserve Land Use Zone (IR), Light Industrial Zone (M1), and Industrial Office Park (MP), as well as Residential Land Use Zones.

City of Sacramento

Parts of the city of Sacramento border the southern reaches of the Sacramento River east levee. The land use designations along the southern reaches of the Sacramento River to the confluence with the American River consist of Low Density Residential 4–15 du/na, with smaller areas designated Medium Density Residential 16–29 du/na, Regional Commercial & Office, Park-Recreation-Open Space, and more Regional Commercial & Offices in the vicinity of Interstate 5 (I-5). A Rural Estate parcel is located at the northern city limits.

The zoning consists of R-1 Standard Single Family residential along the south reaches of the Sacramento River, and Office Building in the vicinity of I-5 along the American River.

3.2.2.2 LAND USES ALONG THE PROJECT SITES

Natomas Cross Canal

The project site and vicinity are generally rural in character. Farms and rural residences are located on both sides of the NCC, with rice the primary crop under cultivation. Three homes are located 700–1,000 feet north of the south levee in Reach 1. In Reach 6 of the NCC, a few residences are located between 50 and 200 feet south of the

levee. In Reach 7, a residence and several ranch buildings are within 25 feet of the levee landside toe. Several roadways are located in the vicinity of the NCC, including State Route 99/70, which crosses the NCC in Reach 6; several county roads (Sankey Road, Powerline Road, Howsley Road), and Garden Highway, which is located on the crown of the Sacramento River east levee. Other land uses include the Verona Village Resort, a small trailer campground, marina, restaurant, and store on the west side of Garden Highway, approximately 660 feet southwest of the western terminus of the NCC south levee.

Sacramento River

Table 3.2-1 contains a description of the land uses along the Sacramento River east levee in the project area.

Table 3.2-1
Existing Land Uses Along the Sacramento River East Levee in the Project Area

Reach	Landside Uses	Waterside Uses
1	Sankey Road intersects Garden Highway near the start of Reach 1. Oak woodland and a rural residence are located approximately 300 feet south of the start of Reach 1; the rural residence is located within 50 feet of the landside toe of the levee. Field crops border the levee throughout the reach.	Verona Village Resort (a small trailer campground, marina, restaurant, and store) is located on the west side of Garden Highway bordering the start of the reach. Small clusters of woodland are scattered along the highway to the south.
2	A rural residence adjacent to the existing levee is located approximately 1/3 mile south of the start of Reach 2. Field crops border the levee throughout the reach. The northern part of the TNBC Huffman West Habitat Preserve borders the levee in the southern end of the reach.	Small clusters of woodland are scattered along the highway. Eight residences are located at the end of Reach 2 adjacent to Garden Highway.
3	A field used for row crops, part of the TNBC Huffman West Habitat Preserve, covers the entire reach.	Six residences are located adjacent to Garden Highway.
4A and 4B	Field crops border the levee throughout the reach. Most of the parcels bordering the levee are TNBC land (Huffman West and Atkinson Habitat Preserves) or Airport land. Riego Road intersects Garden Highway approximately 1,500 feet from the start of Reach 4A. Agricultural facilities at the end of a narrow paved road are located approximately 2,000 feet south of Riego Road. The Prichard Lake Pumping Plant is located on the North Drainage Canal. The Elkhorn Canal closely parallels the levee from the North Drainage Canal south. A highline canal perpendicular to the levee is located approximately 2,000 feet south of the North Drainage Canal. A cluster of woodlands is located just south of the canal. A line of trees perpendicular to the levee is located near the southern end of the reach.	Approximately nine residences, interspersed among woodland, are located adjacent to Garden Highway. Several docks and private marinas are located along the bank.
5A and 5B	Field crops border the levee throughout the reach on Airport land. A cluster of woodlands is located at the start of the reach. A rural residence with outbuildings and surrounding woodland is located approximately 1,600 feet south of the start of the reach. Elverta Road intersects Garden Highway approximately 1,500 feet north of the end of the reach. The Elkhorn Canal closely parallels the levee throughout the reach.	Woodland covers the entire reach west of Garden Highway.

Table 3.2-1
Existing Land Uses Along the Sacramento River East Levee in the Project Area

Reach	Landside Uses	Waterside Uses
6A and 6B	A rural residence associated with an orchard is located approximately 1,500 feet south of the start of the reach. Field crops border the levee throughout the reach. The West Drainage Canal, which borders Teal Bend Golf Course on the north, intersects the levee approximately 1,400 feet south of the orchard. Reservoir Road intersects Garden Highway approximately 1,000 feet south of the West Drainage Canal. The golf course covers the remaining 2,800 feet of the reach. The Elkhorn Canal closely parallels the levee throughout the reach.	Approximately eight residences, interspersed among woodland, are located adjacent to Garden Highway. Several docks are located along the bank.
7	Teal Bend Golf Course extends approximately 600 feet beyond the start of the reach. Field crops border the levee for the remaining 2,400 feet of the reach. The Elkhorn Canal closely parallels the levee throughout the reach.	Approximately 14 residences, interspersed among woodland, are located adjacent to Garden Highway. Several private docks are located along the bank.
8	Field crops border the levee throughout the reach. A rural residence with outbuildings and surrounding woodland is located at the start of the reach. Another rural residence with outbuildings and surrounding woodland is located approximately 1,200 feet south of the first residence. West Elkhorn Boulevard intersects Garden Highway approximately 800 feet north of the end of the reach. A woodland cluster is located at the end of the reach. The Elkhorn Canal closely parallels the levee throughout the reach, ending approximately 1,200 feet south of Elkhorn Boulevard.	Approximately eight residences, interspersed among woodland, are located adjacent to Garden Highway. Several private docks are located along the bank.
9A and 9B	A woodland cluster is located approximately 1,300 feet south of the start of the reach. Two rural residences are located within 1,000 feet of Bayou Road and the I-5 overpass. A woodland cluster is located on the south side of the I-5 overpass. Another woodland cluster is located approximately 700 feet further south. A woodland cluster is located at the end of Reach 9. Field crops border the levee throughout the reach.	Approximately 10 residences are located adjacent to Garden Highway interspersed among woodland. Several private docks are located along the bank. Two restaurant/marina facilities (Alamar Marina Restaurant & Bar and Swabbies Restaurant & Bar) are located within 800 feet of the intersection of Bayou Road and Garden Highway.
10	A rural residence is located at the start of the reach. A woodland cluster is located approximately 1,100 feet farther south. A large ranch occupies Reach 10 from approximately 1,700 feet south of the start of the reach to the end of the reach. Field crops border the levee throughout the reach.	Approximately five residences, interspersed among woodland, are located adjacent to Garden Highway. Several private docks are located along the bank.
11A and 11B	Reach 11 contains the remaining 400 linear feet of the large ranch in Reach 10. Field crops border the levee throughout the reach. A rural residence is located approximately 2/3 mile from the start of Reach 11. Another rural residence is located another 2,000 feet south. Approximately ½ mile farther south, the river bends to the east. A cluster of trees is located approximately 1,600 feet west of the end of the reach. Field crops border the levee throughout the reach.	Approximately 12 residences, interspersed among woodland, are located adjacent to Garden Highway. Several private docks are located along the bank.

Table 3.2-1
Existing Land Uses Along the Sacramento River East Levee in the Project Area

Reach	Landside Uses	Waterside Uses
12	An orchard covers much of Reach 12, at which point the river trends south again. A rural residence is located approximately ½ mile south of the start of the reach. A rural residence and the Kimura Ditch are located 500–700 feet north of the end of the reach, followed by two more residences. A highline ditch starts at the Kimura Ditch and closely parallels the levee to the south. Field crops border the levee throughout the reach.	Approximately 14 residences, interspersed among woodland, are located adjacent to Garden Highway. Several private docks are located along the bank.
13	A residence is located at the start of Reach 13. Pumping Plant #3 and a large drainage ditch perpendicular to the levee are located 800 feet south of the start of the levee. Another 1,400 feet farther south is a woodland cluster. A highline ditch closely parallels the levee for the length of the reach. Field crops border the levee throughout the reach. The TNBC Cummings property includes mitigation plantings for valley elderberry longhorn beetle.	Approximately 13 residences, interspersed among woodland, are located adjacent to Garden Highway. Several private docks are located along the bank.
14	Radio Road intersects Garden Highway approximately 1,600 feet south of the start of Reach 14 at the end of a large field used for row crops. A rural residence is located approximately 800 feet farther south. The southern part of the reach is bordered by the TNBC Alleghany property.	Approximately 14 residences, interspersed among woodland, are located adjacent to Garden Highway. Several private docks are located along the bank.
15	Reach 15 starts at the intersection of San Juan Road and Garden Highway. Two residential estates are located 600 and 1,200 feet farther south. Scattered trees are located adjacent to the levee. The northern part of the reach is bordered by the TNBC Alleghany property.	Approximately 21 residences, interspersed among woodland, are located adjacent to Garden Highway. More than a dozen private docks are located along the bank.
16	Eight rural residences amid scattered trees are located in the first 1,600 feet of Reach 16. The next 2,000 feet are a mixture of open fields, rural residences, farm buildings, and scattered trees. Dense woodland makes up the remaining 1,200 feet of the reach. The reach contains approximately 20 residences.	Approximately 12 residences, interspersed among woodland, are located adjacent to Garden Highway. Several private docks are located along the bank.
17	A rural residence is located at the start of Reach 17, approximately 600 feet inland from the levee toe. A rural residence with outbuildings is located approximately 800 feet south of the start of the reach.	Approximately seven residences, interspersed among woodland, are located adjacent to Garden Highway. Several private docks are located along the bank.
18	Reach 18 contains four to five rural residences among small orchards north of the I-80 overcrossing. A woodland cluster is located on the east side of the I-80 overcrossing, where the river bends east.	Approximately six residences, interspersed among woodland, are located northwest of the I-80 overcrossing, adjacent to Garden Highway. Sand Cove Park (37 acres) is located southeast of the I-80 overcrossing. Several private docks are located along the bank.

Table 3.2-1
Existing Land Uses Along the Sacramento River East Levee in the Project Area

Reach	Landside Uses	Waterside Uses
19A and 19B	Two rural residences are located within 800 feet of the start of Reach 19, with scattered trees along and adjacent to the levee. The rest of the reach contains a subdivision of several hundred homes, the Swallows Nest Golf Course and condominium complex, and a subdivision of approximately 90 homes. Scattered trees are located on or adjacent to the levee.	Woodland occupies the first 1,700 feet of Reach 19. The remaining mile to the east is a mixture of homes, private docks, and businesses, including the River View Marina.
20A and 20B	Reach 20 contains an office park and the 13-acre Natomas Oaks Park. Scattered trees are located on or adjacent to the levee.	The first 2/3 mile east of Reach 19 contains a mixture of homes, private docks, and businesses, including the Riverbank Marina. The remaining 2,000 feet contains Discovery Park woodland.

Notes: I-5 = Interstate 5; I-80 = Interstate 80; RD = Reclamation District
Source: Data compiled by EDAW in 2007

Pleasant Grove Creek Canal

The land uses along the PGCC consist primarily of agricultural uses along with minimal industrial manufacturing. Farther south, more residences exist, but they are located outside of the project area.

Borrow Sites

SAFCA would use several borrow sites to provide soil material for the proposed levee improvements and canal construction. These sites, described in Section 2.2.2, are currently cultivated or fallow agricultural lands.

3.2.3 Environmental Impacts and Mitigation Measures

3.2.3.1 Significance Criteria

The thresholds for determining the significance of impacts for this analysis are based on the environmental checklist in Appendix G of the State CEQA Guidelines. The proposed project was determined to result in a significant effect on agricultural resources or land use planning if it would:

- physically divide an established community;
- conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project adopted for the purpose of avoiding or mitigating an environmental effect;
- conflict with any applicable habitat conservation plan or natural community conservation plan;
- conflict with existing zoning for agricultural use or a Williamson Act contract; or
- convert or result in the conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to nonagricultural uses.

The proposed project would improve the flood control system that protects local communities. Portions of the proposed flood control improvements consist of projects located near residential areas (e.g., within the Sacramento city limits), but none would divide any community or residential cluster. Therefore, no impacts

related to the physical division of communities would result from implementation of the proposed project, and this issue is not discussed further.

The threshold related to Williamson Act contracts is not relevant to this analysis because Williamson Act contracts are deemed null and void when Williamson Act land is acquired for a public improvement by a public agency (Government Code Section 51295).

See Section 3.7, "Terrestrial Biological Resources," for the analysis of consistency of the proposed project with the NBHCP. That analysis concludes that, with mitigation, no inconsistency would result from implementation of the proposed project.

3.2.3.2 IMPACT ANALYSIS

IMPACT 3.2-a Conflicts with Land Use Plans and Policies. *The proposed project would not conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project adopted for the purpose of avoiding or mitigating an environmental effect. This impact would be* less than significant.

The adjacent setback levee and berms would overlap parts of the Airport Critical Zone. These flood control improvements would not modify intended land uses within those areas or include components, such as the creation of water features, that could attract waterfowl and thereby introduce hazards into the Critical Zone. The use of Airport bufferland parcels for soil borrow and their subsequent conversion to managed habitats is being coordinated with SCAS to enhance SCAS's ability to minimize the flight safety hazards associated with wildlife attraction to these lands and, therefore, supports plans and policies intended to enhance public safety associated with Airport operations (see also Section 3.16, "Hazards and Hazardous Materials").

Improvements along the NCC south levee, the Sacramento River east levee, and the PGCC west levee would result in a widened landside footprint of flood control facilities, removing edges of agricultural parcels from agricultural use in some locations and also removing some residences, agricultural buildings, and appurtenances; however these edge conversions and structure removals are not expected to conflict with the land use goals or policies of Sutter and Sacramento Counties intended to retain agricultural land holding in units large enough to guarantee future and continued agricultural use. The conversion of entire parcels or large portions of parcels of land currently or recently in agricultural use to managed habitat on Airport land and private lands is discussed in Impact 3.2-b.

Flood control facilities proposed to be constructed in 2009–2010 (adjacent setback levee and seepage berms along the Sacramento River east levee) would encroach on a planned City of Sacramento park, reducing or eliminating the allowable recreational uses within the footprint of the improvements. As described in Section 3.13, "Recreation," mitigation would be required to compensate for the loss or reduction of recreational uses on this land.

Furthermore, the proposed improvements to flood control facilities would be consistent with the community flood protection goals of the jurisdictions in which they would take place.

The proposed project would not conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project adopted for the purpose of avoiding or mitigating an environmental effect. This impact would be less than significant.

Mitigation Measure: No mitigation is required.

IMPACT 3.2-b **Conversion of Important Farmland to Nonagricultural Uses.** *Landside widening of flood control facilities, the conversion of agricultural lands to managed habitat, and the alteration of land cover on additional agricultural lands would convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to nonagricultural uses. This impact would be* ***significant****.*

The proposed project would widen the landside footprint of the NCC south levee and associated maintenance access corridor, substantially widen the Sacramento River east levee flood control facilities and maintenance access through the construction of the adjacent setback levee and 100-foot-wide and 300-foot-wide landside seepage berms in many reaches, and widen the footprint of the PGCC west levee flood control facilities and maintenance access. In all these areas, the proposed project would also include acquiring additional land to prevent encroachment into areas that may be required for future flood control facilities. Woodland corridors and groves would also be planted throughout the project area as part of the proposed project, in areas still to be determined. Soil borrow for construction would be obtained from the borrow sites described in Section 2.2.2. Nearly all of the areas of flood control facility expansion and borrow removal are classified as Prime Farmland, Unique Farmland, or Farmland of Statewide Importance. Given that most of the western portion of the Natomas Basin is classified within these categories by the FMMP, it is assumed that most areas selected for tree planting are likely to be on lands with these FMMP designations as well.

The removal of borrow from all borrow sites would entail the preservation and replacement of the topsoil on these parcels, thus retaining their potential use for agriculture. However, the proposed project includes converting these lands to managed marsh and managed grassland (which may include hay or alfalfa) to support their use by giant garter snakes and Swainson's hawks, respectively, and to reduce the presence of hazardous wildlife species in areas nearest to the Airport. Therefore, for purposes of this analysis, these land cover changes are considered conversions of Important Farmland to nonagricultural uses. Restoration of the borrow sites would be performed in compliance with SMARA.

The project activities proposed for 2008 would convert approximately 500 acres of Important Farmland to nonagricultural uses: 75 acres in the footprint of flood control facilities and adjacent land for maintenance access and prevention of encroachment into the flood control system, 25 acres for woodland areas, and 400 acres for borrow removal and conversion to managed habitats.

The project activities proposed for 2009–2010 would convert approximately 1,000 acres of Important Farmland to nonagricultural uses: 340 acres in the footprint of flood control facilities and adjacent land for maintenance access and prevention of encroachment into the flood control system, 125 acres for woodland areas, and 535 acres for borrow removal and conversion to managed habitats. This impact would be significant.

Mitigation Measure 3.2-b: Minimize Important Farmland Conversion to the Extent Practicable and Feasible.

SAFCA shall ensure that the following measures are implemented with regard to Prime Farmland, Unique Farmland, and Farmland of Statewide Importance to minimize impacts on these lands:

(a) Borrow sites shall be configured to minimize the fragmentation of lands that are to remain in agricultural use. Contiguous parcels of agricultural land of sufficient size to support their efficient use for continued agricultural production shall be retained to the extent practicable and feasible.

(b) To the extent practicable and feasible, when expanding the footprint of a flood control facility (e.g., levee or berm) onto agricultural land, the most productive topsoil from the construction footprint shall be salvaged and redistributed to less-productive agricultural lands in the vicinity of the construction area that could benefit from the introduction of good-quality soil. By agreement between the implementing agencies or landowners of affected properties and the recipient(s) of the topsoil, the recipient(s) would be required to use the topsoil for agricultural purposes.

(c) During project construction, use of utilities that are needed for agricultural purposes (including wells, pipelines, and power lines) and of agricultural drainage systems shall be minimized so that agricultural uses are not disrupted.

(d) Disturbance of agricultural land and agricultural operations during construction shall be minimized by locating construction staging areas on sites that are fallow, that are already developed or disturbed, or that are to be discontinued for use as agricultural land, and by using existing roads to access construction areas to the extent possible.

(e) To the extent feasible, lands acquired for flood control purposes shall also be used as mitigation land for NBHCP programs so that agricultural land conversion is minimized.

(f) Agricultural conservation easements shall be acquired at a 1:1 ratio (i.e., 1 acre on which easements are acquired to 1 acre of Prime Farmland, Unique Farmland, and Farmland of Statewide Importance removed from agricultural use), and the lands on which the easements are acquired shall be maintained in agricultural use.

Implementing this mitigation measure would reduce potential for impacts on Prime Farmland, Unique Farmland, and Farmland of Statewide Importance, but would not reduce the impact to a less-than-significant level because conversion of Important Farmland could still occur. Therefore, this impact would remain **significant and unavoidable**.

3.3 GEOLOGY AND SOILS

This section addresses issues related to geologic hazards, specifically seismicity and soil erosion. The loss of agriculturally productive topsoil through conversion of agricultural land is addressed in Section 3.2, "Agriculture and Land Use." Effects of erosion on water quality are discussed in Section 3.5, "Water Quality." Paleontological resources and unique geological features are addressed in Section 3.9, "Paleontological Resources."

3.3.1 REGULATORY SETTING

There are no federal, state, or local laws, regulations, policies, or ordinances related to geology or earthquake hazards that are relevant to this analysis. Several laws and regulations pertaining to soil erosion could apply to the proposed project and are described in this section.

3.3.1.1 FEDERAL LEVEE REQUIREMENTS

For a levee to be recognized by the Federal Emergency Management Agency (FEMA) as providing a "100-year" level of flood protection, the levee must be shown to satisfy several criteria, including protection of the embankment against erosion. Specific requirements are contained in Code of Federal Regulations Title 44, Section 65.10.

3.3.1.2 CLEAN WATER ACT

Construction-generated erosion is regulated under the federal Clean Water Act and under local grading ordinances. The State Water Resources Control Board and the regional water quality control boards regulate discharges of waste into waters of the state through National Pollutant Discharge Elimination System (NPDES) permits, which are authorized under Section 402 of the federal Clean Water Act. NPDES stormwater permits apply to general ground-disturbing construction activities that would disturb more than 1 acre, including clearing, grading, excavation, and reconstruction of existing facilities. The NPDES permitting process and other regulatory requirements for the protection of water quality are described in Section 3.5, "Water Quality."

3.3.1.3 SURFACE MINING AND RECLAMATION ACT

The state Surface Mining and Reclamation Act of 1975 (PRC Section 2710 et seq.) (SMARA) addresses surface mining of minerals and requires mitigation to reduce adverse impacts on public health, property, and the environment. SMARA applies to an individual or entity that would disturb more than 1 acre or remove more than 1,000 cubic yards of material through surface mining activities, including the excavation of borrow pits for soil material. SMARA is implemented through ordinances for permitting developed by local government "lead agencies" that provide the regulatory framework under which local mining and reclamation activities are conducted. The State Mining and Geology Board reviews the local ordinances to ensure that they meet the procedures established by SMARA. The general process consists of obtaining a permit to mine material, implementing a reclamation plan to return the land to a useable condition, and providing financial assurances to ensure the feasibility of the reclamation plan. The process of reclamation includes maintaining water and air quality and minimizing flooding, erosion, and damage to wildlife and aquatic habitats caused by surface mining. The final step in this process is often replacement of topsoil and revegetation with suitable plant species.

3.3.2 ENVIRONMENTAL SETTING

3.3.2.1 GEOLOGY

See Section 4.3.2, "Environmental Setting," in Section 4.3, "Geology and Soils," of Volume I of SAFCA's *Environmental Impact Report on Local Funding Mechanisms for Comprehensive Flood Control Improvements*

for the Sacramento Area (Local Funding EIR), for a detailed description of the geology of the project area (the Local Funding EIR is included as an attachment to this EIR).

3.3.2.2 SEISMICITY

See Section 4.3.2, "Environmental Setting," in Section 4.3, "Geology and Soils," of Local Funding EIR Volume I for a description of seismic hazards in general and as they relate to the project area.

The project area has experienced relatively low seismic activity in the past and does not contain any Alquist-Priolo Earthquake Fault Zones (California Geological Survey 1999, Hart and Bryant 1999). Numerous earthquakes of magnitude (M) 5.0 or greater have occurred on regional faults, primarily those within the San Andreas Fault System. The west side of the Central Valley is a seismically active region. The nearest known active (Holocene or Historic) fault trace to the project area is the Dunnigan Hills fault, approximately 30 miles northwest of downtown Sacramento and 15 miles from the Natomas Basin (Jennings 1994).

The closest active faults to the project area are listed in Table 3.3-1. In addition, Table 3.3-1 identifies the approximate distance from the project site, maximum moment magnitude (M), and fault class.

Table 3.3-1
Active Faults in the Project Area

Fault Name	Age of Fault Activity[1]	Approximate Distance from Project Site (Nearest Point)	Fault Class[2]	Maximum Moment Magnitude[3]
Dunnigan Hills	Holocene	15 miles	NA	NA
Coast Range Fault Zone	Historic	50 miles	NA	6.5
Green Valley	Historic	40 miles	B	6.9
Prairie Creek	Historic	30 miles	NA	6.5
Swain Ravine	Historic	25 miles	NA	6.5
Cleveland Hills	Historic	40 miles	NA	6.5
Hayward–Rodgers Creek	Historic	55 miles	A	7.0
San Andreas	Historic	75 miles	A	7.9

Notes: NA = not applicable

[1] Historic = activity within the last 200 years; Holocene = activity within the last 10,000 years

[2] Faults with an "A" classification are capable of producing large magnitude (M) events (M greater than 7.0), have a high rate of seismic activity (e.g., slip rates greater than 5 millimeters per year), and have well-constrained paleoseismic data (e.g., evidence of displacement within the last 700,000 years). Class B faults are those that lack paleoseismic data necessary to constrain the recurrence intervals of large-scale events. Faults with a "B" classification are capable of producing an event of M 6.5 or greater.

[3] The moment magnitude scale is used by seismologists to compare the energy released by earthquakes. Unlike other magnitude scales, it does not saturate at the upper end, meaning that there is no particular value beyond which all earthquakes have about the same magnitude, which makes it a particularly valuable tool for assessing large earthquakes.

Sources: Jennings 1994, Petersen et al. 1996, DWR 1979

3.3.2.3 SOILS

The Sutter and Sacramento County soil surveys (NRCS 1988, 1993) identify a variety of soil map units in the project area. Most of the soils in the project area are shallow to moderately deep, sloping, well-drained soils with very slowly permeable subsoils underlain with hardpan. These soils have good natural drainage, slow subsoil permeability, and slow runoff (NRCS 1988, 1993).

The Natomas Basin generally consists of deep soils derived from alluvial sources, which range from low to high permeability rates and low to high shrink-swell potential. Soils range from low to high hazard ratings for construction of roads, buildings, and other structures related to soil bearing strength, shrink-swell potential, and the potential for cave-ins during excavation. Soils immediately adjacent to the Sacramento River are dominated by deep, nearly level, well-drained loamy and sandy soils. The natural drainage is good, and the soils have slow to moderate subsoil permeability. The river terraces consist of very deep, well-drained alluvial soils. (NRCS 1988, 1993.)

3.3.3 ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Effects associated with geology and soils that could result from project-related activities were evaluated based on expected construction practices, materials used to construct the proposed improvements, general locations, and the nature of proposed operations.

3.3.3.1 SIGNIFICANCE CRITERIA

The thresholds for determining the significance of impacts for this analysis are based on the environmental checklist in Appendix G of the State CEQA Guidelines. The proposed project was determined to result in a significant effect related to geology and soils if it would:

- result in substantial soil erosion or the loss of topsoil;
- expose people or structures to potential substantial adverse impacts, including risk of loss, injury, or death through the rupture of a known earthquake fault, strong seismic shaking, seismic-related ground failure, soil liquefaction, or landslides;
- locate project facilities on a geologic unit or soil that is unstable, or that would become unstable as a result of the proposed project, and potentially result in on-site or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse;
- locate project facilities on expansive soil, creating substantial risks to property;
- have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater; or
- destroy a unique geologic feature.

Landslides are not a concern in relation to the proposed project because the project area is relatively flat. The proposed improvements would not involve the construction of any structures intended for human occupancy or the construction or modification of any structure in an area subject to seismic ground shaking or seismic-related ground failure. Therefore, the proposed project would not expose people to potential substantial adverse effects, including the risk of loss, injury, or death due to rupture of a known earthquake fault, strong seismic ground shaking, seismic-related ground failure, or landslides.

All levee improvements would be designed based on the results of detailed geotechnical engineering studies and would be required to comply with standard engineering practices for levee design. The Reclamation Board's standards are the primary state standards applicable to the proposed levee improvements; these are stated in Title 23, Division 1, Article 8, Sections 111–137 of the California Code of Regulations. The Reclamation Board's standards direct that levee design and construction be in accordance with the USACE's *Engineering Design and Construction of Levees* (USACE 2000), the primary federal standards applicable to levee improvements. Because the design, construction, and maintenance of levee improvements must comply with the regulatory standards of The Reclamation Board and the USACE, it is assumed that the design and construction of all levee modifications

under the proposed project would meet or exceed applicable design standards for static and dynamic stability, secondary effects related to ground shaking, and seepage.

Because the proposed project would not involve the use of wastewater disposal systems of any kind, there would be no impact related to the ability of project site soils to support the use of septic systems. Therefore, these issues are not addressed further in this EIR.

There are no unique geologic features in the project area. Therefore, the proposed project would not destroy such features and this issue is not discussed further in this EIR.

3.3.3.2 IMPACT ANALYSIS

IMPACT 3.3-a **Potential Temporary, Short-Term Construction-Related Erosion.** *Ground-disturbing activities associated with project construction could result in substantial soil erosion and loss of topsoil at construction and borrow sites. This impact would be* ***significant****.*

The proposed project would include a substantial amount of construction activity over large areas, particularly along the Natomas Cross Canal (NCC), the Sacramento River east levee, the Pleasant Grove Creek Canal (PGCC) west levee, and at borrow sites, during both the 2008 and the 2009–2010 construction periods. In all years of project construction, the construction activities are expected to be conducted continuously from early May through November.

For the 2008 construction, approximately 2 million cubic yards of soil borrow would be excavated from borrow sites and the alignment of the new GGS/Drainage Canal and used for construction of improvements to the NCC south levee and the Sacramento River east levee and construction of a portion of the relocated Elkhorn Canal. Installation of the seepage cutoff wall through the NCC south levee would require degradation and reconstruction of the top third of the levee. Soil stripping and site grading would be necessary in the footprint of the expanded NCC landside levee toe, the adjacent setback levee along the Sacramento River east levee, the seepage berms along Sacramento River east levee Reaches 2–4B (to Station 214+00), and the canal alignments between the North Drainage Canal and Elkhorn Reservoir. Structures and trees would need to be removed from a portion of the footprint of the adjacent setback levee and berms along the Sacramento River east levee, and power poles would need to be removed and relocated.

For the 2009–2010 construction, approximately 4.4 million cubic yards of soil would be excavated from borrow sites, excavated from the new GGS/Drainage Canal alignment, or removed from existing berms along the Sacramento River east levee, and would be used for improvements to the Sacramento River east levee, the Elkhorn and Riverside Canal relocations, and the PGCC west levee improvements. Soil stripping and site grading would be necessary in the footprint of the adjacent setback levee and berms, where they are planned, along the Sacramento River east levee in Reaches 4B (Station 214+00) to 19A; the expanded toe of the PGCC west levee and adjacent seepage berms; and the new canal alignments below the Elkhorn Reservoir. Structures and trees would need to be removed from a portion of the footprint of the adjacent setback levee and berms along the Sacramento River east levee, and power poles would need to be removed and relocated.

The upper 6–12 inches of topsoil from the borrow sites would be set aside and replaced on-site after project construction in each construction year. However, these activities would result in the temporary disturbance of soil and could expose disturbed areas to winter or early-season storm events. Rainfall of sufficient intensity could dislodge soil particles from the soil surface. Once particles are dislodged and the storm is large enough to generate runoff, substantial localized erosion could occur. In addition, soil disturbance during the summer months could result in substantial loss of topsoil because of wind erosion. The potential for substantial erosion or loss of topsoil during construction would be a significant impact.

Mitigation Measure 3.3-a: Implement Mitigation Measure 3.5-a (Implement Standard Best Management Practices, Prepare and Implement a Stormwater Pollution Prevention Plan, and Comply with NPDES Permit Conditions).

Implementing this mitigation measure (described in Section 3.5, "Water Quality") would reduce potential soil erosion impacts to a **less-than-significant** level.

3.4 HYDROLOGY AND HYDRAULICS

This section addresses seasonal flooding and flood management as defining elements of the physical environment in the project area and evaluates the effects of SAFCA's proposed improvements on these elements.

3.4.1 REGULATORY SETTING

For a detailed description of the history of the regulatory and conceptual frameworks for SAFCA's overall program of flood control improvements for the Sacramento area, see Section 4.4, "Hydrology and Hydraulics," of the *Environmental Impact Report on Local Funding Mechanisms for Comprehensive Flood Control Improvements for the Sacramento Area* (Local Funding EIR), which is included as an attachment to this EIR.

3.4.1.1 FEDERAL

The federal government, primarily through the U.S. Army Corps of Engineers (USACE), has a major role in shaping flood management policies and regulations affecting the Sacramento River drainage basin. Through a series of federal laws, Congress gave the USACE specific authority to participate with the State of California and local agencies in planning and constructing the Sacramento River Flood Control Project (SRFCP). The SRFCP is a comprehensive system of levees, bypass channels, and multipurpose dams that was initially conceived by state engineers to prevent a recurrence of the catastrophic flooding that occurred in the Sacramento Valley as a result of the record floods of 1907 and 1909. This system was essentially completed in 1968.

The Federal Emergency Management Agency (FEMA) administers the National Flood Insurance Program (NFIP), which establishes minimum standards for insuring existing structures in floodplain areas against flood damage and for designing new structures in these areas to avoid such damage. These minimum standards apply in areas that are subject to inundation in the event of a "100-year" flood (i.e., the flood with a 1% chance of being exceeded in a given year).

In the lower Sacramento Valley, most counties and cities joined the NFIP in the late 1970s and early 1980s based on maps of the 100-year floodplain adopted by FEMA. For areas protected by the SRFCP, these maps were developed in consultation with the USACE, which concluded that the design of the SRFCP was generally adequate to contain a 100-year flood in accordance with FEMA's freeboard requirements and related levee safety requirements. However, the record flood of 1986 exposed serious deficiencies in the structural soundness of many SRFCP levees. This caused FEMA to promulgate new 100-year floodplain maps in several communities, including the Sacramento area. The flood of 1997 raised additional concerns about the permeability of the soil materials in the foundations supporting many SRFCP levees. Nearly a decade later, the catastrophic consequences of flooding in New Orleans from Hurricane Katrina in August 2005 have triggered widespread interest in updating NFIP policies and programs. FEMA is undertaking a new round of floodplain mapping and has announced that levees such as those comprising the SRFCP will be deemed deficient unless the affected local community provides the technical data necessary to demonstrate that their levees meet the NFIP's minimum standards.

3.4.1.2 STATE

The State of California Reclamation Board (The Reclamation Board) was established in 1911 to facilitate construction of the SRFCP and to regulate its operation and maintenance. With the subsequent emergence of the federal government as the principal financier of the SRFCP, the legislature designated The Reclamation Board as the nonfederal sponsor responsible for managing the SRFCP through a series of cost-sharing and administrative agreements with the USACE. These agreements require The Reclamation Board to operate and maintain the SRFCP in accordance with requirements approved by the USACE. The Reclamation Board has in turn passed many of these requirements along to the affected local agencies through a separate series of local cost-sharing and administrative agreements. The entire arrangement is backed up by legislative enactments contained in the State

Water Code that give The Reclamation Board regulatory authority over all activities affecting the levees and related facilities of the SRFCP.

3.4.1.3 COMPREHENSIVE STUDY

The USACE and The Reclamation Board undertook the Sacramento and San Joaquin River Basins California Comprehensive Study (Comprehensive Study) after the 1997 flood in coordination with a consortium of federal, state, and local governmental agencies and private groups and organizations in California's Central Valley, with the objective of developing a comprehensive plan for flood damage reduction and environmental restoration purposes for the Sacramento and San Joaquin River basins. An interim report (USACE and The Reclamation Board 2002) identified the Comprehensive Study as an approach to developing projects in the future to reduce damages from flooding and restore the ecosystem in the Sacramento and San Joaquin River basins. The Comprehensive Study consists of three elements:

- a set of principles to guide future projects,
- an approach to developing projects that considers systemwide effects, and
- a call to create the institutional arrangements necessary to consistently apply the Comprehensive Study's guiding principles in maintaining the flood management system and developing future projects.

The following are the Comprehensive Study's guiding principles:

- Recognize that public safety is the primary purpose of the flood management system.
- Promote effective floodplain management.
- Promote agriculture and open space protection.
- Avoid hydraulic and hydrologic impacts.
- 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 multipurpose projects to improve flood management and ecosystem restoration.

Although the Comprehensive Study is not a regulatory program per se, consistency with its goals and objectives is important for any project affecting flood control in the Sacramento and San Joaquin River basins, including the proposed project.

3.4.1.4 LOCAL

Reclamation District (RD) 1000 is responsible for operating and maintaining the levees around the Natomas Basin, the American River Flood Control District operates and maintains the levees along the American River and in North Sacramento, and the City and County of Sacramento operate and maintain small reaches of the SRFCP levee system. Because none of these agencies alone has either the resources or the jurisdiction to manage all of the SRFCP levees in the Sacramento area, they have banded together in SAFCA to provide a principal point of local contact with The Reclamation Board and the USACE.

In November 2005, the SAFCA board endorsed a white paper outlining a legislative framework for comprehensively addressing flood control and flood risk management issues in the lower Sacramento Valley. This white paper was subsequently endorsed with minor revisions in April 2006 by the Sacramento Area Council of Governments. It calls for the adoption of a new set of standards to guide the development of the flood basins protected by the SRFCP over the next several decades:

- a standard for protecting agricultural areas that is consistent with the historical design of the SRFCP,
- a new standard for protecting the small communities of the Sacramento Valley that is consistent with the requirements of the NFIP, and
- a new "200-year" urban flood protection standard that exceeds the minimum requirements of the NFIP.

These standards reflect three different approaches to developing the hydrology (flood flows) that will guide management of the SRFCP:

- using the historical floods of 1907 and 1909 as the basis for protecting agricultural areas,
- using the federally adopted statistical approach to defining the 100-year flood (1% chance of being equaled or exceeded in a given year) as the basis for protecting small communities, and
- using a hypothetical design flood representing the most severe combination of meteorologic and hydrologic conditions that are considered reasonably characteristic for the Sacramento River drainage basin and its subbasins as the basis for protecting urban areas.

For purposes of developing this urban design flood, SAFCA believes it is appropriate to use Comprehensive Study procedures for estimating the 200-year flood. Because of the problems associated with extrapolating the actual frequency of this flood, SAFCA refers to this design as "200-year" urban standard flood protection.

See Appendix D in Volume I of the Local Funding EIR for SAFCA's white paper.

3.4.2 ENVIRONMENTAL SETTING

3.4.2.1 HYDROLOGY

The project area lies just north of the confluence of the Sacramento and American Rivers. The Sacramento River drainage basin covers approximately 26,150 square miles and includes the Feather River drainage basin, which totals approximately 5,500 square miles. Despite its relatively small size, the Feather River has the potential to generate very high peak floods. Table 3.4-1 compares the runoff characteristics of these drainage basins.

Table 3.4-1
Basin Runoff Characteristics

Basin	Watershed Area (square miles)	Flood of Record (year)	Unregulated Flow Record 1-Day Flow (cfs)	Flow per Square Mile (cfs)
Sacramento River at Latitude of Verona	21,251	1997	624,000	29
Feather River at Shanghai Bend	5,313	1997	534,000	101
Sacramento River at Latitude of Sacramento	26,150	1997	840,000	32

Note: cfs = cubic feet per second
Source: Data provided by MBK Engineers in 2006

The American and Feather Rivers produce about 90% of the flood flows approaching Sacramento from the north and the east. Both historically and as part of the design of the SRFCP, flood flows approaching from the north are split between the Sacramento River and the Yolo Basin (Bypass). Under the current design of the SRFCP, the Yolo Bypass absorbs about 70% of this flow at the latitude of Verona and 80% at the latitude of Sacramento.

The Natomas Cross Canal (NCC) carries water from several tributary watersheds in western Placer County and eastern Sutter County to the Sacramento River. The Pleasant Grove Creek Canal (PGCC) carries water from Pleasant Grove Creek and other western Placer County creeks, as well as from water backed up in the NCC from high river stages in the Sacramento River.

See Chapter 2, "Background," and Section 4.4.2.1, "Hydrology," in Volume I of the Local Funding EIR for detailed information on the flood control history, major waterways and tributaries, flood control facilities, and flood control operations of the Sacramento area.

3.4.2.2 LEVEE DESIGN

When the 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.

This design, although well suited to address the technical and financial challenges of a previous era, has left a succeeding generation of flood managers with two systemic problems and levee risk factors: chronic erosion and seepage. The mechanisms of riverbank erosion are described in Section 4.4.2.2, "Levee Design," of the Local Funding EIR, and currently identified erosion problems along the east bank of the Sacramento River adjacent to the Natomas Basin are being addressed in a separate SAFCA project that is being evaluated in the *Environmental Impact Report on Natomas Levee Improvement Program Bank Project* (see Section 1.3.3 of this EIR).

Because of the use of relatively porous hydraulic mining sediments in many parts of the mainstem levee system, the levees have a propensity to seep when subjected to prolonged high water surface elevations such as occurred during the floods of 1986 and 1997. Through-seepage was deemed a levee system design deficiency in the aftermath of the 1986 flood, and a substantial capital improvement program has been under way since the early 1990s to address this deficiency. Additionally, because the mainstem levees are constructed on high berms relatively close to the river channel, the same energy that was harnessed to drive hydraulic mining sediment from the system also exerts itself against the sandy alluvial soil layers that lie beneath the levees. In high river stage conditions, this energy is strong enough to push water through these layers in volumes great enough to exert an uplift force capable of fracturing the soil mantel on the land side of the levee. This "underseepage" can occur where levees are constructed on low-permeability foundation soil (silt and clay) underlain by a higher-permeability layer (sand and gravel), and makes the levee susceptible to failure during periods of high river stage (see Section 2.3.2, "Levee Raising and Seepage Remediation," for further discussion of underseepage).

3.4.2.3 IRRIGATION AND DRAINAGE FACILITIES

Along the NCC and Sacramento River are more than a dozen points at which water is either pumped from these waterways into irrigation channels or pumped back into them from canals or ditches that are draining irrigation return flows or stormwater runoff from the Natomas Basin. Most of these pumping facilities are owned and maintained by the Natomas Central Mutual Water Company (NMWC) or RD 1000, and some are privately owned. Major irrigation and drainage canals that connect to the pumping facilities are owned and maintained by

NMWC and RD 1000, respectively, and numerous smaller canals and ditches, owned and maintained NMWC and basin landowners, connect to the major canals.

The major irrigation and drainage facilities that would be affected by the proposed project are discussed in Sections 2.2.1, "Flood Control and Irrigation Facilities," and 2.3.3.1, "Overview of Major Drainage and Infrastructure Modification."

3.4.3 ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Hydraulic modeling has been performed for the proposed project evaluated in this EIR. The November 2006 MBK hydraulic impact analysis used in the Local Funding EIR assumed complete flood control system modifications, including Folsom Dam and American River levee improvements, and provides the framework for this project-level analysis. This section addresses the impacts of the levee raises on the NCC south levee, Sacramento east levee, and the PGCC without the Folsom Dam and American River modifications.

3.4.3.1 SIGNIFICANCE CRITERIA

The thresholds for determining the significance of impacts for this analysis are based on the environmental checklist in Appendix G of the State CEQA Guidelines and professional practice. The proposed project was determined to result in a significant effect on hydrology or hydraulics if it would:

- substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level;
- create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff;
- place housing within a 100-year flood hazard area or place within a 100-year flood hazard area structures that would impede or redirect flood flows;
- expose people or structures to a significant risk of loss, injury, or death involving flooding; or
- substantially alter the existing drainage pattern of a site or an area, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on-site or off-site.

The proposed project would not affect groundwater levels or recharge capability; cause substantial increases in amounts of runoff; or place housing or other structures, with the exception of flood control facilities, in a 100-year flood hazard area. Therefore, the first three significance criteria do not apply to this analysis.

In determining whether a proposed project would expose people or structures to a significant risk as a result of flooding, SAFCA uses the following thresholds:

- whether the proposed project would cause encroachment on SRFCP design levee freeboard outside the project area, or
- whether the proposed project would cause a significant increase in flooding, defined as an increase of 0.1 foot or more, in an area that is outside the protection of the SRFCP.

3.4.3.2 IMPACT ANALYSIS

IMPACT 3.4-a **Hydraulic Effects of the Proposed Levee Improvements.** *The proposed project includes raising and strengthening levees in the Natomas Basin. The effects of these modifications on design SRFCP water surface elevations, including the water surface elevations associated with 100- and 200-year conditions, show that hydraulic impacts upstream of, downstream of, and within the project area would be* ***less than significant****.*

The NCC south levee, many of the reaches of the Sacramento River east levee, and several sections of the PGCC west levee lack the required 3 feet of freeboard above the 100-year water surface profile. SAFCA would increase the levee freeboard sufficiently in freeboard-deficient areas to meet the desired minimum of 3 feet of freeboard above the 200-year water surface profile. The PGCC west levee at Sankey Road, however, would not be raised by SAFCA as part of the proposed project.

These improvements could reduce the risk of overtopping and failure of these levees, thereby causing more water to be retained in the channels under rare flood conditions. This, in turn, could increase the potential for overtopping and failure elsewhere in the SRFCP system, either within the Sacramento metropolitan area or upstream or downstream of this area.

MBK Engineers performed a hydraulic impact analysis for SAFCA to analyze the effects of the proposed project on flood risk within the project study area, both upstream and downstream of the study area (modeling results are included in Appendix B). The analysis was performed using MBK Engineers' version of the Sacramento River UNET hydraulic simulation model that was developed by the USACE for the Comprehensive Study. The evaluation included raising the NCC south levee, the Sacramento River east levee, and the PGCC, as described in Chapter 2.

The simulations were based on the following hydrologic conditions:

- 100-year (Sacramento River) hydrology,
- 200-year (Sacramento River) hydrology, and
- 200-year (Sacramento River) hydrology with concurrent 200-year Folsom Dam release (200+ year hydrologic condition).

To determine whether the proposed improvements would cause encroachment on SRFCP design levee freeboard outside the project area, MBK looked at three conditions:

- whether the improvements would increase the "1957" water surface profiles that serve as the minimum design standard for all reaches of the SRFCP,
- whether the improvements would increase the 100-year water surface elevation in any urban areas upstream or downstream of the program study area, and
- whether the improvements would increase the 200-year water surface elevation in any urban areas upstream or downstream of the program study area.

With respect to the design of the SRFCP, MBK concluded that all the levees in the project area, including those that would be improved as part of the proposed project, currently contain the "1957" profile. The proposed improvements would not alter the SRFCP's "1957" water surface profiles (a 0.00-foot increase in the 1957 design flow above the 1957 design stage under modeling for the proposed project) or cause encroachment into the levee freeboard associated with these profiles.

The proposed project would not increase 100-year and 200-year water surface elevations; the model showed an elevation change of 0.00 foot for both simulations. The details of this analysis are included in Appendix B.

Therefore, the proposed project would not expose people or structures to a significant risk as a result of flooding, and the impact would be less than significant.

Mitigation Measure: No mitigation is required.

IMPACT 3.4-b **Alteration of Local Drainage.** *In 2009–2010, construction of the adjacent setback levee and relocated and new canals could temporarily disrupt local drainage systems, and shallow excavation of soil material from large parcels could permanently alter local drainage patterns such that localized flooding may occur. This potential impact would be* ***significant****.*

As part of the planning process for the proposed project and in coordination with SAFCA, Sacramento County Airport System, and RD 1000, Mead & Hunt has conducted preliminary evaluations of local drainage patterns and needs in relation to proposed project features. Information on drainage trends and drainage collection needs in the project area have been an integral part of development of the project concept.

Extensive landside seepage berms would be constructed in 2008 along Sacramento River east levee Reaches 2–4B and in 2009–2010 in many areas along Sacramento River east levee Reaches 4B–19A and along the PGCC. Because these berms would be constructed of earth and would be very gradually sloped (1.5%–2% grade), they would not affect local site drainage or runoff.

Project elements proposed for 2008 construction include relocating the private irrigation ditch in Sacramento River east levee Reach 1 to relocate it as part of the construction of the adjacent setback levee (see Exhibit 2-23). No aspects of the Natomas Basin drainage system would be affected by 2008 construction. The preferred borrow sites for use in 2008, the Vestal and/or Spangler property and The Natomas Basin Conservancy's Bolen South and Nestor sites—or the Brookfield property, an alternative borrow source—would be 2–3 feet lower than adjacent parcels following the conclusion of borrow operations. These sites would be reconfigured into managed marsh with a combination of shallow water bodies, swales, and uplands, and with water control structures that would be used to carefully manage water levels at different times of the year to optimize the intended habitat conditions. Drainage from these sites would be routed to the existing drainage system for these lands. No substantial alteration of drainage patterns or disruption of drainage systems would result from the proposed project as a result of the elements proposed for 2008 construction.

Similarly, in 2009–2010, managed marsh created in Sacramento International Airport (Airport) bufferland areas used as a borrow source would be designed to drain to the existing drainage system for these lands. Other Airport borrow areas would be converted to managed grassland that would be 2–3 feet lower than other basin lands following borrow removal. Given that the primary management objective on these lands would be to reduce hazardous wildlife populations, these lands would need to be graded to ensure their efficient drainage, as needed, to existing drainage canals. A specific grading plan is still under development.

Other project elements proposed for 2009–2010 include construction of the proposed adjacent setback levee in Reaches 4B–19A of the Sacramento River east levee, and the associated relocation of the existing Elkhorn and Riverside Canals and rerouting of irrigation water through replacement canals that would be constructed in advance of that removal, as described in Section 2.3.3, "Major Irrigation and Drainage Infrastructure." Privately maintained local canals, some of which may provide a drainage function, would be overlapped by the footprint of the adjacent setback levee along the Sacramento River east levee, the widened PGCC west levee, and berms associated with both levees. Drainage would need to be rerouted to new replacement canals before these canals are decommissioned to ensure that local drainage and ponding areas would not be adversely affected as a result of project construction. Detailed plans for these replacements are still under development. The new GGS/Drainage Canal would become part of the local drainage system and would be designed to intercept and convey runoff from

much of the area currently drained by the Airport West Ditch. Construction of the new GGS/Drainage Canal, and the repairs to infrastructure associated with the Airport West Ditch described in Section 2.3.3.4, "Airport West Ditch (2009 Construction),"would substantially alter drainage collection west of the Sacramento International Airport (Airport) operations area by improving drainage in the Airport Critical Zone. Specific design of connections with the existing local drainage system is still under development.

Because specific plans have not been developed to ensure uninterrupted conveyance of drainage from agricultural lands along the Sacramento River east levee and the PGCC west levee and grading plans have not yet been developed for borrow areas that would be converted to managed grassland, there is the potential for the proposed project to temporarily or permanently alter the existing drainage pattern of the project area as a result of 2009–2010 construction, causing localized flooding. This potential impact would be significant.

Mitigation Measure 3.4-b: Coordinate with Landowners and Drainage Infrastructure Operators, Prepare Drainage Studies as Needed, and Remediate Impacts through Project Design.

SAFCA and its primary consultants for engineering design and construction shall ensure that the following measures are implemented to avoid significant effects associated with disruption of local drainage systems.

During project design, project engineers shall coordinate with owners and operators of local drainage systems and landowners served by the systems to evaluate preproject and postproject drainage needs, and design features to remediate any project-related substantial drainage disruption or alteration in runoff that would increase the potential for local flooding. If substantial alteration of runoff patterns or disruption of a local drainage system could result from a project feature, a drainage study shall be prepared as part of project design. The study shall consider the design flows of any existing facilities that would be crossed by project features and shall develop appropriate plans for relocation or other modification of these facilities and construction of new facilities, as needed, to ensure equivalent functioning of the system during and after construction. If no drainage facilities (e.g., ditches, canals) would be affected, but project features would have a substantial adverse impact on runoff amounts and/or patterns, then new drainage systems shall be included in the design of project improvements to ensure that the project would not result in new or increased local flooding. Any necessary features to remediate project-induced drainage problems shall be constructed before the project is completed or as part of the project, depending upon site-specific conditions.

Implementing this mitigation measure would reduce the potential impact on local drainage to a **less-than-significant** level.

3.5 WATER QUALITY

3.5.1 REGULATORY SETTING

3.5.1.1 FEDERAL

Clean Water Act

The Clean Water Act (CWA) is the country's primary surface water protection legislation. The CWA was established to restore and maintain the chemical, physical, and biological integrity of surface waters to support "the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water" through a variety of regulatory and nonregulatory tools, including establishing water quality standards, issuing permits, monitoring discharges, and managing polluted runoff.

The U.S. Environmental Protection Agency (EPA) is the federal agency with primary authority for implementing regulations adopted pursuant to the CWA. EPA has delegated to the State of California the authority to implement and oversee most of the California programs authorized or adopted for CWA compliance through the Porter-Cologne Water Quality Control Act of 1969 (Porter-Cologne Act), described in Section 3.5.1.2 below.

In accordance with CWA Section 404, the U.S. Army Corps of Engineers regulates and issues permits for activities that involve the discharge of dredged or fill materials into "waters of the United States," Waters of the United States include navigable waters of the United States, interstate waters, all other waters where the use or degradation or destruction of the waters could affect interstate or foreign commerce, tributaries to any of these waters, and wetlands that meet any of these criteria or that are adjacent to any of these waters or their tributaries. Many surface waters and wetlands in California meet the criteria for waters of the United States. While important to water quality, the Section 404 program also addresses the overall functions of aquatic habitat; therefore, this program is addressed in more detail in Section 3.6, "Fisheries and Aquatic Resources," and Section 3.7, "Terrestrial Biological Resources."

Implementation of CWA Sections 402 and 401 is delegated to the State of California through the State Water Resources Control Board (SWRCB). These sections of the CWA are described below in Section 3.5.1.2.

3.5.1.2 STATE

Porter-Cologne Water Quality Control Act

The Porter-Cologne Act complements the CWA and establishes the state policies subject to the CWA. The act established the SWRCB and nine regional water quality control boards (RWQCBs). The SWRCB is the primary state agency responsible for protecting the quality of California's surface water and groundwater supplies, but much of its daily implementation authority is delegated to the RWQCBs. The Porter-Cologne Act authorizes the SWRCB to issue waste discharge requirements (WDRs) and National Pollutant Discharge Elimination System (NPDES) permits (described below), and requires that either the SWRCB or the RWQCBs adopt water quality control plans (basin plans) for the protection of surface water and groundwater quality. The project area is within the jurisdiction of the Central Valley RWQCB (Region 5), which has adopted a basin plan described in the next section.

Basin Plan

Pursuant to the Porter-Cologne Act, the Central Valley RWQCB prepares and updates the *Water Quality Control Plan for the Sacramento and San Joaquin River Basins* (Basin Plan) every 3 years; the most recent update was completed in February 2007 (Central Valley RWQCB 2007). The Basin Plan describes the officially

designated beneficial uses for specific surface water and groundwater resources and the enforceable water quality objectives necessary to protect those beneficial uses.

The Basin Plan includes numerical and narrative water quality objectives for physical and chemical water quality constituents. Numerical objectives are set for temperature, dissolved oxygen, turbidity, and pH; total dissolved solids, electrical conductivity, bacterial content, and various specific ions; trace metals; and synthetic organic compounds. Narrative objectives are set for parameters such as suspended solids, biostimulatory substances (e.g., nitrogen and phosphorus), oil and grease, color, taste, odor, and aquatic toxicity. Narrative objectives are often precursors to numeric objectives. The primary method used by the Central Valley RWQCB to ensure conformance with the Basin Plan's water quality objectives and implementation policies and procedures is to issue WDRs for projects that may discharge wastes to land or water. WDRs specify terms and conditions that must be followed during the implementation and operation of a project.

Clean Water Act Section 303(d)

Under CWA Section 303(d) and California's Porter-Cologne Act, the State of California is required to establish beneficial uses of state waters and to adopt water quality standards to protect those beneficial uses. Section 303(d) establishes the total maximum daily load (TMDL) process to assist in guiding the application of state water quality standards. This process requires the states to identify streams whose water quality is "impaired" (affected by the presence of pollutants or contaminants) and to establish the TMDL or the maximum quantity of a particular contaminant that a water body can assimilate without adverse effect.

Clean Water Act Section 401

Under CWA Section 401(a)(1), applicants for a federal license or permit to conduct activities that may result in the discharge of a pollutant into waters of the United States must obtain certification from the state in which the discharge would originate or, if appropriate, from the interstate water pollution control agency with jurisdiction over affected waters at the point where the discharge would originate. Therefore, all projects with a federal component that may affect state water quality (including projects that require federal agency approval such as issuance of a Section 404 permit) must also comply with CWA Section 401. The RWQCBs administer the Section 401 program with the intent of prescribing measures necessary to avoid, minimize, or mitigate adverse impacts of proposed projects on water quality and ecosystems.

California Toxics Rule and State Implementation Policy

The California Toxics Rule (CTR) was promulgated in 2000 in response to requirements of the EPA National Toxics Rule (NTR). The NTR and CTR criteria are regulatory criteria adopted for inland surface waters, enclosed bays, and estuaries in California that are subject to regulation pursuant to Section 303(c) of the CWA. The NTR and CTR include criteria for the protection of aquatic life and human health. Human health criteria (water and organisms) apply to all waters with a Municipal and Domestic Supply beneficial use designation as indicated in the RWQCBs' basin plans. The *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California*, also known as the State Implementation Plan (SIP), was adopted by the SWRCB in 2000 to establish provisions for translating CTR criteria, NTR criteria, and basin plan water quality objectives for toxic pollutants into the following:

- NPDES permit effluent limits
- Compliance determinations
- Monitoring for dioxin (2,3,7,8-TCDD) equivalents
- Chronic toxicity control provisions
- Initiating site-specific objective development
- Granting exceptions

Waste Discharge Requirements and National Pollutant Discharge Elimination System Permits

The SWRCB and the RWQCBs regulate discharges of waste into waters of the state through WDRs, which are authorized under the state Porter-Cologne Act, and through NPDES permits, which are authorized under Section 402 of the federal CWA. The Porter-Cologne Act defines waters of the state as "any surface water or ground water, including saline waters, within the boundaries of the state." Some waters that qualify as waters of the state, such as isolated wetlands, do not necessarily qualify as waters of the United States.

The RWQCBs issue WDRs to regulate activities of entities subject to the state's jurisdiction that would discharge waste that may affect groundwater quality or that may discharge waste in a diffused manner (e.g., through erosion from soil disturbance). The RWQCB administers a general WDR/NPDES permit process for low-threat discharges from construction dewatering activities that discharge to surface waters (i.e., removal of accumulated water during excavation). A notice of intent (NOI) to discharge must be submitted to the RWQCB before the activity begins; the general order contains a set of standard terms and conditions for compliance with discharge prohibitions, specific effluent and receiving-water limitations, required solids disposal activities, water quality monitoring protocols, and applicable water quality criteria. When numerous discharge locations are anticipated, the general order allows the applicant to submit a pollution prevention, monitoring, and reporting plan that provides for consolidated identification of discharges, monitoring, and reporting procedures. The RWQCB can also issue a waiver to dewatering discharges if the discharge would not enter a water body.

The RWQCBs issue NPDES permits for waste discharges to surface water from both point and nonpoint sources. The NPDES permit system includes an individual system for municipal wastewater treatment plants and several categories of stormwater discharges. NPDES stormwater permits apply to industrial facilities and any general ground-disturbing construction activity that would disturb more than 1 acre.

Before construction of such projects, applicants must submit an NOI to discharge stormwater to the RWQCB and must prepare a storm water pollution prevention plan (SWPPP). A SWPPP generally describes proposed construction activities, receiving waters, stormwater discharge locations, and best management practices (BMPs) that will be used to reduce the effects of project construction on receiving-water quality. A number of "good housekeeping" BMPs are also generally included in a SWPPP to control waste discharges during the dry months. An appropriate selection of postconstruction, permanent pollution control and treatment measures must also be considered for implementation where necessary to prevent long-term water quality impairment.

The NPDES permitting process for general construction activities requires the applicant to:

- file an NOI to discharge stormwater,
- prepare a SWPPP that identifies BMPs to prevent or minimize the discharge of sediments and other contaminants with the potential to affect beneficial uses or lead to violations of water quality objectives, and
- complete a self-implemented inspection, monitoring, and reporting program for BMP performance.

Fish and Game Code Section 1602

All diversions, obstructions, or changes to the natural flow or bed, channel, or bank of any river, stream, or lake in California that supports wildlife resources is subject to regulation by the California Department of Fish and Game, pursuant to Section 1602 of the California Fish and Game Code. See Section 3.7, "Terrestrial Biological Resources," for a description of this regulation.

3.5.2 ENVIRONMENTAL SETTING

The project area is located in Reclamation District (RD) 1000. In 1911, RD 1000 was created and approximately 43 miles of levees were constructed around approximately 55,000 acres. This area came to be known as the Natomas Basin. It is bounded on the west by the Sacramento River, on the north by the Natomas Cross Canal (NCC), on the east by the Pleasant Grove Creek Canal and Natomas East Main Drainage Canal (NEMDC)/Steelhead Creek, and on the south by the American and Sacramento Rivers. This reclaimed floodplain, protected from external flooding by a levee system, has an internal drainage system that depends on pumping into the Sacramento River.

The East Drainage Canal and the West Drainage Canal drain the Natomas Basin. The basin is protected from flows in the Sacramento River by a series of levees and pumping systems. Levees lie along the east bank of the Sacramento River, the south side of the NCC, and the east side of the Natomas Basin. Currently, seven pumping sites remove stormwater from the Natomas Basin. Four sites pump into the Sacramento River, one pumps into the NCC, and two pump into the NEMDC/Steelhead Creek. The two pump sites on the NEMDC/Steelhead Creek add stormwater from the lower Natomas Basin to higher property to the east. This has actually made stormwater flow uphill and reverses the natural downhill flow of the stormwater.

3.5.2.1 SURFACE WATER QUALITY

Surface water quality in the hydrologic region is generally good. Possible sources of contamination that can affect water quality include turbidity; pesticides and fertilizers from agricultural runoff; water temperature exceedances; and toxic heavy metals, such as mercury, copper, zinc, and cadmium from acid mine drainage (U.S. Geological Survey 2000, DWR 2005). The portion of the Sacramento River forming the western boundary of the project area is part of a 16-mile segment from Knights Landing to the Sacramento–San Joaquin Delta that is on the Section 303(d) list for diazinon from agricultural sources, mercury from abandoned mines, and toxicity from unknown sources (Central Valley RWQCB 2002).

As defined by the Basin Plan (Central Valley RWQCB 2007), the following are the designated beneficial uses for the Sacramento River and all tributaries from the Colusa Basin Drain, upstream of the project area, to the I Street Bridge in Sacramento:

- Municipal, industrial, and agricultural supply
- Irrigation
- Contact and noncontact recreation
- Coldwater fish habitat, migration, and spawning
- Warm water fish habitat, migration, and spawning
- Wildlife habitat
- Power generation
- Navigation

See Table 3.4-1 in Volume II of SAFCA's *Environmental Impact Report on Local Funding Mechanisms for Comprehensive Flood Control Improvements for the Sacramento Area* (Local Funding EIR), included as an attachment to this EIR, for a summary of conventional water quality constituents in the Sacramento River at Verona, 1996–1998.

3.5.2.2 GROUNDWATER QUALITY

The project area is in the North American Groundwater Subbasin, which lies in the eastern central portion of the Sacramento Valley Groundwater Basin. It is bounded on the north by the Bear River, on the west by the Feather and Sacramento Rivers, and on the south by the American River. The eastern boundary is a north-south line extending from the Bear River south to Folsom Lake.

Although there are many areas of good quality groundwater in the North American subbasin, some areas within the subbasin have shown elevated levels of total dissolved solids (TDS), chloride, sodium, bicarbonate, boron, fluoride, nitrate, iron manganese, and arsenic, based on applicable water quality standards and guidelines for domestic and irrigation uses. An area between Sacramento International Airport (Airport) and the Bear River to the north has high levels of TDS, chloride, sodium, bicarbonate, manganese, and arsenic (DWR 2006).

3.5.3 ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Water quality impacts that could result from project construction activities were evaluated based on the construction practices and materials used, the location and duration of the activities, and the potential for degradation of water quality or beneficial uses of project area waterways.

3.5.3.1 SIGNIFICANCE CRITERIA

The thresholds for determining the significance of impacts for this analysis are based on the environmental checklist in Appendix G of the State CEQA Guidelines. The proposed project was determined to result in a significant effect on water quality if it would:

- violate any water quality standards or waste discharge requirements or otherwise substantially degrade water quality.

3.5.3.2 IMPACT ANALYSIS

IMPACT 3.5-a **Temporary Effects on Water Quality from Stormwater Runoff, Erosion, and Spills Associated with Construction.** *Ground-disturbing activities associated with project construction in 2008 and 2009–2010 could cause soil erosion and sedimentation of local drainages and waterways. Construction activities could also discharge waste petroleum products or other construction-related substances that could enter these waterways in runoff. Because the release of soil or other materials into these waters could adversely affect river water quality and beneficial uses, this potential impact would be* ***significant****.*

The proposed project would include extensive ground-disturbing activities, many of them near local drainages and waterways that could become contaminated by soil or construction substances. Construction in 2008 would include degradation of the upper approximately one-third of, and installation of a seepage cutoff wall through, much of the NCC south levee; subsequent reconstruction of the degraded portions; and raising of the entire levee, including reshaping of portions of the waterside levee slope. An adjacent setback levee would be constructed adjoining the Sacramento River east levee from the NCC to Station 214+00 below the North Drainage Canal (Reach 1 through a portion of Reach 4B), with a 100-foot-wide seepage berm in Reaches 2–4A and a 300-foot-wide seepage berm in Reach 4B on each side of the North Drainage Canal. An existing irrigation canal at the current landside levee toe in Reach 1 would be dewatered and destroyed, and a replacement canal would be constructed east of the existing canal. In addition, the relocated Elkhorn Canal and the new GGS/Drainage Canal would be constructed between the North Drainage Canal and Elkhorn Reservoir.

Fill material for levee and berm construction would be excavated from three or more borrow sites: (1) the RD 1001 site; (2) Bolen South/Nestor; and (3) the Vestal and/or Spangler properties, the Airport north bufferlands area, or the Brookfield property (see Exhibit 2-8). Following excavation, the sites would be converted to marsh or otherwise reclaimed in conformance with permits issued for borrow areas pursuant to the state Surface Mining and Reclamation Act (SMARA) (see Section 3.3.1.3 in Section 3.3, “Geology and Soils”). Some of these lands are bordered by agricultural canals or ditches.

Construction in 2009–2010 would include reconstruction of Pumping Plant No. 2 at the western end of the North Drainage Canal. The adjacent setback levee would be constructed from Sacramento River east levee Station 214+00 in Reaches 4B–19A with seepage berms, cutoff walls, and relief wells. The Elkhorn and Riverside Canals

would be relocated, the new GGS/Drainage Canal would be extended south to connect to the West Drainage Canal, the West Drainage Canal would be enhanced, and modifications to infrastructure at the Airport West Ditch would be made. Extensive borrow operations would be required from lands north and south of the Airport and possibly the Fisherman's Lake area. Much of the work would be conducted near or would involve modifications of local irrigation and drainage canals.

Planned construction activities would coincide with part of the rainy season. These activities have the potential to temporarily impair water quality if disturbed and eroded soil, petroleum products, and other construction-related wastes (e.g., concrete and solvents) are discharged into receiving waters or onto the ground in places where they can be carried into receiving waters. Soil and associated contaminants that enter receiving waters through stormwater runoff and erosion can increase turbidity, stimulate algae growth, increase sedimentation of aquatic habitat, and introduce compounds that are toxic to aquatic organisms. Accidental spills of construction-related substances such as oils, fuels, and cutoff wall materials can contaminate both surface water and groundwater. The extent of potential effects on water quality would depend on the following factors: tendency for erosion of soil types encountered, types of construction practices, extent of the disturbed area, duration of construction activities, timing of particular construction activities relative to the rainy season, proximity to receiving water bodies, and sensitivity of those water bodies to construction-related contaminants.

Slurry that would be used for construction of the new cutoff wall in the NCC south levee is usually composed of cement, bentonite, and water. Because this mixture has the consistency of liquid mud when being placed during construction, improper handling or storage could result in releases to nearby surface water, thereby degrading water quality.

Excavated areas that fill with groundwater or surface drainage during project construction would require dewatering. Effluent from dewatering operations typically contains high levels of suspended sediment and often high levels of petroleum products and other construction-related contaminants. This effluent could be directly released to local receiving waters, thereby degrading water quality.

Because the potential for release of soil or other construction-related materials into the NCC, local drainages, and ultimately the Sacramento River channel could adversely affect river water quality, this potential impact would be significant.

Mitigation Measure 3.5-a: Implement Standard BMPs, Prepare and Implement a SWPPP, and Comply with NPDES Permit Conditions.

SAFCA shall file an NOI to discharge stormwater with the Central Valley RWQCB. Final design and construction plans shall require the implementation of standard erosion, siltation, and good housekeeping BMPs. SAFCA's construction contractor shall be required to prepare a SWPPP and comply with the conditions of the NPDES general stormwater permit for construction activity. The SWPPP, for work conducted under NPDES authorization, shall describe the construction activities to be conducted, BMPs that will be implemented to prevent discharges of contaminated stormwater into waterways, and inspection and monitoring activities that shall be conducted.

BMPs shall include all of the following:

- pollution prevention measures (erosion and sediment control measures and measures to control nonstormwater discharges and hazardous spills),
- demonstration of compliance with all applicable Central Valley RWQCB standards and other applicable water quality standards,

- demonstration of compliance with regional and local standards for erosion and sediment control,
- identification of responsible parties,
- detailed construction timelines, and
- a BMP monitoring and maintenance schedule.

BMPs shall be applied to meet the "maximum extent practicable" and "best conventional technology/best available technology" requirements and to address compliance with water quality standards. A monitoring program shall be implemented during and after construction to ensure that the project is in compliance with all applicable standards and that the BMPs are effective.

Implementing this mitigation measure would reduce the potential impact on water quality from stormwater runoff, erosion, and spills associated with construction to a **less-than-significant** level.

IMPACT 3.5-b **Effects on Water Quality from Groundwater Discharged by Relief Wells.** *Relief wells used for seepage remediation in 2009–2010 would also release groundwater into drainage canals. The water from the drainage canals, including the groundwater released from the relief wells, would ultimately be pumped into the Sacramento River. Groundwater may exceed contaminant levels under the Basin Plan's water quality objectives. Because the release of untreated groundwater into these waters could adversely affect river water quality, this potential impact would be* ***significant****.*

Relief wells would be installed to intercept levee underseepage in some locations as part of the 2009–2010 improvements along the Sacramento River east levee. The relief wells would discharge seepage water along with intercepted groundwater into drainage canals that would be installed to transport the water to existing pump stations or detention areas. Pump stations located in the vicinity of the east levee discharge to the Sacramento River.

Information about the quality of the groundwater in the areas where the wells are proposed is limited, although DWR has reported that an area between the Airport and the Bear River to the north has high levels of TDS, chloride, sodium, bicarbonate, manganese, and arsenic. However, it should be noted that relief wells are typically drilled to a shallower depth (approximately 50 feet) than the groundwater wells used by DWR for water sampling (200 feet deep or greater); therefore, the data from the sample wells in or near the project area may not reflect the quality of water at the shallow depths that would be in contact with the proposed relief wells. In addition, during the high surface-water events in which the relief wells discharge, the groundwater would be highly diluted with water that has seeped under the levee from the Sacramento River. The actual quality of groundwater released by the relief wells would not be known until tests at or in the vicinity of potential well sites are conducted. Because the release of untreated groundwater into canals that is pumped into the Sacramento River could adversely affect river water quality, this potential impact would be significant.

Mitigation Measure 3.5-b: Conduct Groundwater Quality Tests, Notify the Central Valley RWQCB, and Comply with the RWQCB's Waste Discharge Authorization and NPDES Permit.

SAFCA and RD 1000 shall ensure that groundwater in the vicinity of potential relief well locations is tested during project design, to ensure that MCLs specified in Title 22 are not exceeded. SAFCA shall notify the Central Valley RWQCB, providing it with the results of these water quality tests and a conceptual plan for how the relief wells will be used, and shall comply with any WDR and NPDES permit issued by the RWQCB.

Implementing this mitigation measure would reduce the impact on water quality from groundwater discharge to a **less-than-significant** level.

3.6 FISHERIES AND AQUATIC RESOURCES

This section addresses the potential impacts of the proposed project on common and sensitive fisheries and aquatic resources found in the Natomas Cross Canal (NCC), the lower Sacramento River, and Pleasant Grove Creek Canal (PGCC) and the Natomas East Main Drainage Canal (NEMDC)/Steelhead Creek. Effects on water quality are addressed in Section 3.5, "Water Quality." Terrestrial biology of the project area is addressed in Section 3.7, "Terrestrial Biological Resources."

3.6.1 REGULATORY SETTING

3.6.1.1 FEDERAL

Federal Endangered Species Act

Pursuant to the federal Endangered Species Act (ESA), the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) have authority over projects that may result in take of a federally listed species. Under ESA, the definition of "take" is to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." Under federal regulation, "take" is further defined to include habitat modification or degradation where it would be expected to result in death or injury to listed wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. If the project may affect a federally listed species, either an incidental take permit, under ESA Section 10(a), or a federal interagency consultation, under ESA Section 7, is required. USFWS has regulatory jurisdiction over freshwater and estuarine fishes (such as delta smelt), while NMFS has jurisdiction over anadromous and marine species (such as chinook salmon and steelhead).

Sustainable Fisheries Act

In response to growing concern about the status of United States fisheries, Congress passed the Sustainable Fisheries Act of 1996 (Public Law [PL] 104-297) to amend the Magnuson-Stevens Fishery Conservation and Management Act (PL 94-265), the primary law governing marine fisheries management in the federal waters of the United States. Under the Sustainable Fisheries Act, consultation is required by NMFS on any activity that might adversely affect essential fish habitat (EFH). EFH includes those habitats that fish rely on throughout their life cycles. It encompasses habitats necessary to allow sufficient production of commercially valuable aquatic species to support a long-term sustainable fishery and contribute to a healthy ecosystem.

Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act requires federal agencies to consult with USFWS, NMFS, and state fish and wildlife resource agencies before undertaking or approving projects that control or modify surface water. The recommendations made by these agencies must be fully considered in project plans by federal agencies.

Clean Water Act, Section 404

Section 404 of the Clean Water Act (CWA) requires project proponents to obtain a permit from the U.S. Army Corps of Engineers (USACE) before performing any activity that involves any discharge of dredged or fill material into "waters of the United States." Waters of the United States include navigable waters of the United States, interstate waters, all other waters where the use or degradation or destruction of the waters could affect interstate or foreign commerce, tributaries to any of these waters, and wetlands that meet any of these criteria or that are adjacent to any of these waters or their tributaries. Many surface waters and wetlands in California meet the criteria for waters of the United States.

Clean Water Act, Section 402

CWA Section 402 regulates construction-related stormwater discharges to surface waters through the National Pollutant Discharge Elimination System (NPDES) program, which is administered by the U.S. Environmental Protection Agency (EPA). In California, the State Water Resources Control Board (SWRCB) is authorized by EPA to oversee the NPDES program through the regional water quality control boards (RWQCBs), in this case, the Central Valley RWQCB.

Clean Water Act, Section 401

CWA Section 401(a)(1) specifies that any applicant for a federal license or permit to conduct any activity that may result in any discharge into navigable waters shall provide the federal licensing or permitting agency with a certification that any such discharge will not violate state water quality standards. The RWQCBs administer the Section 401 program with the intent of prescribing measures for projects that are necessary to avoid, minimize, and mitigate adverse impacts on water quality and ecosystems.

3.6.1.2 STATE

California Endangered Species Act

Pursuant to the California Endangered Species Act (CESA), a permit from the California Department of Fish and Game (DFG) is required for projects that could result in the take of a state-listed threatened or endangered species. Under CESA, "take" is defined as an activity that would directly or indirectly kill an individual of a species, but the definition does not include "harming" or "harassing," as the federal ESA does. As a result, the threshold for take under CESA is higher than under ESA (e.g., habitat modification is not necessarily considered take under CESA). Authorization for take of state-listed species can be obtained through a California Fish and Game Code Section 2080.1 consistency determination or Section 2081 incidental take permit.

California Fish and Game Code Section 1602—Streambed Alteration

All diversions, obstructions, or changes to the natural flow or bed, channel, or bank of any river, stream, or lake in California that supports wildlife resources are subject to regulation by DFG under Section 1602 of the California Fish and Game Code. Under Section 1602, it is unlawful for any person, governmental agency, or public utility to do the following without first notifying DFG:

- substantially divert or obstruct the natural flow of, or substantially change or use any material from the bed, channel, or bank of any river, stream, or lake; or

- deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake.

A stream is defined as a body of water that flows at least periodically or intermittently through a bed or channel with banks and supports fish or other aquatic life. This definition includes watercourses with a surface or subsurface flow that supports or has supported riparian vegetation. DFG's jurisdiction within altered or artificial waterways is based on the value of those waterways to fish and wildlife. A DFG streambed alteration agreement must be obtained for any project that would result in an impact on a river, stream, or lake.

3.6.1.3 LOCAL

The *Sutter County General Plan* (Sutter County 1996) provides overall guidance for resource conservation in Sutter County and includes several general resource conservation objectives that aim to protect significant biological resources, including habitats that support fish and wildlife species. It includes a goal to protect and enhance habitats that support fish and wildlife species and describes general policies supporting this goal.

The Conservation/Open Space–Natural Resources Element of the general plan includes the following goal and policies that may be relevant to the analysis of fish and wildlife habitat:

- **Goal 4.C:** To protect and enhance habitats that support fish and wildlife species.

    - **Policy 4.C-1.** The County shall strive to preserve those areas of wildlife habitat designated "high habitat value" as shown on the biological sensitivity map in Chapter 9 of the Background Report.

    - **Policy 4.C-2.** The County shall encourage preservation and proper management of those areas designated "moderate habitat value" on the biological sensitivity map in Chapter 9 of the Background Report. The County shall support the preservation and re-establishment of fisheries in the rivers and streams within the County.

    - **Policy 4.C-3.** The County shall participate in the process of developing mitigation programs for threatened and endangered species to ensure that Sutter County's agricultural, economic, fiscal, and future urbanization and natural resource goals and policies are met.

The Conservation Element of the *Sacramento County General Plan* (Sacramento County 1993) provides overall guidance for resource conservation in Sacramento County and includes several resource conservation goals and objectives. It includes a specific goal to preserve and protect fisheries in county waterways and describes policies and programs under four objectives:

1. Water flows monitored and maintained, when climatic conditions allow, to promote fish propagation and migration.

2. Maintenance of channelized areas to reduce detritus accumulation and increase fish populations.

3. Water quality and runoff levels maintained to provide a healthy aquatic environment for fisheries.

4. Riparian vegetation and topographic diversity maintained by stream channel and bank stabilization projects.

3.6.2 ENVIRONMENTAL SETTING

The NCC is a tributary to the lower Sacramento River and the PGCC and NEMDC/Steelhead Creek are tributaries to the lower American River. Implementation of the proposed project could potentially affect aquatic resources within the NCC, the lower Sacramento River, and the PGCC and NEMDC/Steelhead Creek. These streams provide important habitat for native anadromous and resident Central Valley fishes, including species that are listed under ESA and CESA. These waterways support similar assemblages of fish species, and therefore are discussed together in this section.

Information on existing conditions was derived from other environmental documents prepared for projects within the project area, including the following:

- previous environmental documents;

- field data collected by resource agencies and other organizations;

- status reviews of winter-run, spring-run, and fall-run chinook salmon, steelhead, green sturgeon, delta smelt, and Sacramento splittail; and

- reports describing conditions of the area fisheries and aquatic resources.

3.6.2.1 FISH SPECIES FOUND IN THE CHANNELS BORDERING THE NATOMAS BASIN

The NCC, lower Sacramento River, and PGCC and NEMDC/Steelhead Creek provide vital fish spawning, rearing, and/or migratory habitat for a diverse assemblage of native and nonnative species (Table 3.6-1). Native species present in the NCC and/or lower Sacramento River can be separated into anadromous (i.e., species that spawn in fresh water after migrating as adults from marine habitat) and resident species. Native anadromous species include four runs of chinook salmon (*Oncorhynchus tshawytscha*), steelhead trout (*O. mykiss*), green and white sturgeon (*Acipenser medirostris* and *A. transmontanus*), and Pacific lamprey (*Lampetra tridentata*). Native resident species include Sacramento pikeminnow (*Ptychocheilus grandis*), Sacramento splittail (*Pogonichthys macrolepidotus*), Sacramento sucker (*Catostomus occidentalis*), hardhead (*Mylopharodon conocephalus*), California roach (*Lavinia symmetricus*), and rainbow trout (*O. mykiss*). Nonnative anadromous species include striped bass (*Morone saxatilis*) and American shad (*Alosa sapidissima*). Nonnative resident species include largemouth bass (*Micropterus salmoides*), smallmouth bass (*M. dolomieu*), white and black crappie (*Pomoxis annularis* and *P. nigromaculatus*), channel catfish (*Ictalurus punctatus*), white catfish (*Ameiurus catus*), brown bullhead (*Ictalurus nebulosus*), bluegill (*Lepomis macrochirus*), green sunfish (*L. cyanellus*), and golden shiner (*Notemigonus crysaleucas*).

Table 3.6-1
Fishes Present in the Natomas Cross Canal, Lower Sacramento River, Pleasant Grove Creek Canal, and/or NEMDC/Steelhead Creek

Common Name	Scientific Name	Native (N) or Introduced (I)
Sacramento River winter-run chinook salmon	*Oncorhynchus tshawytscha*	N
Central Valley spring-run chinook salmon	*Oncorhynchus tshawytscha*	N
Central Valley fall-/late fall–run chinook salmon	*Oncorhynchus tshawytscha*	N
Central Valley steelhead/rainbow trout	*Oncorhynchus mykiss*	N
Green sturgeon	*Acipenser medirostris*	N
White sturgeon	*Acipenser transmontanus*	N
Pacific lamprey	*Lampetra tridentate*	N
Sacramento pikeminnow	*Ptychocheilus grandis*	N
Sacramento splittail	*Pogonichthys macrolepidotus*	N
Sacramento sucker	*Catostomus occidentalis*	N
Hardhead	*Mylopharodon conocephalus*	N
California roach	*Lavinia symmetricus*	N
Striped bass	*Morone saxatilus*	I
American shad	*Alosa sapidissima*	I
Largemouth bass	*Micropterus salmoides*	I
Smallmouth bass	*Micropterus dolomieui*	I
White crappie	*Pomoxis annularis*	I
Black crappie	*Pomoxis nigromaculatus*	I
Channel catfish	*Ictalurus punctatus*	I
White catfish	*Ameiurus catus*	I
Brown bullhead	*Ictalurus nebulosus*	I
Bluegill	*Lepomis macrochirus*	I
Green sunfish	*Lepomis cyanellus*	I
Golden shiner	*Notemigonus crysaleucas*	I

Notes: NCC = Natomas Cross Canal; NEMDC = Natomas East Main Drainage Canal; PGCC = Pleasant Grove Creek Canal
Source: Moyle 2002

The use of different areas of the NCC, lower Sacramento River, and PGCC and NEMDC/Steelhead Creek by fish species is influenced by variations in habitat conditions, each species' habitat requirements, life history timing, and daily and seasonal movements and behavior. Altered flow regimes, flood control, and bank protection efforts along these channels have reduced available shaded riverine aquatic (SRA) habitat, sediment transport, channel migration and avulsion, and large woody debris recruitment, and have isolated the channel from its floodplain. SRA vegetation and instream tree and shrub debris provide important riverine fish habitat along the NCC, lower Sacramento River, and PGCC and NEMDC/Steelhead Creek. SRA habitat is defined as the nearshore aquatic habitat occurring at the interface between a river and adjacent woody riparian habitat. The principal attributes of this cover type are: (1) an adjacent bank composed of natural, eroding substrates supporting riparian vegetation that either overhangs or protrudes into the water; and (2) water that contains variable amounts of woody debris, such as leaves, logs, branches, and roots and has variable depths, velocities, and currents. Riparian habitat provides structure (through SRA habitat) and food for fish species. Shade decreases water temperatures, while low overhanging branches can provide sources of food by attracting terrestrial insects. As riparian areas mature, the vegetation sloughs off into the rivers, creating structurally complex habitat consisting of large woody debris that furnishes refugia from predators, creates higher water velocities, and provides habitat for aquatic invertebrates. For these reasons, many fish species are attracted to SRA habitat.

3.6.2.2 SPECIAL-STATUS SPECIES

Special-status fish species are legally protected or are otherwise considered sensitive by federal, state, or local resource conservation agencies and organizations. Special-status fish species addressed in this section include:

- species listed as threatened or endangered under ESA or CESA;
- species identified by USFWS, NMFS, or DFG as species of special concern; and
- species fully protected in California under the California Fish and Game Code.

Seven special-status fish species have the potential to occur in the NCC, lower Sacramento River, and/or PGCC and NEMDC/Steelhead Creek, as described below (Table 3.6-2). Of the seven species, green sturgeon, Central Valley steelhead Evolutionarily Significant Unit (ESU), Sacramento River winter-run chinook salmon ESU, and Central Valley spring-run chinook salmon ESU are federally listed as endangered or threatened species. Sacramento River winter-run chinook salmon ESU (endangered) and Central Valley spring-run chinook salmon ESU (threatened) are also listed under CESA. USFWS delisted Sacramento splittail from its threatened status on September 22, 2003, but it is currently listed as a species of special concern by DFG. NMFS determined that listing is not warranted for Central Valley fall-/late fall–run chinook salmon. However, this species is still designated a species of concern by NMFS and a species of special concern by DFG because of concerns about specific risk factors. The remaining species (hardhead) is considered a species of special concern by DFG. Delta smelt, which is federally and state listed as threatened, is found in the Sacramento River but downstream of the confluence with the American River, and therefore is not expected to be found in the Sacramento River near the project site. Delta smelt are not found in the NCC, PGCC, or NEMDC/Steelhead Creek. Summary descriptions for those species that have the potential to occur in the project area are provided below.

Fall-Run Chinook Salmon

Adult fall-run chinook salmon enter the Sacramento and San Joaquin River systems from July through April and spawn from October through February. During spawning, the female digs a redd (gravel nest) in which she deposits her eggs, which are then fertilized by the male. Optimal water temperatures for egg incubation are 6.7 degrees Celsius (ºC) to 12.2ºC (Rich 1997). Newly emerged fry remain in shallow, lower-velocity edgewaters, particularly where debris congregates and makes the fish less visible to predators (DFG 1998). The duration of egg incubation and time of fry emergence depends largely on water temperature. In general, eggs hatch after a 3- to 5-month incubation period, and alevins (yolk-sac fry) remain in the gravel until their yolk-sacs are absorbed (2–3 weeks).

Table 3.6-2
Special-Status Fish Species Potentially Occurring in the Natomas Cross Canal, Lower Sacramento River, Pleasant Grove Creek Canal, and/or NEMDC/Steelhead Creek

Species	Status[1]		Habitat	Potential to Occur
	USFWS/ NMFS	DFG		
Central Valley fall-/late fall–run chinook salmon *Oncorhynchus tshawytscha*	SC	SSC	Requires cold, freshwater streams with suitable gravel for spawning; rears in seasonally inundated floodplains, rivers, and tributaries, and in the Delta	Occurs in the NCC, lower Sacramento River, and PGCC and NEMDC/Steelhead Creek
Sacramento River winter-run chinook salmon ESU *Oncorhynchus tshawytscha*	E	E	Requires cold, freshwater streams with suitable gravel for spawning; rears in seasonally inundated floodplains, rivers, and tributaries, and in the Delta	Occurs in the Sacramento River; juveniles may stray into the NCC
Central Valley spring-run chinook salmon ESU *Oncorhynchus tshawytscha*	T	T	Requires cold, freshwater streams with suitable gravel for spawning; rears in seasonally inundated floodplains, rivers, and tributaries, and in the Delta	Occurs in the Sacramento River and certain tributaries; adults and juveniles may stray into the NCC
Central Valley steelhead ESU *Oncorhynchus mykiss*	T	–	Requires cold, freshwater streams with suitable gravel for spawning; rears in seasonally inundated floodplains, rivers, and tributaries, and in the Delta	Occurs in the NCC, lower Sacramento River, and PGCC and NEMDC/Steelhead Creek
Green sturgeon *Acipenser medirostris*	T	–	Requires cold, freshwater streams with suitable gravel for spawning; rears in seasonally inundated floodplains, rivers, tributaries, and Delta	Occurs in the lower Sacramento River; unlikely to stray into the NCC, PGCC, or NEMDC/Steelhead Creek
Sacramento splittail *Pogonichthys macrolepidotus*	DT	SSC	Spawning and juvenile rearing from winter to early summer in shallow weedy areas inundated during seasonal flooding in the lower reaches and flood bypasses of the Sacramento River, including the Yolo Bypass	Occurs in the lower Sacramento River; may also occur in the NCC
Hardhead *Mylopharodon conocephalus*	–	SSC	Spawning occurs in pools and side pools of rivers and creeks; juveniles rear in pools of rivers and creeks, and in shallow to deeper water of lakes and reservoirs	Occurs in the lower Sacramento River; likely to occur in the NCC, PGCC, and NEMDC/Steelhead Creek

Notes: Delta = Sacramento–San Joaquin Delta; DFG = California Department of Fish and Game; ESU = Evolutionarily Significant Unit; NEMDC = Natomas East Main Drainage Canal; NMFS = National Marine Fisheries Service; PGCC = Pleasant Grove Creek Canal; USFWS = U.S. Fish and Wildlife Service

[1] Legal Status Definitions

Federal Listing Categories (USFWS and NMFS)		State Listing Categories (DFG)	
E	Endangered (legally protected)	E	Endangered (legally protected)
T	Threatened (legally protected)	T	Threatened (legally protected)
DT	Recently delisted from threatened status	FP	Fully Protected (legally protected, no take allowed)
SC	Species of Concern	SSC	Species of Special Concern (no formal protection)

Source: Data compiled by EDAW in 2007

Juveniles typically rear in freshwater (in their natal streams, the Sacramento River system, and the Sacramento–San Joaquin Delta [Delta]) for up to 5 months before entering the ocean. Juveniles migrate downstream from January through June. Juvenile chinook salmon prefer water depths of 0.5–3.3 feet and velocities of 0.26–1.64 feet per second (Raleigh, Miller, and Nelson 1986). Important winter habitat for juvenile chinook salmon includes flooded bars, side channels, and overbank areas with relatively low water velocities. Juvenile chinook salmon have been found to rear successfully in floodplain habitat, which routinely floods but is dry at other times. Growth rates appear to be enhanced by the conditions found in floodplain habitat.

Cover structures, space, and food are necessary components for chinook salmon rearing habitat. Suitable habitat includes areas with instream and overhead cover in the form of undercut banks; downed trees; and large, overhanging tree branches. The organic materials forming fish cover also help provide sources of food, in the form of both aquatic and terrestrial insects. Growth of juvenile chinook salmon in floodplain habitat is fast relative to growth in river habitat. Juvenile salmon have been found to have growth rates in excess of 1 millimeter (mm) per day when they rear in flooded habitat and as much as 20 mm in 2–3 weeks (Jones & Stokes 2001). The water temperature in floodplain habitat is typically higher than that in main channel habitats. Although increased temperature increases metabolic requirements, the productivity in flooded habitat is also increased, resulting in higher growth rates (Sommer et al. 2001). The production of drift invertebrates in the Yolo Bypass has been found to be one to two times greater than production in the river (Sommer et al. 2001). Also, grasses that are flooded support invertebrates that are also a substantial source of food for rearing juveniles. Increased areas resulting from flooded habitat can also reduce the competition for food and space and potentially decrease the possible encounters with predators (Sommer et al. 2001). Juvenile chinook salmon that grow faster are likely to migrate downstream sooner, which helps to reduce the risks of predation and competition in freshwater systems.

Juvenile chinook salmon in the Sacramento River system move out of upstream spawning areas into downstream habitats in response to many factors, including inherited behavior, habitat availability, flow, competition for space and food, and water temperature. The number of juveniles that move and the timing of movement are highly variable. Storm events and the resulting high flows appear to trigger movement of substantial numbers of juvenile chinook salmon to downstream habitats. In general, juvenile abundance in the Delta increases as flow increases (USFWS 1993).

Fall-run chinook salmon emigrate as fry and subyearlings and remain off the California coast during their ocean migration (63 *Federal Register* [FR] 11481, March 9, 1998).

Winter-Run Chinook Salmon

Adult winter-run chinook salmon leave the ocean and migrate through the Delta into the Sacramento River system from November through July. Salmon migrate upstream past the Red Bluff Diversion Dam (RBDD) on the Sacramento River from mid-December through July, and most of the spawning population has passed RBDD by late June.

Winter-run chinook salmon spawn from mid-April through August, and incubation continues through October. The primary spawning grounds in the Sacramento River are above RBDD. Adult winter-run chinook salmon generally do not enter the American River.

Juvenile winter-run chinook salmon rear and emigrate in the Sacramento River from July through March (Hallock and Fisher 1985). Juveniles descending the Sacramento River above RBDD from August through October and possibly November are mostly pre-smolts (smolts are juveniles that are physiologically ready to enter seawater) and probably rear in the Sacramento River below RBDD. Juveniles have been observed in the Delta between October and December, especially during high Sacramento River discharge caused by fall and early-winter storms.

Triggers for downstream movement are similar to those described above for fall-run chinook salmon. Winter-run salmon smolts may migrate through the Delta and bay to the ocean from December through as late as May

(Stevens 1989). The Sacramento River channel is the main migration route through the Delta. Adult winter-run chinook salmon spend 1–4 years in the ocean. About 67% of the adult escapement that leaves the ocean to spawn in the Sacramento River consists of 3-year-olds, 25% consists of 2-year-olds, and 8% consists of 4-year-olds (Hallock and Fisher 1985).

Spring-Run Chinook Salmon

Spring-run chinook salmon historically were the second most abundant run of Central Valley chinook salmon (Fisher 1994). They occupied the headwaters of all major river systems in the Central Valley where there were no natural barriers. Adults returning to spawn ascended the tributaries to the upper Sacramento River, including the Pit, McCloud, and Little Sacramento Rivers. They also occupied Cottonwood, Battle, Antelope, Mill, Deer, Stony, Big Chico, and Butte Creeks and the Feather, Yuba, American, Mokelumne, Stanislaus, Tuolumne, Merced, San Joaquin, and Kings Rivers. Spring-run chinook salmon migrated farther into headwater streams where cool, well-oxygenated water is available year-round.

Current surveys indicate that remnant, nonsustaining spring-run chinook salmon populations may be found in Cottonwood, Battle, Antelope, and Big Chico Creeks (DWR 1997). More sizable, consistent runs of naturally produced fish are found only in Mill and Deer Creeks. The Feather River Fish Hatchery sustains the spring-run population on the Feather River, but the genetic integrity of that run is questionable (DWR 1997). Estimates since 1953 on the Feather River indicate that numbers returning to the hatchery average around 2,115, although the estimates have increased dramatically since 1990 (DFG 2006).

Historical records indicate that adult spring-run chinook salmon enter the mainstem Sacramento River in February and March and continue to their spawning streams, where they then hold in deep, cold pools until they spawn. Spring-run chinook salmon are sexually immature during their spawning migration. Some adult spring-run chinook salmon start arriving in the Feather River below the Fish Barrier Dam in June. They remain there until the fish ladder is opened in early September. Spawning and rearing requirements for the species are similar to those identified above for fall-run chinook salmon.

Spawning occurs in gravel beds from late August through October, and emergence takes place in March and April. Spring-run chinook salmon appear to emigrate at two different life stages: fry and yearlings. Fry move between February and June, while the yearling spring-run emigrate October to March, peaking in November (Cramer and Demko 1997).

Juveniles display considerable variation in stream residence and migratory behavior. Juvenile spring-run chinook salmon may leave their natal streams as fry soon after emergence or rear for several months to a year before migrating as smolts or yearlings (Yoshiyama, Fisher, and Moyle 1998). Triggers for downstream movement are similar to those described above for fall-run chinook salmon.

On March 9, 1998 (63 FR 11481), NMFS issued a proposed rule to list Central Valley spring-run chinook salmon ESU as endangered. NMFS designated the species as threatened on September 16, 1999 (64 FR 50393). On February 5, 1999, the California Fish and Game Commission listed it as threatened under CESA. Critical habitat had originally been designated for Central Valley spring-run chinook salmon by NMFS (65 FR 7764, February 16, 2000). However, following a lawsuit (*National Association of Home Builders et al. v. Donald L. Evans, Secretary of Commerce, et al.*), NMFS rescinded the listing. After further review, critical habitat for the Central Valley spring-run chinook salmon ESU was designated on August 12, 2005. Critical habitat is designated to include select waters in the Sacramento and San Joaquin River basins.

Central Valley Steelhead

Historically, steelhead spawned and reared in most of the accessible upstream reaches of Central Valley rivers, including the Sacramento and American Rivers and many of their tributaries. Compared with chinook salmon,

steelhead generally migrated farther into tributaries and headwater streams where cool, well-oxygenated water is available year-round.

In the Central Valley, steelhead are now restricted to the upper Sacramento River downstream of Keswick Reservoir; the lower reaches of large tributaries downstream of impassable dams; small, perennial tributaries of the Sacramento River mainstem; and the San Francisco Bay/Sacramento–San Joaquin Delta (Bay-Delta) system.

The upstream migration of adult steelhead in the mainstem Sacramento River historically started in July, peaked in September, and continued through February or March. Central Valley steelhead spawn mainly from January through March, but spawning has been reported from late December through April (McEwan and Jackson 1996). During spawning, the female digs a redd (gravel nest) in which she deposits her eggs, which are then fertilized by the male. Egg incubation time in the gravel is determined by water temperature, varying from approximately 19 days at an average water temperature of 15.5ºC to approximately 80 days at an average temperature of 14.5ºC (McEwan and Jackson 1996).

Steelhead fry usually emerge from the gravel 2–8 weeks after hatching, between February and May, sometimes extending into June (Barnhart 1986, Reynolds et al. 1993). Newly emerged steelhead fry move to shallow, protected areas along streambanks but move to faster, deeper areas of the river as they grow. Juvenile steelhead feed on a variety of aquatic and terrestrial insects and other small invertebrates.

Juvenile steelhead rear throughout the year and may spend 1–3 years in freshwater before emigrating to the ocean. Smoltification, the physiological adaptation that juvenile salmonids undergo to tolerate saline waters, occurs in juveniles as they begin their downstream migration. Smolting steelhead generally emigrate from March to June (Barnhart 1986, Reynolds et al. 1993).

NMFS completed a status review of steelhead populations in Washington, Oregon, Idaho, and California and identified 15 Distinct Population Segments (DPSs) in this range. On August 9, 1996, NMFS issued a proposed rule to list five of these DPSs (including the Central Valley steelhead) as endangered and five as threatened under the ESA (61 FR 155). The Central Valley steelhead DPS was later listed as threatened (downgraded from its proposed status of endangered) (63 FR 13347, March 19, 1998), and critical habitat (which included the lower Feather and Yuba Rivers) was designated for this DPS (65 FR 7764, February 16, 2000). However, after the lawsuit referenced above (*National Association of Home Builders et al. v. Donald L. Evans, Secretary of Commerce, et al.*), NMFS rescinded the listing. After further review, critical habitat for the Central Valley steelhead DPS was designated on August 12, 2005. This habitat includes select waters in the Sacramento and San Joaquin River basins.

Green Sturgeon

Green sturgeon has recently has been listed as threatened by NMFS (71 FR 17757, April 7, 2006). Green sturgeon are found in the lower reaches of large rivers, including the Sacramento–San Joaquin River basin, and in the Eel, Mad, Klamath, and Smith Rivers. Green sturgeon adults and juveniles are found throughout the upper Sacramento River, as indicated by observations incidental to winter-run chinook monitoring at RBDD in Tehama County (NMFS 2005). Green sturgeon spawn predominantly in the upper Sacramento River. They are thought to spawn every 3–5 years (Tracy 1990). Their spawning period is March to July, with a peak in mid-April to mid-June (Moyle, Foley, and Yoshiyama 1992). Juveniles inhabit the estuary until they are approximately 4–6 years old, when they migrate to the ocean (Kohlhorst et al. 1991). Green sturgeon is found primarily in the Sacramento River and occasionally in the Feather River.

Sacramento Splittail

Recent data indicate that Sacramento splittail occur in the Sacramento River as far upstream as RBDD (Sommer et al. 1997) and that some adults spend the summer in the mainstem Sacramento River rather than returning to the

estuary (Baxter 1999). The distribution and extent of spawning and rearing along the mainstem Sacramento River is unknown.

Sacramento splittail spawn over flooded terrestrial or aquatic vegetation (Moyle 2002, Wang 1986). Sacramento splittail spawn in early March and May in lower reaches of the Sacramento River (Moyle et al. 1995). Spawning has been observed to occur as early as January and to continue through July (Wang 1986). Larval splittail are commonly found in the shallow, vegetated areas where spawning occurs. Larvae eventually move into deeper, open-water habitats as they grow and become juvenile. During late winter and spring, young-of-year juvenile splittail (i.e., those less than 1 year old) are found in floodplain habitat, sloughs, rivers, and Delta channels near spawning habitat. Juvenile splittail gradually move from shallow, nearshore habitats to the deeper, open water habitats of Suisun and San Pablo Bays (Wang 1986). In areas upstream of the Delta, juvenile splittail can be expected to be present in the flood basins (i.e., Sutter and Yolo Bypasses and the Sacramento River) when these areas are flooded during the winter and spring.

In 1999, after 4 years of candidate status, the splittail was listed as threatened under the ESA (64 FR 25, March 10, 1999). Fall midwater trawl surveys indicate that juvenile splittail abundance has been highly variable from year to year, with peaks and declines coinciding with wet and dry periods, respectively, and correlated with the availability of flooded shallow-water habitat. After the listing, the State Water Contractors, the San Luis & Delta-Mendota Water Authority, and others challenged the listing, contending that it violated the ESA and the Administrative Procedures Act. On June 23, 2000, the U.S. District Court in Fresno ruled in favor of the plaintiffs and found the listing unlawful. On September 22, 2003, USFWS delisted splittail as a threatened species, indicating that habitat restoration actions implemented through the CALFED Bay-Delta Program and the Central Valley Project Improvement Act are likely to keep the splittail from becoming endangered in the foreseeable future (68 FR 55139, September 22, 2003).

Hardhead

Hardhead are widely distributed throughout the low- to mid-elevation streams in the main Sacramento–San Joaquin drainage, including the Sacramento River system. Undisturbed portions of larger streams at low to middle elevations are preferred by hardhead. Hardhead are able to withstand summer water temperatures above 20ºC; however, they will select lower temperatures when they are available. Hardhead are fairly intolerant of low-oxygenated waters, particularly at higher water temperatures. Pools with sand-gravel substrates and slow water velocities are the preferred habitat; adult fish inhabit the lower half of the water column, while the juvenile fish remain in the shallow water closer to the stream edges. Hardhead typically feed on small invertebrates and aquatic plants at the bottom of quiet water (Moyle 2002). Hardhead is a federal species of concern and a state species of special concern.

3.6.2.3 Other Important Native Fish Species Supported by the Natomas Cross Canal, Lower Sacramento River, Pleasant Grove Creek Canal, and NEMDC/Steelhead Creek

Sacramento Sucker

The Sacramento sucker is widely distributed throughout the Sacramento River system. Sacramento sucker occupy waters from cold, high-velocity streams to warm, nearly stagnant sloughs. They are common at moderate elevations (600–2,000 feet). Sacramento sucker feed on algae, detritus, and benthic invertebrates. They usually spawn for the first time in their fourth or fifth years. When they cannot move upstream and end up spawning in lake habitat, they typically orient themselves near areas where spring freshets flow into the lake. They typically spawn in stream habitat on gravel riffles from late February to early June. The eggs hatch in 3–4 weeks, and the young typically live in the natal stream for a couple of years before moving downstream to a reservoir or large river (Moyle 2002).

Sacramento Pikeminnow

Sacramento pikeminnow occupy rivers and streams throughout the Sacramento–San Joaquin River system, mainly at elevations between 300 and 2,000 feet. Sacramento pikeminnow spawn in April and May, with eggs hatching in less than a week. Within a week of hatching, the fry are free-swimming and schooling. Adult pikeminnow may feed on other fish, including juvenile pikeminnow, chinook salmon, and steelhead, but, according to Moyle (2002), are overrated as predators on salmonid species in natural environments. They can, however, be major predators on juvenile salmon and steelhead in riverine environments modified by dams and fish ladders. Pikeminnow tend to remain in well-shaded, deep pools with sand or rock substrate and are less likely to be found in areas where there are higher numbers of introduced predator species, such as largemouth bass and other centrarchid species.

3.6.2.4 Important Nonnative Fish Species Supported by the Natomas Cross Canal, Lower Sacramento River, Pleasant Grove Creek Canal, and NEMDC/Steelhead Creek

Striped Bass

Striped bass are anadromous fish that have been an important part of the sport-fishing industry in the Delta. They were introduced into the Sacramento–San Joaquin estuary between 1879 and 1882 (Moyle 2002). Striped bass may move into the lower reaches of the rivers year-round but probably most often between April and June, when they spawn. The species tends to remain in deep, slow-moving water, where it has access to prey without having to expend a great deal of energy.

American Shad

American shad are an anadromous fish that have been introduced into the Central Valley and have become established as a popular sport fish. American shad enter the American River to spawn during the spring (primarily May and June) and support a seasonal fishery downstream of the dams during these months.

3.6.2.5 Sensitive Habitats

Sensitive habitats include those that are of special concern to resource agencies or that are afforded specific consideration through ESA, CEQA, Section 1602 of the California Fish and Game Code, Section 404 of CWA, or the Sustainable Fisheries Act (as amended). Sensitive habitats are of special concern because they are of high value to plants, wildlife, and fish species and have high potential to support special-status species. Sensitive habitats can also provide other important ecological functions, such as enhancing flood and erosion control and maintaining water quality.

Open water and associated riparian forest are protected under the Fish and Game Code and/or CWA. In addition to the critical habitat designations noted above, the NCC and Sacramento River have also been designated as EFH by the Pacific Fishery Management Council to protect and enhance habitat for coastal marine fish and macroinvertebrate species that support commercial fisheries. EFH is defined as waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity. Under the Pacific Coast salmon fisheries management plan (Pacific Fishery Management Council 2003), the NCC and lower portion of the NEMDC/Steelhead Creek (i.e., portion below confluence with Dry Creek) have been designated as EFH for fall-run chinook salmon and the Sacramento River has been designated as EFH for spring-, fall-, late fall–, and winter-run chinook salmon.

3.6.3 ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Fisheries and aquatic resources impacts that could result from project construction activities were qualitatively evaluated based on the construction practices and materials to be used, the location and duration of the activities, and the potential for adverse effects on aquatic habitats adjacent to the project area and/or the fish community that may be occupying these habitats.

3.6.3.1 SIGNIFICANCE CRITERIA

The thresholds for determining the significance of impacts for this analysis are based on the environmental checklist in Appendix G of the State CEQA Guidelines and professional standards and practices. The proposed project was determined to result in a significant effect related to fisheries and aquatic resources if it would:

- have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by DFG, USFWS, or NMFS;
- interfere substantially with the movement of any native resident or migratory fish species;
- substantially reduce the habitat of a fish or wildlife species;
- cause a fish or wildlife species to drop below self-sustaining levels;
- threaten to eliminate a plant or animal community; or
- substantially reduce the number or restrict the range of an endangered, rare, or threatened species.

The first threshold may be met if the proposed project would substantially reduce or degrade the habitat of a federal or state special-status species or its prey species, potentially resulting in a reduction in special-status species abundance, or if it would substantially reduce the growth, survival, or reproductive success of a special-status fish species.

3.6.3.2 IMPACT ANALYSIS

IMPACT 3.6-a **Loss of Fish Habitat Through Increased Sedimentation and Turbidity or Releases of Contaminants.** *Project construction could result in increases in sediments, turbidity, and contaminants, which could adversely affect fish habitats immediately adjacent to and downstream of project construction activities. See Impact 3.5-a in Section 3.5, "Water Quality," for more information. This impact would be* ***significant****.*

Impact 3.5-a, "Temporary Effects on Water Quality from Stormwater Runoff, Erosion, and Spills Associated with Construction," in Section 3.5, "Water Quality," provides a detailed description of project construction activities and the potential resulting effects on water quality. Water quality impacts would affect habitats and the physical health of individual fish and species populations within the Sacramento River, NCC, and PGCC and NEMDC/Steelhead Creek. As discussed above, these waterways provide migratory habitat for listed adult and juvenile chinook salmon and steelhead that would be susceptible to these water quality–related effects. Furthermore, the Sacramento River provides migration and spawning habitat for green sturgeon, striped bass, and American shad.

Project construction activities would include clearing and grubbing/stripping, degrading and subsequent reconstruction of the upper third of the NCC south levee, construction of cutoff walls along the NCC south levee, extensive soil borrow excavation and placement for all levee improvements, construction of the adjacent setback levee and seepage berms, finish grading, relocation and construction of canals, and demobilization/cleanup. These activities have the potential to temporarily impair water quality if disturbed and eroded soil is discharged into receiving waters. Soil and associated contaminants that enter receiving waters through stormwater runoff and

erosion can increase turbidity, stimulate algae growth, increase sedimentation of aquatic habitat, and introduce compounds that are toxic to aquatic organisms.

Fish population levels and survival have been linked to levels of turbidity and siltation in a watershed. Prolonged exposure to high levels of suspended sediment could create a loss of visual capability in fish, leading to a reduction in feeding and growth rates; a thickening of the gill epithelia, potentially causing the loss of respiratory function; clogging and abrasion of gill filaments; and increases in stress levels, reducing the tolerance of fish to disease and toxicants (Waters 1995).

Also, high levels of suspended sediments would cause the movement and redistribution of fish populations and could affect physical habitat. Once suspended sediment is deposited, it could reduce water depths in pools, decreasing the water's physical carrying capacity for juvenile and adult fish (Waters 1995). Increased sediment loading could degrade food-producing habitat downstream of the project area as well. Sediment loading could interfere with photosynthesis of aquatic flora and displace aquatic fauna. Many fish are sight feeders, and turbid waters reduce the ability of these fish to locate and feed on prey. Some fish, particularly juveniles, could become disoriented and leave areas where their main food sources are located, ultimately reducing their growth rates.

Avoidance is the most common result of increases in turbidity and sedimentation. Fish will not occupy areas unsuitable for survival unless they have no other option. Some fish, such as bluegill and bass species, will not spawn in excessively turbid water (Bell 1991). Therefore, project construction could cause fish habitat to become limited if high turbidity resulting from construction-related erosion were to preclude a species from occupying habitat required for specific life stages.

In addition, the potential exists for contaminants such as fuels, oils, and other petroleum products used in construction activities to be introduced into the water system directly or through surface runoff. Contaminants may be toxic to fish or may alter oxygen diffusion rates and cause acute and chronic toxicity to aquatic organisms, thereby reducing growth and survival.

Because sedimentation and increased turbidity or other contamination could degrade water quality and adversely affect fish habitats and fish populations, this impact would be significant.

Mitigation Measure 3.6-a: Implement Standard Best Management Practices, Prepare and Implement a Storm Water Pollution Prevention Plan, and Comply with NPDES Permit Conditions.

SAFCA and its primary contractors for engineering design and construction shall ensure that the following measure is implemented to avoid, minimize, and compensate for potential project effects on fish habitat.

SAFCA shall implement Mitigation Measure 3.5-a, "Implement Standard BMPs, Prepare and Implement a SWPPP, and Comply with NPDES Permit Conditions." This measure requires filing a notice of intent with the Central Valley RWQCB; implementing standard erosion, siltation, and best management practice (BMP) measures; preparing a storm water pollution prevention plan (SWPPP); and complying with the conditions of the NPDES general stormwater permit for construction activity.

Implementing this mitigation measure would reduce the potential temporary impact on fish habitat immediately adjacent to and downstream of project construction activities to a **less-than-significant** level.

IMPACT 3.6-b **Loss of SRA Habitat Associated with Levee Improvement Activities.** *Riparian vegetation that provides SRA habitat function may need to be removed or cleared from the waterside slope of the NCC south levee and the top of the Sacramento River east levee at the RD 1000 Pumping Plant 2 site to accommodate levee improvements. The loss in SRA habitat function for fish would be limited and temporary; however, this potential impact would be* ***significant****.*

Small amounts of riparian vegetation, potentially providing SRA habitat function (e.g., overhead cover for fish or contributing instream woody material to the NCC and Sacramento River [downstream] channels), may need to be removed or cleared from the waterside slope of the existing NCC south levee and the top of the Sacramento River east levee at the RD 1000 Pumping Plant 2 site to accommodate levee improvement activities. Removal of riparian vegetation or woody material along the existing levee or otherwise in the floodplain could result in the loss of important SRA habitat function. Therefore, this potential impact would be significant.

Mitigation Measure 3.6-b: Restore, Replace, or Rehabilitate Loss of Degraded SRA Habitat Function and Comply with Section 1602 Permit Conditions.

SAFCA and its primary contractors for engineering design and construction shall ensure that the following measure is implemented to restore, replace, or rehabilitate any potential loss of SRA habitat function for fish.

SAFCA or its representative shall consult with DFG regarding potential disturbance to fish habitat, including SRA, and shall obtain a streambed alteration agreement, pursuant to Section 1602 of the California Fish and Game Code, for construction work associated with levee improvements made on the water side of a levee, if needed. SAFCA shall comply with all permit conditions of the streambed alteration agreement to protect fish habitat or to restore, replace, or rehabilitate any habitat on a no-net-loss basis (see Mitigation Measure 3.7-a, "Minimize Effects on Sensitive Habitats, Develop a Management Plan to Ensure Adequate Compensation for Unavoidable Adverse Effects, and Comply with Section 404, Section 401, and Section 1602 Permit Processes," in Section 3.7, "Terrestrial Biological Resources").

Implementing this mitigation measure would reduce the impact on SRA habitat function immediately adjacent to project construction activities to a **less-than-significant** level.

3.7 TERRESTRIAL BIOLOGICAL RESOURCES

This section addresses terrestrial biological resources that could be affected by implementation of the proposed project. The information presented is based on field surveys and review of existing documentation. EDAW biologists conducted multiple reconnaissance-level and focused biological surveys of the project area during 2004–2007 as part of current and previous project-related studies and planning efforts. Existing information reviewed for preparation of this section includes documents that discuss biological resources in the region, including the *Natomas Basin Habitat Conservation Plan* (NBHCP) (City of Sacramento, Sutter County, and The Natomas Basin Conservancy 2003a) and annual monitoring reports of The Natomas Basin Conservancy (TNBC).

3.7.1 REGULATORY SETTING

Many sensitive biological resources in California are protected and/or regulated by federal, state, and local plans, policies, regulations, and laws. The following sections provide a summary of those that may be applicable to implementation of the proposed project.

3.7.1.1 FEDERAL

Federal Endangered Species Act

Pursuant to the federal Endangered Species Act (ESA), the U.S. Fish and Wildlife Service (USFWS) has regulatory authority over federally listed species. Under ESA, a permit to "take" a listed species is required for any federal action that may harm an individual of that species. Take is defined under ESA Section 9 as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." Under federal regulation, take is further defined to include habitat modification or degradation where it would be expected to result in death or injury to listed wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. ESA Section 7 outlines procedures for federal interagency cooperation to conserve federally listed species and designated critical habitat. Section 7(a)(2) requires federal agencies to consult with USFWS to ensure that they are not undertaking, funding, permitting, or authorizing actions likely to jeopardize the continued existence of listed species. For projects where federal action is not involved and take of a listed species may occur, the project proponent may seek to obtain an incidental take permit under ESA Section 10(a). Section 10(a) allows USFWS to permit the incidental take of listed species if such take is accompanied by a habitat conservation plan that includes components to minimize and mitigate impacts associated with the take.

Clean Water Act

Section 404 of the Clean Water Act (CWA) requires project proponents to obtain a permit from the U.S. Army Corps of Engineers (USACE) before performing any activity that involves any discharge of dredged or fill material into "waters of the United States," including wetlands. Waters of the United States include navigable waters of the United States, interstate waters, all other waters where the use or degradation or destruction of the waters could affect interstate or foreign commerce, tributaries to any of these waters, and wetlands that meet any of these criteria or that are adjacent to any of these waters or their tributaries. Many surface waters and wetlands in California meet the criteria for waters of the United States.

In accordance with Section 401 of the CWA, projects that apply for a USACE permit for discharge of dredged or fill material must obtain water quality certification from the appropriate regional water quality control board (RWQCB), in this case the Central Valley RWQCB, indicating that the project will uphold state water quality standards.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) implements domestically a series of international treaties that provide for migratory bird protection. The MBTA authorizes the Secretary of the Interior to regulate the taking of migratory birds; the act provides that it shall be unlawful, except as permitted by regulations, "to pursue, take, or kill any migratory bird, or any part, nest or egg of any such bird…" (U.S. Code Title 16, Section 703). This prohibition includes both direct and indirect acts, although harassment and habitat modification are not included unless they result in direct loss of birds, nests, or eggs. The current list of species protected by the MBTA includes several hundred species and essentially includes all native birds. Permits for take of nongame migratory birds can be issued only for specific activities, such as scientific collecting, rehabilitation, propagation, education, taxidermy, and protection of human health and safety and personal property.

3.7.1.2 STATE

California Endangered Species Act

Pursuant to the California Endangered Species Act (CESA), a permit from the California Department of Fish and Game (DFG) is required for projects that could result in the take of a plant or animal species that is state listed as threatened or endangered. Under CESA, "take" is defined as an activity that would directly or indirectly kill an individual of a species, but the CESA definition of take does not include "harming" or "harassing," as the ESA definition does. As a result, the threshold for take is higher under CESA than under ESA. Authorization for take of state-listed species can be obtained through a California Fish and Game Code Section 2080.1 consistency determination or a Section 2081 incidental take permit.

California Fish and Game Code Sections 3503 and 3503.5—Protection of Bird Nests and Raptors

Section 3503 of the California Fish and Game Code states that it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird. Section 3503.5 specifically states that it is unlawful to take, possess, or destroy any raptors (i.e., species in the orders Falconiformes and Strigiformes), including their nests or eggs. Typical violations of these codes include destruction of active nests resulting from removal of vegetation in which the nests are located. Violation of Section 3503.5 could also include failure of active raptor nests resulting from disturbance of nesting pairs by nearby project construction. This statute does not provide for the issuance of any type of incidental take permit.

California Fish and Game Code—Fully Protected Species

Protection of fully protected species is described in Sections 3511, 4700, 5050, and 5515 of the California Fish and Game Code. These statutes prohibit take or possession of fully protected species and do not provide for authorization of incidental take of fully protected species. DFG has informed nonfederal agencies and private parties that their actions must avoid take of any fully protected species.

California Fish and Game Code Section 1602—Streambed Alteration

All diversions, obstructions, or changes to the natural flow or bed, channel, or bank of any river, stream, or lake in California that supports wildlife resources are subject to regulation by DFG under Section 1602 of the California Fish and Game Code. Under Section 1602, it is unlawful for any person, governmental agency, or public utility to do the following without first notifying DFG:

- substantially divert or obstruct the natural flow of, or substantially change or use any material from, the bed, channel, or bank of any river, stream, or lake; or

- deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake.

A stream is defined as a body of water that flows at least periodically or intermittently through a bed or channel that has banks and supports fish or other aquatic life. This definition includes watercourses with a surface or subsurface flow that supports or has supported riparian vegetation. DFG's jurisdiction within altered or artificial waterways is based on the value of those waterways to fish and wildlife. A DFG streambed alteration agreement must be obtained for any project that would result in an impact on a river, stream, or lake.

Porter-Cologne Water Quality Control Act—California Water Code Section 13000 et seq.

Under the Porter-Cologne Water Quality Control Act, "waters of the state" fall under the jurisdiction of the appropriate RWQCB. The RWQCB must prepare and periodically update water quality control plans (basin plans). Each basin plan sets forth water quality standards for surface water and groundwater, as well as actions to control nonpoint and point sources of pollution to achieve and maintain these standards. Projects that affect wetlands or waters of the state must meet waste discharge requirements of the RWQCB, which may be issued in addition to a water quality certification or waiver under Section 401 of the CWA.

3.7.1.3 LOCAL

Natomas Basin Habitat Conservation Plan

The NBHCP (City of Sacramento, Sutter County, and The Natomas Basin Conservancy 2003) was developed to promote biological conservation in conjunction with economic and urban development in the Natomas Basin (i.e., the Natomas area). The NBHCP establishes a multispecies conservation program to minimize and mitigate the expected loss of habitat values and incidental take of "covered species" that could result from urban development and operation and maintenance of irrigation and drainage systems. The NBHCP currently authorizes take associated with 17,500 acres of urban development in southern Sutter County and within the city and county of Sacramento. USFWS approved the NBHCP in 2003 and issued incidental take permits to the City of Sacramento and Sutter County for take of federally listed species resulting from permitted activities. Sacramento County is not a permittee under the NBHCP.

The NBHCP's reserve acquisition and management activities are implemented by TNBC, a private, nonprofit organization that began operating in 1998 and whose mission is to serve as "plan operator" of the NBHCP. TNBC receives mitigation fees paid by developers and other NBHCP participants. These funds are used to acquire, establish, enhance, monitor, and manage mitigation lands in perpetuity. As development occurs within the Natomas Basin, and as TNBC acquires mitigation lands, site-specific management plans are prepared, adopted, and implemented by TNBC to ensure that the objectives of the NBHCP are fulfilled. As of January 2006, nearly 4,000 acres of mitigation property had been acquired in the Natomas area (TNBC 2006).

County and City Policies and Ordinances

Sutter County, Sacramento County, and the City of Sacramento have established codes and policies that address protection of natural resources, including vegetation, sensitive species, and trees, and are applicable to the proposed project.

The *Sutter County General Plan* contains policies that generally address preservation of natural vegetation, including wetlands. It requires that new development mitigate the loss of federally protected wetlands to achieve "no net loss," but it does not include any other specific requirements. The general plan does not specifically address tree preservation, and there is no county tree preservation ordinance.

The *Sacramento County General Plan* contains policies that promote protection of marsh and riparian areas, including specification of setbacks and "no net loss" of riparian woodland or marsh acreage. It also addresses the need to conserve vernal pools and ephemeral wetlands to ensure no net loss of vernal pool acreage. Several policies specifically promote protection of native oak trees measuring 6 inches or more in diameter and native non-oaks, especially landmark trees, which are defined as trees measuring 19 inches or more in diameter (with the

exception of cottonwoods). In addition, the general plan states that discretionary projects located in areas that support oak groves should ensure that there is no net loss of canopy area. The plan states this should be accomplished by preserving the main, central portions of consolidated groves and providing an area on-site to mitigate any canopy loss. Chapter 19.12 of Title 19 of the Sacramento County Code also addresses the protection of native oak trees within Sacramento County. This ordinance specifies that no grade cuts, fill greater than 1 foot, trenching, or irrigation systems shall be placed within the driplines of oak trees, and that grading beneath oak trees should be conducted in a manner that does not adversely affect the tree's health.

Title 12 of the City of Sacramento Municipal Code addresses the protection of trees within the city boundaries, including general protection of all trees on city property and specific protection of heritage trees. Heritage trees include any tree of any species that has a trunk circumference of 100 inches or more and is in good health; any native oak, California buckeye, or western sycamore that has a circumference of 36 inches or greater when a single trunk, or a cumulative circumference of 36 inches or greater when a multi-trunk tree; and any tree 36 inches in circumference or greater in a riparian zone.

3.7.2 ENVIRONMENTAL SETTING

3.7.2.1 LAND USE AND VEGETATION

Before 1850, vegetation in the Natomas Basin and the remainder of the Sacramento Valley bore little resemblance to its current state. The Sacramento River dominated the area, its banks lined by a riverine growth of oak, western sycamore, Fremont cottonwood, willow, and Oregon ash, up to a mile in width. Drainage from the western slopes of the Sierra Nevada resulted in regular flooding of the Sacramento Valley, rendering the Natomas Basin an area of highly fertile, alluvial soils. The southern portion of the basin was part of the overlapping American and Sacramento River floodplains. This large floodplain supported large tracts of riparian woodland and scrub, permanent freshwater marsh, and seasonal wetland. It is likely that vernal pools also existed historically in the Natomas Basin, particularly in upland areas in the eastern portion (USFWS, City of Sacramento, and Sutter County 2003).

Currently, the Natomas Basin supports a wide array of land uses and habitat types, including urban, suburban, and rural development; agricultural fields; and remnant and restored native habitat. The southern portion of the Natomas Basin is largely developed, particularly south of West Elkhorn Boulevard and east of El Centro Road. The western and northern portions, in contrast, are dominated by agricultural lands, The primary crops produced in the Natomas Basin are rice, corn, grain, and tomatoes. Rice, the most common crop, is generally grown over large areas of contiguous land north of Elkhorn Boulevard, though the amount of land in active rice production has greatly diminished in recent years and many former rice fields are now fallow or support grain crops, such as wheat. Agricultural lands in the southern and western portions support other crops and urban land uses (City of Sacramento, Sutter County, and The Natomas Basin Conservancy 2003). Only small fragments of native habitat persist in the Natomas Basin. Riparian habitat is primarily restricted to a narrow strip between the levees of the Sacramento River. Small patches of woodland, scrub, and wetland habitats dominated by native species are scattered throughout the Natomas Basin, most relatively close to the Sacramento River or adjacent to other features that support surface water. An extensive network of irrigation and drainage ditches also traverse the Natomas Basin and a growing number of restored marsh habitat patches are being created, primarily in the north.

The project area is largely undeveloped, except for residences widely scattered along the northern and middle reaches of the Sacramento River, the westernmost reaches of the Natomas Cross Canal (NCC), and the Pleasant Grove Creek Canal (PGCC). Residences are more densely spaced in the southern reaches of the Sacramento River. Levee slope maintenance zones along the landside toe are dominated by weedy ruderal vegetation that is regularly maintained via mowing and/or burning. Irrigation/drainage ditches and canals are present along many of the levee reaches, landward of the maintenance zones. These ditches generally support little native vegetation and are regularly maintained. Lateral ditches and canals also extend into the project area. The relatively limited amount of native vegetation within the project area is associated with these lateral ditches, which are concentrated

in the upper reaches of the Sacramento River east levee, and remnant woodland and scrub patches scattered along the land side of the Sacramento River east levee. The dominant habitat landward of levee maintenance zones and irrigation/drainage features is agricultural. Areas along the Sacramento River are predominantly row and field crops, while those along the NCC are exclusively rice; those adjacent to the PGCC and at the potential borrow sites are a mix of rice and row/field crops.

3.7.2.2 WILDLIFE

Before European settlement, the Sacramento area floodplains supported a wide variety and large numbers of wildlife species associated with its riparian habitats, permanent and seasonal wetlands, and oak woodlands and savannas. Much of this habitat has been lost, locally and regionally. Initially, land within the Natomas Basin was converted to agriculture, though more recent land use conversions have been to urban development. As a result, there have been shifts in wildlife use as land uses and habitats have changed. With the conversion to agriculture, the abundance of species restricted to natural habitats likely decreased, and in some cases particular species ceased to occur (City of Sacramento, Sutter County, and The Natomas Basin Conservancy 2003). However, remnant native habitat patches and created habitat associated with drainage and agricultural supply ditches and habitat reserves have allowed remnant wildlife populations to persist within the Natomas Basin, most notable of which are giant garter snake and the Swainson's hawk populations. The presence of ditches among the mosaic of agricultural fields and remnant riparian and wetland patches provides important nesting, feeding, and migration corridor habitat for a variety of wildlife species that inhabit the Natomas Basin.

Wildlife use is also linked to the Natomas Basin's position in the Pacific Flyway, the westernmost of North America's four flyways, or migration routes. These flyways are defined as geographic regions with breeding grounds in the north, wintering grounds in the south, and a system of migration routes in between. The Central Valley lies at the southerly end of the Pacific Flyway migratory route. Historically, the Central Valley contained approximately 4 million acres of wetlands, including permanent marshes and seasonal wetlands created by winter rains and spring snowmelt from the Sierra Nevada. Today, approximately 300,000 acres remain, providing wintering habitat for 60% of the Pacific Flyway's current waterfowl population and migration habitat for an additional 20% of the population. All together, approximately 10–12 million ducks and geese, along with millions of other water birds, winter in or pass through the Central Valley each year (City of Sacramento, Sutter County, and The Natomas Basin Conservancy 2003). Although most marshes and seasonal wetlands in the Natomas Basin have been converted to agricultural and urban uses, flooded rice fields continue to attract and support migrant waterfowl. Some species also utilize pasture, harvested rice, and other croplands for foraging (USFWS, City of Sacramento, and Sutter County 2003).

The project area provides habitat for a variety of wildlife species, ranging from those that utilize the widely distributed agricultural fields and levee maintenance zones to species that are restricted to remnant patches of native vegetation and the system of irrigation/drainage ditches and canals. Many common wildlife species utilize the project area, and a number of sensitive species also have potential to occur within and adjacent to the levee improvement areas. These sensitive species are discussed further below.

3.7.2.3 SENSITIVE BIOLOGICAL RESOURCES

Sensitive biological resources addressed below include those that are afforded special protection through CEQA, the California Fish and Game Code (including CESA), ESA, the CWA, and local policies and ordinances.

Special-Status Species

For purposes of this evaluation, special-status species are plants and animals that are legally protected or otherwise considered sensitive by federal, state, or local resource conservation agencies and organizations, including:

- plant and wildlife species that are listed under the ESA and/or CESA as rare, threatened, or endangered;
- plant and wildlife species considered candidates for listing or proposed for listing;
- wildlife species identified by DFG as fully protected and/or species of special concern;
- plants considered by the California Native Plant Society (CNPS) to be rare, threatened, or endangered; and
- plants and animals covered by the NBHCP.

DFG applies the term "California Species of Special Concern" to animals that are not listed under ESA or CESA but that are nonetheless declining at a rate that could result in listing, or that historically existed in low numbers and currently face known threats to their persistence. Both USFWS and DFG use CNPS designations when they are considering formal species protection under ESA and CESA, respectively.

The California Natural Diversity Database (CNDDB) (2007) and NBHCP (City of Sacramento, Sutter County, and The Natomas Basin Conservancy 2003) were used as the primary sources to identify previously reported occurrences of special-status species in the project vicinity. Although the CNDDB is the most current and reliable tool for tracking occurrences of special-status species, it contains only those records that have been reported to DFG.

Special-Status Plants

Nine special-status plant species were evaluated for their potential to occur in the project area. The regulatory status and habitat association are summarized for each species in Table 3.7-1. Three of the nine species were determined to have potential to occur in the project area: rose mallow, Delta tule pea, and Sanford's arrowhead. All of these species occur in freshwater habitats, including marshes, swamps, sloughs, and ditches. Potentially suitable habitat for them within the project area is provided by the NCC and irrigation and drainage canals throughout the project area. Elkhorn Reservoir and associated irrigation features immediately north of the Teal Bend Golf Club also provide potential habitat. In general, these areas provide low-quality habitat and are unlikely to support these three special-status plants. In August 2007, focused surveys for rose mallow, Delta tule pea, and Sanford's arrowhead were conducted in areas of suitable habitat that would be disturbed during 2008 construction. None of the species were observed during the surveys, which were conducted during the blooming season for all three species, in accordance with DFG guidelines. Because focused surveys have not been conducted in areas of suitable habitat that would be disturbed in 2009/2010, the potential presence of these special-status elsewhere in the project area cannot be conclusively ruled out.

The remaining six species included in Table 3.7-1 are not addressed further in this section, because the project area does not support the vernal pool and seasonal wetland habitats in which they occur. Potential habitat for these species is generally concentrated in the eastern portion of the Natomas Basin, between Del Paso Road and Riego Road (south of the PGCC portion of the project area). The seasonal wetlands along the NCC were evaluated by an EDAW botanist and determined to be unsuitable habitat for these additional special-status plant species.

Special-Status Wildlife

Twenty-two special-status wildlife species were evaluated for their potential to occur in the project area. The regulatory status and habitat association are summarized for each species in Table 3.7-2. Fifteen of the 22 species were determined to have potential to occur in the project area during at least part of the year, and are discussed further below. The remaining seven species included in Table 3.7-2 are not addressed further in this section, because the project area either does not support the habitats in which they occur or is outside of the species' range.

Table 3.7-1
Special-Status Plant Species Evaluated for Potential to Occur in the Project Area

Common Name	Scientific Name	Status	Habitat	Potential for Occurrence
Dwarf downingia	*Downingia pusilla*	CNPS: 2	Vernal pools and lakes	No suitable habitat is present within the project area
Bogg's Lake hedge-hyssop	*Gratiola heterosepala*	CA: endangered CNPS: 1B NBHCP: covered	Vernal pools and lake margins	No suitable habitat is present within the project area
Rose mallow	*Hibiscus lasiocarpus*	CNPS: 2	Freshwater marshes and swamps	Low potential to occur in ditches and ponds in the project area
Delta tule pea	*Lathyrus jepsonii jepsonii*	CNPS: 1B NBHCP: covered	Freshwater and brackish marshes and sloughs	Low potential to occur in ditches and ponds in the project area
Legenere	*Legenere limosa*	CNPS: 1B NBHCP: covered	Vernal pools	No suitable habitat is present within the project area
Colusa grass	*Neostapfia colusana*	Federal: threatened CA: endangered CNPS: 1B NBHCP: covered	Vernal pools	No suitable habitat is present within the project area
Slender orcutt grass	*Orcuttia tenuis*	Federal: threatened CA: endangered CNPS: 1B NBHCP: covered	Vernal pools	No suitable habitat is present within the project area
Sacramento orcutt grass	*Orcuttia viscida*	Federal: endangered CA: endangered CNPS: 1B NBHCP: covered	Vernal pools	No suitable habitat is present within the project area
Sanford's arrowhead	*Sagittaria sanfordii*	CNPS: 1B NBHCP: covered	Freshwater ponds, marshes and ditches	Low potential to occur in ditches and ponds in the project area

Notes:
CA = California; CNPS = California Native Plant Society; NBHCP = Natomas Basin Habitat Conservation Plan
California Native Plant Society Listing Categories:
1B Plants considered rare, threatened, or endangered in California and elsewhere
2 Plants considered rare, threatened, or endangered in California but more common elsewhere

Sources: CNPS 2007; CNDDB 2007; City of Sacramento, Sutter County, and The Natomas Basin Conservancy 2003; USFWS 2005

Table 3.7-2
Special-Status Wildlife Species Evaluated for Potential to Occur in the Project Area

Common Name	Scientific Name	Status	Habitat	Potential for Occurrence
Invertebrates				
Valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	Federal: threatened NBHCP: covered	Elderberry shrubs, typically in riparian habitats	Elderberry shrubs are present within and adjacent to the Sacramento River east levee improvement area
California linderiella	*Linderiella occidentalis*	Federal: endangered NBHCP: covered	Vernal pools and other seasonal wetlands	No suitable habitat is present within the project area
Vernal pool tadpole shrimp	*Lepidurus packardi*	Federal: endangered NBHCP: covered	Vernal pools and swales	No suitable habitat is present within the project area
Midvalley fairy shrimp	*Branchinecta mesovallensis*	NBHCP: covered	Vernal pools	No suitable habitat is present within the project area
Vernal pool fairy shrimp	*Branchinecta lynchi*	Federal: threatened NBHCP: covered	Vernal pools and other seasonal wetlands	No suitable habitat is present within the project area
Amphibians				
California tiger salamander	*Ambystoma californiense*	Federal: threatened CA: species of special concern NBHCP: covered	Vernal pools and seasonal wetlands in upland with burrows and other belowground refuge	No suitable habitat is present within the project area
California red-legged frog	*Rana aurora draytonii*	Federal: threatened CA: species of special concern	Aquatic habitats, such as creeks, streams, and ponds	No longer occurs on the floor of the Central Valley
Western spadefoot	*Spea hammondii*	CA: species of special concern NBHCP: covered	Vernal pools and seasonal wetlands in upland with burrows and other belowground refuge	No suitable habitat is present within the project area
Reptiles				
Giant garter snake	*Thamnophis gigas*	Federal: threatened CA: threatened NBHCP: covered	Streams, sloughs, ponds, and irrigation/ drainage ditches; also require upland refugia not subject to flooding during the snake's inactive season	The Natomas Basin supports key population; rice fields, ditches, and ponds in the project area provide potentially suitable habitat
Northwestern pond turtle	*Emys marmorata marmorata*	CA: species of special concern NBHCP: covered	Ponds, marshes, rivers, streams, sloughs; nest in nearby uplands with suitable soils	Ditches and ponds in the project area provide potentially suitable habitat

Table 3.7-2
Special-Status Wildlife Species Evaluated for Potential to Occur in the Project Area

Common Name	Scientific Name	Status	Habitat	Potential for Occurrence
Birds				
White-faced ibis	*Plegadis chihi*	CA: species of special concern NBHCP: covered	Forage and roost in shallow water and flooded fields; nest in freshwater marshes	Rice fields in project area provide foraging habitat; the only nesting colony in the Natomas Basin is approximately 3 miles from the nearest levee improvement area
Aleutian Canada goose	*Branta canadensis leucopareia*	NBHCP: covered	Forage in agricultural fields and roost in aquatic habitats	Could be a winter visitor to the project area, but no recent documented occurrences
Bald eagle	*Haliaeetus leucocephalus*	CA: endangered and fully protected	Inland waters with adjacent large, old-growth trees or snags	Could be an irregular visitor to the project area, but does not nest nearby
White-tailed kite	*Elanus leucurus*	CA: fully protected	Forage in grasslands and agricultural fields; nest in isolated trees or small woodland patches	Known to nest and forage in the project area
Northern harrier	*Circus cyaneus*	CA: species of special concern	Forage and nest in grassland, agricultural fields, and marshes	Known to nest and forage in the project area
Cooper's hawk	*Accipiter cooperii*	CA: species of special concern	Forage and nest in open woodlands and woodland margins	Known to nest and forage in the project area
Swainson's hawk	*Buteo swainsoni*	CA: threatened NBHCP: covered	Forage in grasslands and agricultural fields; nest in open woodland or scattered trees	Known to nest and forage in the project area
American peregrine falcon	*Falco peregrinus anatum*	CA: endangered and fully protected NBHCP: covered	Forage in a variety of open habitats, particularly marshes and other wetlands	Likely to occasionally forage in the project area, but no suitable nesting habitat is present
Burrowing owl	*Athene cunicularia*	CA: species of special concern NBHCP: covered	Grasslands and agricultural fields	Known to occur along the Pleasant Grove Creek Canal
Bank swallow	*Riparia riparia*	CA: threatened NBHCP: covered	Forage in various habitats; nest in banks or bluffs, typically adjacent to water	Could forage in the project area, but no colonies have been documented nearby within the past 10 years
Loggerhead shrike	*Lanius ludovidianus*	CA: species of special concern NBHCP: covered	Forage in grasslands and agricultural fields; nest in scattered shrubs and trees	Known to nest and forage in the project area

Table 3.7-2
Special-Status Wildlife Species Evaluated for Potential to Occur in the Project Area

Common Name	Scientific Name	Status	Habitat	Potential for Occurrence
Tricolored blackbird	*Agelaius tricolor*	CA: species of special concern NBHCP: covered	Forage in grasslands and agricultural fields; nest in freshwater marsh, riparian scrub, and other dense shrubs and herbs	Known to nest and forage in the project area

Notes:
CA = California; NBHCP = Natomas Basin Habitat Conservation Plan
Sources: CNDDB 2007; City of Sacramento, Sutter County, and The Natomas Basin Conservancy 2003; USFWS 2005; USFWS 2006a

Valley Elderberry Longhorn Beetle

The valley elderberry longhorn beetle is federally listed as threatened and is covered under the NBHCP. These beetles are patchily distributed throughout the remaining riparian forests of the Central Valley, from Redding to Bakersfield, and appear to be only locally common (i.e., found in population clusters that are not evenly distributed across the Central Valley). Valley elderberry longhorn beetles require elderberry shrubs for reproduction and survival, and are rarely seen because they spend most of their life cycle as larvae within the stems of the shrubs. It appears that in order to function as habitat for the valley elderberry longhorn beetle, host elderberry shrubs must have stems that are 1.0 inch or greater in diameter at ground level. Use of the shrubs by the beetle is rarely apparent; often the only exterior evidence is an exit hole created by the larva just before the pupal stage.

USFWS released a 5-year status review for the valley elderberry longhorn beetle on October 2, 2006 (USFWS 2006b). This review reported an increase in known beetle locations from 10 at the time of listing in 1980 to 190 in 2006. Because of the presumed increase in the estimated population and the concurrent protection and restoration of several thousand acres of riparian habitat suitable for valley elderberry longhorn beetles, the USFWS status review determined that this species is no longer in danger of extinction, and recommended that the species no longer be listed under ESA. This recommendation is not a guarantee that the species will be delisted, however, because formal changes in the classification of listed species require a separate USFWS rulemaking process distinct from the 5-year review. If valley elderberry longhorn beetles are removed from the ESA list, it will likely be more than a year before this decision is finalized.

There are no known documented occurrences of the beetle in the project area, but the species is known to occur in the nearby American River Parkway. Elderberry shrubs that could support beetles are relatively sparsely scattered throughout the project area, primarily in riparian vegetation on the water side of the Sacramento River east levee. Elderberry shrubs are also scattered in some remnant riparian and oak woodland clumps on the land side of the levee, but they are relatively uncommon in these locations.

Giant Garter Snake

The giant garter snake is federally and state listed as threatened and is a primary covered species under the NBHCP. This species formerly ranged throughout the wetlands of California's Central Valley but appears to have been extirpated from the southern San Joaquin Valley (Hansen and Brode 1980, USFWS 1999) and has suffered serious declines in other parts of its former range. The primary cause of decline, loss or degradation of aquatic habitat caused by agricultural development, has been compounded by the loss of upland refugia and bankside vegetation cover (Thelander 1994).

Giant garter snakes inhabit agricultural wetlands and other waterways, such as irrigation and drainage canals, rice fields, marshes, sloughs, ponds, small lakes, low-gradient streams, and adjacent uplands in the Central Valley (USFWS 1999). Rice fields and their adjacent irrigation and drainage canals serve an important role as aquatic habitat for giant garter snake. During the summer, giant garter snakes use the flooded rice fields as long as their prey is present in sufficient densities. In late summer, rice fields provide important nursery areas for newborns. In late summer/fall, water is drained from the rice fields and giant garter snake prey items become concentrated in the remaining pockets of standing water, which allows the snakes to gorge before their period of winter inactivity (USFWS 1999). It appears that the majority of giant garter snakes move back into the canals and ditches as the rice fields are drained, although a few may overwinter in the fallow fields, where they hibernate within burrows in the small berms separating the rice checks (Hansen 1998).

Managed marsh in TNBC reserves also provides important habitat for giant garter snake. In contrast to rice, managed marsh provides year-round habitat, and habitat elements to meet all of the giant garter snake's daily and seasonal needs, such as dense cover, basking sites, and refugia. TNBC reserves have been designed to provide habitat elements throughout the marsh; by contrast, the limited availability of the same elements in rice fields contributes to giant garter snake use occurring primarily around the perimeter of the rice fields.

The width of uplands used by giant garter snake varies considerably. Many summer basking and refuge areas used by this snake are immediately adjacent to canals and other aquatic habitats, and may even be located in the upper canal banks. Giant garter snakes have also been found hibernating as far as 820 feet (250 meters) from water, however, and any land within this distance may be important for snake survival in some cases (Hansen 1988). USFWS considers 200 feet to be the width of upland vegetation needed to provide adequate habitat for giant garter snake along the borders of aquatic habitat (USFWS 1997).

The Natomas Basin supports one of the most significant of the remaining giant garter snake populations. In general, recent occurrences of the species have been concentrated in the central and northern portions of the basin, with giant garter snakes becoming increasingly uncommon at Fisherman's Lake in the south (TNBC 2007). Irrigation and drainage ditches throughout the project area provide habitat of varying quality for giant garter snake, depending on the location. In general, irrigation ditches on the far western side of the basin are of poor habitat quality, while rice fields and canals in the north and TNBC lands within and adjacent to the project area provide high-quality habitat and support a known population.

Northwestern Pond Turtle

Northwestern pond turtle is a DFG species of special concern and is covered under the NBHCP. This species is generally associated with permanent or near-permanent aquatic habitats, such as lakes, ponds, streams, freshwater marshes, and agricultural ditches. They require still or slow-moving water with instream emergent woody debris, rocks, or similar features for basking sites. Pond turtles are highly aquatic but can venture far from water for egg-laying. Nests are typically located on unshaded upland slopes in dry substrates with clay or silt soils (Jennings and Hayes 1994).

Ditches, ponds, and marshes throughout the Natomas Basin provide potential habitat for northwestern pond turtle. Potential breeding habitat is very limited because of the predominance of agriculture and development, but turtles could occur along ditches and margins of other aquatic habitat. Limited information is available on the status and distribution of the northwestern pond turtle in the basin. Surveys conducted in 2004–2006 for TNBC documented only 15 occurrences of northwestern pond turtle in the Natomas Basin (TNBC 2007). Although there have been few documented occurrences, several of them have been within or near the project area.

Swainson's Hawk

Swainson's hawk is state listed as threatened and is a primary covered species under the NBHCP. As many as 17,000 Swainson's hawk pairs may have nested in California at one time (DFG 1994). Currently, there are 700–1,000 breeding pairs in California, of which 600–900 are in the Central Valley (Estep 2003). Swainson's hawks

typically occur in California only during the breeding season (March–September) and winter in Mexico and South America. The Central Valley population migrates only as far south as central Mexico. Swainson's hawks begin to arrive in the Central Valley in March; nesting territories are usually established by April, with incubation and rearing of young occurring through June (Estep 2003).

Swainson's hawks most commonly occur in grasslands, low shrublands, and agricultural habitats that include larges trees for nesting. Nests are found in riparian woodlands, roadside trees, trees along field borders, and isolated trees. Corridors of remnant riparian forest along drainages contain the majority of known nests in the Central Valley (England, Bechard, and Houston 1997; Estep 1984; Schlorff and Bloom 1984). Nesting pairs frequently return to the same nest site for multiple years and decades.

Prey abundance and accessibility are the most important features determining the suitability of Swainson's hawk foraging habitat. In addition, agricultural operations (e.g., mowing, flood irrigation) have a substantial influence on the accessibility of prey and thus create important foraging opportunities for Swainson's hawk. Crops that are tall and dense enough to preclude the capture of prey do not provide suitable habitat except around field margins, but preys in these habitats are accessible during and soon after harvest. Swainson's hawks feed primarily on small rodents but also consume insects and birds. Although the most important foraging habitat for Swainson's hawks lies within a 1-mile radius of each nest (City of Sacramento, Sutter County, and The Natomas Basin Conservancy 2003), Swainson's hawks have been recorded foraging up to 18.6 miles from nest sites (Estep 1989). Any habitat within the foraging distance may provide food at some time in the breeding season that is necessary for reproductive success. In a dynamic agricultural environment such as the Natomas Basin, the area required for Swainson's hawk foraging habitat depends on time of season, crop cycle, crop type, and disking/harvesting schedule, as these factors affect the abundance and availability of prey (City of Sacramento, Sutter County, and The Natomas Basin Conservancy 2003).

The most recent survey published by TNBC (2007) documented that 45 of the 94 known nesting territories in the Natomas Basin and along adjacent waterways were active in 2006. Most nest sites are located in the western portion of the basin along the Sacramento River. In 2006, four nests were present along the NCC and one nest was present approximately 0.25 mile west of the PGCC. Along the Sacramento River, the majority of nest sites are located on the water side of the levees, and the relatively few nest sites on the land side of the Sacramento River east levee are typically located at least several hundred feet or more from the levee. In addition to the scattered nest sites adjacent to the project area, agricultural fields and levee maintenance zones throughout the project area provide suitable foraging habitat for Swainson's hawk.

Burrowing Owl

Burrowing owl is a DFG species of special concern and is covered under the NBHCP. Burrowing owls and their nests are also protected under Section 3503.5 of the California Fish and Game Code. Burrowing owls typically inhabit grasslands and other open habitats with low-lying vegetation. They are also known to nest and forage in idle agricultural fields, ruderal fields, and the edges of cultivated fields, although these areas provide lower-quality habitat than native grasslands. Burrow availability is an essential component of suitable habitat. Burrowing owls are capable of digging their own burrows in areas with soft soil, but they generally prefer to adopt those excavated by other animals, typically ground squirrels. In areas where burrows are scarce, they can use pipes, culverts, debris piles, and other artificial features.

Burrowing owl sightings are generally in the eastern half of the Natomas Basin, with the highest concentration along the far eastern edge (TNBC 2007). No burrowing owls have been observed during the many general and focused biological surveys conducted by EDAW in 2005–2007 along the Sacramento River east levee and the NCC. There have, however, been observations along the PGCC, just north of Sankey Road, including an observation of a pair of burrowing owls by an EDAW biologist in August 2007.

Other Nesting Birds

Several bird species identified in Table 3.7-2 have the potential to nest in or adjacent to the project area. Species associated with riparian and other woodland habitats, such as Cooper's hawk and white-tailed kite, are most likely to nest along the Sacramento River (Cooper's hawk) and in remnant woodland and suitable trees on the land side of the levees (white-tailed kite). In general, these two raptor species are relatively uncommon in the project area, but several active nests are known to have been documented adjacent to the project area in recent years, including a white-tailed kite nest found near Prichard Lake by an EDAW biologist in 2007. Northern harriers are likely to nest in grain crops and fallow agricultural fields in and adjacent to the project area. Three harrier nests were documented by an EDAW biologist in 2007 in fallow fields and upland adjacent to Prichard Lake. Loggerhead shrikes are known to nest at several TNBC reserves and elsewhere in the Natomas Basin (TNBC 2007) and are likely to nest in small trees and shrubs within the project area, particularly on the land side of the Sacramento River east levee.

In recent years, tricolored blackbirds have only been known to nest outside of the project area, on a preserve in TNBC's Central Basin Reserve Area (TNBC 2007). In 2007, however, a new nesting colony was discovered by an EDAW biologist in the northeastern portion of the Natomas Basin. There is also potential for this species to nest in areas of suitable habitat elsewhere adjacent to the project area, including several TNBC reserves and other lands north of the airport. Similarly, until 2007, white-faced ibis were not known to nest anywhere in the Natomas Basin. A new nesting colony became established at a preserve in TNBC's Central Basin Reserve Area. This colony is approximately 3 miles from the nearest portion of the project area.

Sensitive Habitats

Sensitive habitats are those that are of special concern to resource agencies or that are afforded specific consideration through CEQA, Section 1602 of the California Fish and Game Code, and/or Section 404 of the CWA, as discussed above in Section 3.7.1, "Regulatory Setting."

Irrigation/drainage canals and ditches in the project area are anticipated to be considered waters of the United States and subject to regulation under CWA Section 404. Other permanently and/or seasonally wet habitats, such as freshwater marsh and seasonal wetland, could qualify as wetlands subject to Section 404 regulation if they are adjacent or connected to waters of the United States. A wetland delineation has been completed for the NCC portion of the project area. It concluded that the NCC and irrigation/drainage ditches and seasonal wetlands south of the levee are under USACE jurisdiction; this delineation was verified by USACE on November 7, 2006. A delineation of jurisdictional waters of the United States elsewhere in the project area is in preparation and will be submitted to USACE for verification. All of these aquatic habitats are also anticipated to qualify as waters of the state and regulation under the Porter-Cologne Water Quality Control Act. In addition, waterways and associated riparian habitats are likely subject to regulation under Section 1600 et seq. of the California Fish and Game Code.

Other habitats considered sensitive by DFG include those identified as "rare and worthy of consideration" in natural communities recognized by the CNDDB. These sensitive communities provide essential habitat to special-status species that are often restricted in distribution or decreasing throughout their range. Some woodland patches within the project area could be categorized as Great Valley cottonwood riparian forest, which is a natural community documented in the CNDDB.

3.7.3 ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

3.7.3.1 SIGNIFICANCE CRITERIA

The thresholds for determining the significance of impacts for this analysis are based on the environmental checklist in Appendix G of the State CEQA Guidelines. The proposed project was determined to result in a significant effect related to terrestrial biological resources if it would:

- have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by DFG or USFWS;
- have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in any local or regional plans, policies, or regulations, or by DFG or USFWS;
- have a substantial adverse effect on federally protected waters of the United States, including wetlands, as defined by Section 404 of the CWA (including but not limited to marshes, vernal pools, rivers, etc.) through direct removal, filling, hydrological interruption, or other means;
- interfere substantially with the movement of any native resident or migratory wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;
- conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance; or
- conflict with the provisions of an adopted habitat conservation plan, natural community conservation plan, or other approved local, regional, or state habitat conservation plan.

3.7.3.2 IMPACT ANALYSIS

IMPACT 3.7-a Loss of Sensitive Habitats. *Implementation of the proposed project would result in loss of sensitive habitats, including fill of wetlands and other waters of the United States and removal of riparian vegetation and other woodland habitat. The project would also result in creation of habitats similar to those that would be adversely affected. However, specific requirements have not been established to ensure that appropriate habitat conditions are provided to adequately replace the habitat values that would be lost. This impact would be significant.*

Sensitive habitats within the project area include open-water and adjacent riparian habitats that qualify for USACE jurisdiction and are protected under Section 404 of the CWA, are subject to DFG jurisdiction under Section 1600 of the California Fish and Game Code, and/or are considered sensitive natural communities by DFG. Trees protected by county and city policies and ordinances, including native oaks, are also considered sensitive. These sensitive habitats would be permanently and temporarily affected by implementation of the proposed project. Table 2-27 provides a summary of pre- and post-project land cover types, including aquatic and woodland habitats discussed below. Exhibits 2-19 and 2-23 depict the NCC and Sacramento River project components referred to in this and subsequent impact discussions.

Impacts associated with the NCC improvements in 2008 include temporary and permanent adverse effects on four seasonal wetlands, totaling approximately 7.5 acres, within the maintenance zone at the landside toe of the levee. The largest of these wetlands (approximately 5.5 acres) is adjacent to TNBC's Lucich North Preserve and appears to have formed as a result of seepage from this adjacent water source. Approximately 6.5 acres of these wetland areas would be permanently filled to accommodate the levee expansion, eliminate depressions near the levee toe, and facilitate use of the area for maintenance; the remaining 1 acre of the wetland adjacent to the Lucich North

Preserve could be disturbed during construction. In addition, less than 1 acre of irrigation/drainage canal near the landside toe of the levee (where the ends of the canals approach the levee toe) would be filled or re-aligned to eliminate excavated areas in close proximity to the levee. This is anticipated to result in permanent loss of less that 0.5 acre of canal habitat.

NCC improvements in 2008 would also result in water side disturbance, excavation, or fill of approximately 13.5 acres below the ordinary high-water mark (OHWM) identified in the verified delineation. The majority of work below the OHWM would occur on the levee slope and bank of the NCC, which supports ruderal upland vegetation, and would result from excavation required to flatten the waterside slope, rather than fill. Temporary construction disturbance or fill of areas below the OHWM would be limited to approximately 5.5 acres in Reaches 6 and 7. Less than 1.5 acre of riparian vegetation on the waterside of the levee is anticipated to require removal, primarily to accommodate constraints that limit landside expansion in Reaches 6 and 7.

Impacts on waters of the United States resulting from the 2008 improvements to the Sacramento River east levee would be limited to the fill of approximately 1 acre of irrigation ditch/canal along the landside toe of the levee, including 0.5 acre of a minor irrigation ditch in Reach 1 and 0.5 acre of irrigation canal in Reach 4B. Temporary disturbance of approximately 0.5 acre of open-water habitat would occur where the Elkhorn Canal (replacement highline irrigation canal north of Interstate 5 [I-5]) and the GGS/Drainage Canal connect to existing lateral canals, including the North Drainage Canal and more minor irrigation canals and ditches. The existing highline canal would not be filled until 2009, except for the 0.5 acre in Reach 4B.

Construction of the adjacent setback levee and seepage berms along the Sacramento River east levee are anticipated to require removal of up to 5 acres of woodland habitat in 2008. In addition, approximately 0.5 acre of riparian vegetation along the lateral canals is within the current footprint of the replacement canals and would require removal to accommodate the 2008 canal construction. The woodland areas that would be affected in 2008 generally provide moderate- to high-quality habitat.

Construction of levee improvements in 2009–2010 would result in permanent fill of approximately 12 acres of irrigation canals and 1 acre of Elkhorn Reservoir near the landside toe of the Sacramento River east levee. In general, these irrigation features support little, if any, wetland vegetation and are dominated by weedy ruderal bankside vegetation; portions of the canals are concrete-lined and do not support any in-channel vegetation. Approximately 2 additional acres of lateral irrigation/drainage ditch segments within the levee improvement footprint, and between the new levee features and replacement irrigation canals and GGS/Drainage Canal, would be filled. It is anticipated that riparian vegetation along the banks of these canals, but outside of the levee/berm footprint, would be preserved. Approximately 6 acres of open water in the Airport West Ditch would be dewatered as part of the irrigation and drainage infrastructure reconfiguration associated with construction of the new Elkhorn Canal and GGS/Drainage Canal. This ditch is anticipated to be subsequently filled and graded by the airport to function as a drainage swale; water would only be present during runoff events. Finally, approximately 2 acres of irrigation/drainage canal along the toe of the PGCC levee would require relocation to accommodate the levee raise and seepage remediation in 2010.

A total of approximately 20 acres of woodland habitat is anticipated to be removed to accommodate construction of the adjacent levee and seepage remediation (berms and relief wells) along the Sacramento River east levee in 2009–2010. The affected woodland patches vary in habitat quality, but many of them are dominated by mature Valley oak trees that qualify for protection under city and county codes, as well as other mature native trees, such as Fremont cottonwood and western sycamore. No woodland habitat exists within the footprint of the potential PGCC improvements.

The loss and disturbance of open-water habitat would be offset by the habitat creation and preservation components of the project. Approximately 50 acres of aquatic habitat would be created by construction of the new GGS/Drainage Canal and expansion of the existing Western Drainage Canal, and approximately 30 acres of new irrigation canal would be created. Once it has had time to develop, habitat quality of the GGS/Drainage Canal is

anticipated to be higher than the habitat that would be lost. This canal has been designed to support wetland vegetation, and it would be managed to maximize the habitat benefits. Although the primary function of the replacement irrigation canals would be irrigation supply, these canals are anticipated to provide habitat comparable in quality to that of the canals that would be filled as a result of the proposed project. This creation of approximately 80 acres of new and expanded canals would offset the loss of up to approximately 25 acres of canal and 1 acre of reservoir. In addition, managed marsh habitat would be created on an anticipated 310 acres after borrow extraction from sites within the Natomas Basin and the RD 1001 borrow site. It is anticipated that seasonal wetland habitat could be incorporated into the marsh creation to offset the potential loss of seasonal wetland.

The loss of woodland habitat would be offset by the woodland creation and preservation components of the proposed project. Approximately 125 acres of woodland habitat are anticipated to be planted along corridors on the land side of the adjacent levee in 2008–2010; of this total, approximately 25 acres would be planted in Sacramento River Reaches 1–4A in 2008. Additional groves may be planted in appropriate locations, such as on TNBC reserves and/or in areas where it has been necessary to acquire excess property (i.e., severed agricultural lands). The overall creation of an anticipated 150 acres of woodland habitat would offset the anticipated loss of approximately 25 acres. In addition to the increase in the amount of habitat, the majority of the new habitat is anticipated to eventually reach a higher level of quality than the habitat that would be lost, because it would be specifically managed for its habitat values. In contrast, much of the woodland habitat that would be lost is along roadways and associated with agricultural equipment areas and other land uses with high disturbance levels that limit development of understory vegetation.

Although loss of sensitive habitat would be offset by habitat creation as described above, a plan specifying how the habitat would be managed to ensure that the appropriate conditions are established and maintained has not yet been prepared. Creation of replacement habitat that does not provide the essential functions and values would fail to compensate for the habitat that would be lost and could result in a substantial adverse effect on these sensitive habitats. Therefore, impacts on sensitive habitats would be significant.

Mitigation Measure 3.7-a: Minimize Effects on Sensitive Habitats, Develop a Habitat Management Plan to Ensure Compensation for Unavoidable Adverse Effects, and Comply with Section 404, Section 401, and Section 1602 Permit Processes.

SAFCA and its primary contractors for engineering design and construction shall ensure that the following measures are implemented to avoid, minimize, and compensate for potential project effects on sensitive habitats.

Areas of sensitive habitat shall be identified and the primary engineering and construction contractors shall ensure, through coordination with a qualified biologist retained by SAFCA, that staging areas and access routes are designed to minimize disturbance of canals and ditches, seasonal wetlands, and woodland patches. Trees within the Sacramento County portion of the project area that qualify as Native Oaks or Heritage Trees under Sacramento County's tree preservation ordinance shall be identified. All sensitive habitats and protected trees that are located adjacent to construction areas, but can be avoided, shall be protected by temporary fencing during construction.

SAFCA shall develop and implement a habitat management plan to address establishment and management of aquatic (i.e., GGS/Drainage Canal and marsh/seasonal wetland habitat) and woodland habitats that are created as part of the proposed project in order to ensure that the performance standard of no net loss of sensitive habitat is met. The plan shall, at a minimum, establish specific requirements for habitat creation (e.g., acreage of specific habitats to be created and number and species of trees to be planted), success criteria for habitat creation (e.g., tree survival requirements), specify remedial measures to be undertaken if success criteria are not met (e.g., supplementary plantings and additional monitoring), and describe short- and long-term maintenance and management of the features. Long-term protection of the created features, and funding for their management, shall be provided through appropriate mechanisms to be determined by SAFCA, in consultation with the regulatory

agencies and other entities cooperating in implementation of the proposed project. The management plan for the habitat creation components of the proposed project shall be reviewed and approved by the appropriate resource agencies before project implementation.

Applicable permits, including a Section 404 permit from the USACE, Section 401 certification from the Central Valley RWQCB, and a Section 1602 streambed alteration agreement from DFG, shall be obtained before any impact on the relevant resources occurs. All measures adopted through these permitting processes shall be implemented.

Implementation of the project as proposed and the above measures would ensure that adverse effects on sensitive habitats are minimized and an overall performance criterion of no net loss in acreage, function, and value of sensitive habitats is met. This would reduce the impact on sensitive habitats to a **less-than-significant** level.

IMPACT 3.7-b Disturbance and Loss of Special-Status Plant Habitat. *Implementation of the proposed project would result in disturbance and temporary and permanent loss of habitats that could be occupied by special-status plant populations. This potential impact would be significant.*

Three special-status plant species have potential to occur in aquatic habitats within the project area: rose mallow, Delta tule pea, and Sanford's arrowhead. The proposed project would result in permanent and temporary direct effects on irrigation/drainage ditches, canals, and reservoir that provide potentially suitable habitat for these species. Improvements to the NCC south levee and Sacramento River east levee to be conducted in 2008 would not result in adverse effects on special-status plants, because no special-status plants were found during focused surveys conducted in areas of suitable habitat that would be affected. Areas within the 2009–2010 project footprint provide only poor to marginal quality habitat for special-status plants, but surveys have not been conducted to confirm that the species in question are not present. Therefore, fill and disturbance of these habitats could result in adverse effects on special-status plants, if present.

Adverse effects on potentially suitable habitat for special-status plants from construction of levee improvements in 2009–2010 include permanent loss of approximately 12 acres of relatively unvegetated irrigation canals, 1 acre of Elkhorn Reservoir along the landside toe of the Sacramento River east levee, and 2 acres of lateral irrigation/drainage ditch segments within the levee improvement footprint and between the new levee features and replacement irrigation canals and the GGS/Drainage Canal. Approximately 6.5 acres of potential habitat in the Airport West Ditch would be lost as a result of the irrigation and drainage infrastructure reconfiguration. Finally, approximately 2 acres habitat provided by an irrigation/drainage ditch along the toe of the PGCC levee would be lost as a result of the levee raise and seepage remediation in 2010.

Disturbance of suitable habitat for special-status plants could result in temporary loss of individual plants, but populations could persist if habitat suitability and value are maintained. Permanent loss of habitat could result in permanent loss of special-status plant populations or portions of populations, if present. This habitat loss would be offset by the habitat creation components of the project. The quality of habitat to be created is anticipated to be at least comparable to that of the habitat that would be lost as a result of the project and, in the case of the GGS/Drainage Canal, it would likely be better. There is potential, however, for direct loss of special-status plant populations to occur, if present within the affected habitats. This potential impact would be significant.

Mitigation Measure 3.7-b: Conduct Focused Surveys for Special-Status Plants, Minimize Effects, Transplant Unavoidable Individual Plants, and Develop Management Plant for Transplanted Populations.

SAFCA and its primary contractors for engineering design and construction shall ensure that the following measures are implemented to avoid and minimize potential project effects on special-status plants.

Before any ground-disturbing project activities begin, a qualified biologist retained by SAFCA shall conduct surveys for special-status plants in appropriate habitat within the project footprint, in accordance with USFWS

and/or DFG guidelines and at the appropriate time of year when the target species would be clearly identifiable. If no special-status plants are found during focused surveys, no further action shall be required.

If special-status plants are found, areas of occupied habitat shall be identified and the primary engineering and construction contractors shall ensure, through coordination with the biologist, that staging areas and access routes are designed to minimize disturbance of these areas. All occupied habitat that is located adjacent to construction areas, but can be avoided, shall be protected by temporary fencing during construction.

If special-status plants are present in areas that cannot be avoided, plants that would be affected shall be transplanted to the GGS/Drainage Canal, if feasible. If this is infeasible (i.e., because the created habitat is not suitable at the time transplantation is required), an alternative transplantation location (e.g., TNBC preserves), approved by USFWS and DFG, shall be utilized. A plan to address management of the transplanted populations and their habitat shall be developed. The management plan shall be approved by USFWS and DFG and shall, at a minimum, establish specific success criteria (e.g., no net loss of occupied special-status plant habitat), specify remedial measures to be undertaken if success criteria are not met (e.g., enhancement of habitat quality and additional monitoring), and describe short- and long-term maintenance of the transplantation site. Long-term protection of the special-status plants, and funding for management of their habitat, shall be provided through appropriate mechanisms to be determined by SAFCA, in consultation with the regulatory agencies and other entities cooperating in implementation of the proposed project.

Implementation of the project as proposed and the above measures would ensure that adverse effects on special-status plants are minimized, plants that cannot be avoided are transplanted, and an overall performance criterion of no net loss in acreage, function, and value of occupied special-status plant habitat is met. This would reduce the impact on special-status plants to a **less-than-significant** level.

IMPACT 3.7-c Loss of Potential Habitat for Valley Elderberry Longhorn Beetles. *Implementation of the proposed project would result in loss of elderberry shrubs, potentially resulting in adverse effects on, and potential loss of, valley elderberry longhorn beetles. The project would also result in creation of habitat for the beetle, but specific requirements have not been established to ensure that the appropriate amount of habitat is created and that appropriate habitat conditions are provided to adequately replace the habitat values that would be lost. This impact would be significant.*

Blue elderberry shrubs, the host plant for valley elderberry longhorn beetle larvae, are widely but relatively sparsely distributed throughout the project area, primarily in riparian vegetation along the Sacramento River. As mentioned previously, no known occurrences of the beetle have been documented in the project area, but valley elderberry longhorn beetles are known to occur nearby and could utilize shrubs in the project area. Removal of shrubs in which larvae are present would result in loss of beetles. Nearby construction activities could also result in larvae mortality if the health of the shrubs is adversely affected. Adverse effects on elderberry shrubs could have an overall effect on the beetle, even if larvae are absent at the time of impact, if the shrubs are relied upon for reproduction.

Fourteen elderberry shrubs are known to be present within the footprint of the 2008 Sacramento River levee improvements. One shrub is located immediately north of the intersection of Sankey Road and Garden Highway at the northern end of Reach 1, three shrubs are located in the woodland patch in Reach 1, and 10 shrubs are located in woodland habitat in the northern portion of Reach 4B. All of these shrubs would require removal to accommodate construction of the adjacent levee and seepage berms.

Additional shrubs would likely require removal during 2009 and 2010 construction, but the number of shrubs that would be removed is anticipated to be relatively small given the scope of the improvements. Based on reconnaissance-level surveys conducted in 2007, shrubs are known to occur in 15 locations along the approximately 15-mile-long footprint of 2009–2010 Sacramento River east levee construction.

The loss of elderberry shrubs and potential loss of beetles would be offset by incorporation of plantings of elderberry shrubs and other appropriate native species into the woodland corridors and other potential woodland restoration areas. Elderberry shrubs would be planted in numbers adequate to compensate for elderberry shrub loss that would result from the proposed project. However, the exact number of shrubs that would be lost and the number that would be planted has not been determined. In addition, a plan has not yet been prepared specifying how the woodland/elderberry habitat creation areas would be managed to ensure that the appropriate habitat conditions are provided. If this replacement habitat does not provide the essential components and is not managed in a way that maximizes habitat quality and minimizes potential adverse effects on valley elderberry longhorn beetle, substantial adverse effects on the species could result. This potential impact would be significant.

Mitigation Measure 3.7-c: Minimize Effects on Valley Elderberry Longhorn Beetle, Conduct Focused Surveys, Develop a Management Plan to Ensure Adequate Compensation for Unavoidable Adverse Effects, and Obtain Incidental Take Authorization.

SAFCA and its primary contractors for engineering design and construction shall ensure that the following measures are implemented to minimize potential project effects on valley elderberry longhorn beetles.

The primary engineering and construction contractors shall ensure, through coordination with a qualified biologist retained by SAFCA, that staging areas and access routes are designed to minimize disturbance of areas that support elderberry shrubs. All elderberry shrubs that are located adjacent to construction areas, but can be avoided, shall be protected by temporary fencing during construction.

Before the initiation of any ground-disturbing activities, the biologist shall conduct surveys for elderberry shrubs within 100 feet of the impact area, in accordance with USFWS guidelines. All elderberry shrubs with potential to be affected by project activities shall be mapped, the number of stems greater than 1 inch in diameter on each shrub that requires removal shall be counted, and these stems shall be searched for beetle exit holes. Shrubs that are removed shall be transplanted to the woodland creation areas, if feasible. If none of the areas of suitable habitat to be created as part of the proposed project would be available before the impact would occur, alternative transplantation locations (e.g., other SAFCA mitigation areas or TNBC preserves) shall be identified.

SAFCA shall develop and implement a plan to address establishment and management of the elderberry shrubs and associated species plantings to compensate for unavoidable effects on elderberry shrubs. The plan shall, at a minimum, describe requirements for transplantation of shrubs that require removal; specify the number of replacement elderberry shrubs and associated native plants to be established and associated success criteria; specify remedial measures to be undertaken if mitigation success criteria are not met; and describe short- and long-term maintenance and management. The number of replacement plantings shall be determined based on USFWS guidelines, which require replacement ratios ranging from 1:1 to 8:1 for lost stems at least 1 inch in diameter, depending on the size of the affected stems and presence or absence of beetle exit holes. Associated native species shall be planted at ratios ranging from 1:1 to 2:1 for each elderberry planting. Long-term protection of the planting area for elderberry and associated species, and funding for its management, shall be provided through appropriate mechanisms to be determined by SAFCA, USFWS, and other entities cooperating in implementation of the proposed project.

The management plan shall be reviewed and approved by USFWS before removal of any elderberry shrubs. Authorization for take of valley elderberry longhorn beetle under ESA shall be obtained if it is determined, in consultation with USFWS, that shrub removal is likely to result in such take. All measures subsequently developed through informal consultation with USFWS shall be implemented, as well as any additional measures adopted through a formal permitting process, if applicable.

Implementation of the project as proposed and the above measures would ensure that adverse effects on valley elderberry longhorn beetle are minimized, elderberry shrubs that cannot be avoided are transplanted, and an

overall performance criterion of no net loss in acreage of valley elderberry longhorn beetle habitat is met. This would reduce the impact on valley elderberry longhorn beetle to a **less-than-significant** level.

IMPACT 3.7-d **Disturbance and Loss of Giant Garter Snake Habitat.** *Implementation of the proposed project would result in disturbance and loss of aquatic and upland habitat for giant garter snake. The project would also result in creation of habitat for the snake, but specific requirements have not been established to ensure that appropriate habitat conditions are provided to adequately replace the habitat values that would be lost. Project construction also has the potential to result in direct take of giant garter snake individuals. This impact would be significant.*

Irrigation and drainage ditches, rice fields, managed marsh, and remnant marsh within the Natomas Basin provide critically important aquatic habitat for the basin's giant garter snake population. Suitable upland adjacent to these aquatic habitats is very limited, and, in some areas, is provided almost exclusively by agricultural field boundaries and levee slopes and maintenance corridors. In general, recent occurrences of giant garter snake have been concentrated in the central and northern portions of the basin and opportunities for exchange of individuals between key populations in the northern concentration of TNBC reserves and the population at Fisherman's Lake in the south are limited (TNBC 2007). The project area provides habitat of varying quality for giant garter snake, depending on the location. In general, irrigation ditches on the far western side of the basin, along the toe of the Sacramento River east levee, are of poor habitat quality. Sections of these ditches are concrete lined, and in the southern portion of the basin they are bordered by development. In contrast, rice fields, canals, and TNBC lands within and adjacent to the northern portion of the project area provide high-quality habitat and support a known population.

The proposed project would result in permanent loss and disturbance of potential giant garter snake habitat. However, it also includes components that would result in creation, enhancement, and preservation of habitat, including the GGS/Drainage Canal (created in previously unsuitable habitat), managed marsh (created on rice fields that are utilized for borrow), and rice land preserved in rice production. Table 3.7-3 provides a summary of changes in giant garter snake habitat that would result from the proposed project, including habitat loss, creation, enhancement, and preservation.

Table 3.7-3
Giant Garter Snake Habitat Alteration Resulting from Implementation of the Proposed Project

Habitat Alteration	Habitat Type	Acres
Loss	Rice Converted to Unsuitable GGS Habitat [1]	540
	Irrigation Canal Filled	20
Creation	Irrigation Canal [2]	30
	Drainage/GGS Canal	50
Enhancement	Managed Marsh [3]	300
Preservation	Rice [4]	130

[1]Includes 500 acres of airport rice fields utilized for borrow and converted to managed grassland and 40 acres of private rice within the improved levee right-of-way (17 acres along west Natomas Cross Canal and north Sacramento River reaches; 23 acres along Pleasant Grove Creek Canal).

[2]Replacement irrigation canals would not be designed and managed for giant garter snake habitat purposes, but they are anticipated to be similar in habitat quality to the existing irrigation canals that would be filled.

[3]Includes 130 acres of airport rice field, 120 acres of private rice field, and 50 acres of Reclamation District 1001 rice field utilized for borrow and converted to marsh.

[4]Includes private rice land that would be transferred to public or Natomas Basin Conservancy ownership and management.

Habitat loss and disturbance could adversely affect giant garter snake populations in the Natomas Basin if the snakes rely upon the affected areas. This is unlikely to be the case for irrigation ditches along the toe of the Sacramento River east levee, but snakes are likely to utilize rice fields in the northern portion of the Basin that would be utilized for borrow. Fill, temporary dewatering, and other construction disturbances would adversely affect snakes utilizing the affected habitats. Project construction activities in areas of potentially suitable habitat could also result in direct disturbance and loss of individual giant garter snakes. Despite the habitat creation components of the project, there would be some temporal loss in potential habitat while the created habitat develops into a suitable state. This temporal loss would be minimized by constructing the replacement irrigation and GGS/Drainage Canal before most of the fill of existing ditches and canals occurs, providing some time for habitat development before the loss. In addition, marsh habitat creation would occur as soon after borrow extraction as possible.

Adverse effects on giant garter snake habitat within the 2008 project construction footprint would occur along the NCC south levee and Reaches 1 and 4B of the Sacramento River east levee. Most of the work along the NCC south levee would occur within 200 feet of suitable aquatic habitat for giant garter snake provided by irrigation/drainage canals near the landside toe of the levee. Therefore, potentially suitable uplands adjacent to this aquatic habitat would be disturbed during construction. The limited amount of waterside levee expansion in Reaches 6 and 7 would not result in loss of aquatic habitat typically present during the snake's active season. In addition, the NCC provides poor-quality habitat for giant garter snake and there is little evidence to suggest the species regularly occurs in the NCC. On the land side of the NCC south levee, less than 1 acre of irrigation/drainage canal (where the ends of the canals approach the levee toe) would be filled or re-aligned to eliminate excavated areas in close proximity to the levee. This is anticipated to result in permanent loss of less that 0.5 acre of canal habitat.

Approximately 27 acres of rice field in Reach 1 of the NCC south levee and Reach 1 of the Sacramento River east levee and 0.5 acre of a minor irrigation ditch in Reach 1 and 0.5 acre of irrigation canal in Reach 4B of the Sacramento River east levee would be filled to accommodate levee expansion and construction of the adjacent levee. Temporary disturbance of approximately 0.5 acre of aquatic habitat would occur where the Elkhorn Canal and the GGS/Drainage Canal connect to existing lateral canals. Approximately 280 acres of rice fields would be used for borrow to support 2008 construction. This borrow could come from several potential sources, including rice fields at the RD 1001 borrow site north of the Natomas Basin, privately owned fields in the northern portion of the basin, or northern airport lands. Additional borrow material is anticipated to originate from TNBC's habitat creation at the Bolen South and Nestor Preserves.

The nature of adverse effects on giant garter snakes and their habitat in 2009 and 2010 would be similar to those described for 2008, but the acreages of impact would be greater. Sacramento River east levee improvements in 2009 would result in permanent fill of approximately 12 acres of irrigation canal and 1 acre of Elkhorn Reservoir along the landside toe of the levee. The existing irrigation canals along the levee toe generally provide poor-quality habitat, and no giant garter snakes have been documented in them. However, the canals represent potential habitat for giant garter snake and are a component of the overall area of habitat available in the Natomas Basin and addressed in the NBHCP. Approximately 2 additional acres of lateral irrigation/drainage ditch segments within the levee improvement footprint, and between the new levee features and replacement irrigation canals and the GGS/Drainage Canal, would be filled. The Airport West Ditch, which supports approximately 6.5 acres of potential giant garter snake aquatic habitat, would be dewatered as part of the irrigation and drainage infrastructure reconfiguration. Finally, approximately 2 acres of irrigation/drainage canal along the toe of the PGCC levee would require relocation to accommodate the levee raise and seepage remediation in 2010, and rice fields adjacent to the levee could be lost if seepage berms are constructed. Based on a maximum 100-foot-wide seepage berm that could be required in portions of these reaches, approximately 23 acres of rice fields could be lost. Borrow material for 2009 and 2010 construction is anticipated to come from the RD 1001 borrow site and agricultural fields in the vicinity of Fisherman's Lake. Approximately 20 acres of rice fields would be used for the PGCC work and approximately 500 acres of mixed agricultural land (rice and/or field/row crops) would be used for the Sacramento River east levee work.

The loss and disturbance of giant garter snake habitat would be offset by the habitat creation and preservation components of the project. In 2008, giant garter snake habitat creation would include approximately 16 acres of aquatic habitat in the new GGS/Drainage Canal and new Elkhorn Canal. In addition, up to 280 acres of managed marsh habitat would be created as part of borrow activities conducted on rice fields at the RD 1001 borrow site north of the Natomas Basin, privately owned fields in the northern portion of the basin, and northern airport lands. Up to 130 acres of existing privately owned rice fields in the northern portion of the basin would also be acquired and preserved either in public ownership or under the control of the TNBC. In 2009–2010, an additional 64 acres of aquatic habitat would be created in the new GGS/Drainage Canal, enhancement of the existing Western Drainage Canal, and the new Elkhorn and Riverside canals. An additional 20 acres of managed marsh habitat would be created as part of borrow activities at the RD 1001 borrow site.

The habitat quality of the GGS/Drainage Canal and Western Drainage Canal is anticipated to eventually be substantially higher than the canal habitat that would be lost. Creation and enhancement of these canals would include a number of features designed to maximize the amount and quality of habitat, as well as minimize the need for maintenance activities that temporarily reduce habitat quality and can result in injury and mortality of giant garter snakes. In addition, the configuration and design of the GGS/Drainage Canal and Western Drainage Canal enhancement were specifically formulated based on the goal of providing a functional travel corridor between giant garter snake populations in the northern and southern portions of the Natomas Basin. Loss and deterioration in the quality of existing travel corridors has been identified as a primary concern in maintaining a genetic connection between these two snake populations. Although the primary function of the new Elkhorn and Riverside Canals would be irrigation supply, they are anticipated to provide habitat comparable to that of the irrigation canals that would be filled as a result of the proposed project. They have also been designed to minimize maintenance and resulting habitat degradation and snake injury and mortality.

Although rice fields are an important component of giant garter snake habitat, the quality of the created marsh habitat is anticipated to be of higher than the rice it would replace. The marsh areas would include uplands, which are a very important component of snake habitat that is nearly lacking in rice fields. Managed marsh would also provide habitat consistently from one year to the next, while rice fields can periodically sit fallow and fail to provide aquatic habitat during key periods. The marsh areas would also be managed in a manner that minimizes potential for snake injury and mortality that can result from typical farming practices. In addition, the preserved rice fields would be cultivated in a manner that maximizes habitat suitability and minimizes potential for injury and mortality.

Although the habitat loss would be compensated for by habitat creation and preservation, a plan has not yet been prepared specifying how canals and marsh that are designed to provide giant garter snake habitat would be managed to ensure that the appropriate habitat conditions are provided. Creation of replacement habitat that does not provide the essential components, and is not managed in a way that maximizes habitat quality and minimizes potential adverse effects on giant garter snake, could also result in a substantial adverse effect on the species. In addition, loss of individual giant garter snakes during construction could result in a substantial adverse effect on the species. These potential impacts would be significant.

Mitigation Measure 3.7-d: Minimize the Potential for Direct Loss of Giant Garter Snake Individuals, Develop a Management Plan in Consultation with USFWS and DFG, and Obtain Incidental Take Authorization.

SAFCA and its primary contractors for engineering design and construction shall ensure that the following measures are implemented to avoid, minimize, and compensate for potential project effects on giant garter snakes.

The primary engineering and construction contractors shall ensure, through coordination with a qualified biologist retained by SAFCA, that staging areas and access routes are designed to minimize disturbance of giant garter snake habitat. All aquatic and adjacent upland habitat that is located adjacent to construction areas, but can be avoided, shall be protected by temporary fencing during construction.

Additional measures consistent with the goals and objectives of the NBHCP shall be implemented to minimize the potential for direct injury or mortality of individual giant garter snakes during project construction. Such measures shall be finalized in consultation with DFG and USFWS, and are likely to include conducting worker awareness training, timing initial ground disturbance to correspond with the snake's active season (as feasible in combination with minimizing disturbance of nesting Swainson's hawks), dewatering aquatic habitat before fill, conducting preconstruction surveys, and conducting biological monitoring during construction.

SAFCA shall develop and implement a plan to address management of aquatic (i.e., GGS/Drainage Canal and marsh/seasonal wetland habitat) and adjacent upland habitats that are created and rice fields that are preserved as part of the project in order to ensure that the performance standard of no net loss in function and value of giant garter snake habitat is met. The management plan shall, at a minimum, establish specific success criteria for habitat creation, specify remedial measures to be undertaken if success criteria are not met (e.g., adaptive management, physical adjustments to created habitat, additional monitoring), and describe short- and long-term maintenance and management of the features. Long-term protection of the created features and funding for their management shall be provided through appropriate mechanisms to be determined by SAFCA, the regulatory agencies, and other entities cooperating in implementation of the proposed project.

The management plan for the giant garter snake habitat creation and preservation components of the project shall be reviewed and approved by USFWS and DFG before project implementation. Authorization for take of giant garter snake under ESA and CESA shall be obtained. All measures subsequently adopted through the permitting process shall be implemented.

Implementation of the project as proposed and the above measures would ensure that adverse effects to giant garter snake are minimized and an overall performance criterion of no net loss in function and value of giant garter snake habitat is met. This would reduce the impact on giant garter snake to a **less-than-significant** level.

IMPACT 3.7-e Disturbance and Loss of Northwestern Pond Turtle Habitat. *Implementation of the proposed project would result in disturbance and temporary and permanent loss of habitats that could be occupied by northwestern pond turtles. Injury and mortality of turtles could result if individuals are present in affected habitats during construction. This potential impact would be significant.*

Northwestern pond turtles have the potential to occupy irrigation/drainage ditches, canals, and reservoir that would be adversely affected by the proposed project. Improvements to the NCC south levee to be conducted in 2008 would result in permanent loss of less than 0.5 acre of suitable pond turtle habitat to accommodate fill and re-alignment of portions of irrigation/drainage canals near the landside toe of the levee. Permanent loss of suitable pond turtle habitat resulting from the Sacramento River east levee improvements in 2008 would be limited to fill of approximately 0.5 acre of irrigation canal at the toe of the levee in Reach 4B. Temporary disturbance of approximately 0.5 acre of additional suitable habitat would occur where the Elkhorn Canal and the GGS/Drainage Canal connect to existing lateral canals. The irrigation ditch in Reach 1 does not provide suitable habitat for pond turtle because of its very limited extent and isolation from other areas of suitable habitat.

Construction of levee improvements in 2009 would result in permanent fill of approximately 12 acres of relatively unvegetated irrigation canals and 1 acre of Elkhorn Reservoir along the landside toe of the Sacramento River east levee. Approximately 2 additional acres of lateral irrigation/drainage ditch segments within the levee improvement footprint would be filled, and approximately 6.5 acres of open water in the Airport West Ditch would be dewatered. Finally, approximately 2 acres of irrigation/drainage canal along the toe of the PGCC levee would be relocated in 2010.

Loss of suitable habitat for northwestern pond turtle would be offset by the habitat creation components of the project. The quality of habitat to be created is anticipated to be at least comparable to that of the irrigation canals that would be filled as a result of the project, and in the case of the GGS/Drainage Canal, it would likely be better.

Fill of irrigation/drainage ditches, canals, and ponds, however, could result in injury or mortality of pond turtles if they are present in the affected ditches when fill occurs. This potential impact would be significant.

Mitigation Measure 3.7-e: Conduct Focused Surveys for Northwestern Pond Turtle and Relocate Turtles.

SAFCA and its primary contractors for engineering design and construction shall ensure that the following measure is implemented to avoid and minimize potential project effects on northwestern pond turtle.

A qualified biologist retained by SAFCA shall conduct surveys in aquatic habitats to be dewatered and/or filled during project construction. Surveys shall be conducted immediately after any dewatering and before any fill of aquatic habitat. If pond turtles are found, the biologist shall capture them and move them to nearby areas of suitable habitat that would not be disturbed by project construction.

Implementation of the above measure would minimize potential for direct mortality of northwestern pond turtle. This would reduce the impact on northwestern pond turtle to a **less-than-significant** level.

IMPACT 3.7-f Loss of Swainson's Hawk Habitat and Potential Disturbance of Nests. *Implementation of the proposed project would result in loss of suitable foraging habitat. Creation of suitable foraging habitat would also occur, but specific requirements have not been established to ensure that appropriate habitat conditions are provided to adequately replace the habitat values that would be lost. Project construction could also result in disturbance and potential failure of active nests for Swainson's hawk. This impact would be* ***significant****.*

The project area is within a densely populated and critical component of the Central Valley Swainson's hawk population. Nesting pairs in the Natomas Basin may represent as much as 10% of the Swainson's hawks that are found in the Central Valley. Most nest sites are located in the western portion of the basin along the Sacramento River; several nests are also typically scattered along the NCC and PGCC. In addition to these nest sites adjacent to the project area, agricultural fields and levee maintenance zones throughout the project area provide suitable foraging habitat for Swainson's hawk.

The proposed project would result in permanent loss and disturbance of Swainson's hawk foraging and nesting habitat. However, it also includes components that would result in creation of grassland and woodland anticipated to provide suitable foraging and nesting habitat. Table 3.7-4 provides a summary of changes in Swainson's hawk habitat that would result from the proposed project.

Table 3.7-4
Swainson's Hawk Habitat Alteration Resulting from Implementation of the Proposed Project

Action	Habitat Type	Acres
Loss	Field/row crop	665
	Woodland	25
Creation	Grassland fields	500
	Grassland on levee slope/berm/canal margins/right-of-way	520
	Woodland	125

Potential adverse effects on the Natomas Basin Swainson's hawk population from the proposed project would include disturbance and loss of suitable foraging habitat and disturbance of nesting pairs. As shown in Table 3.7-4 and described below, loss of cropland foraging habitat would be offset by creation of grassland. However, there could be a temporal loss until the created grassland supports the necessary prey populations to provide suitable Swainson's hawk foraging habitat. In addition to adverse effects on habitat, project construction in 2008–2010

would occur during the Swainson's hawk nesting season and could result in disruption of nesting behavior. If project construction is already under way when pairs return to their nesting territories, disturbance could render previously occupied territories unsuitable. If nests become established near construction areas, the nesting pairs could be disturbed by construction activities, potentially resulting in nest abandonment and loss of eggs or young.

Levee improvements to be conducted in 2008 would result in loss of potential Swainson's hawk foraging habitat within portions of the constructed levee/berm and canal footprints along the NCC south levee and Sacramento River east levee. Portions of the area (approximately 15 acres) that would be covered by the expanded footprint currently include some rural developments and levee maintenance roads/corridors that provide poor foraging opportunities. The replacement of these habitats with an expanded levee and less-steep levee slope is unlikely to substantially reduce the quality of foraging habitat for Swainson's hawk. Seepage berm construction, project right-of-way acquisition, canal construction, and woodland creation along the Sacramento River east levee in 2008 would result in conversion of approximately 130 acres of actively cultivated agricultural field crops (e.g., wheat) and fallow agricultural fields to approximately 90 acres of managed grassland habitat, 15 acres of managed aquatic habitat, and 25 acres of woodland habitat. Although agricultural crops can provide very high-quality foraging habitat for Swainson's hawks at particular times in the cultivation cycle, the grassland habitat can also provide valuable foraging habitat because its availability is consistent throughout the period when Swainson's hawks are present in the Natomas Basin. However, the value of grassland may be less than that of the high-quality agricultural crops, such as alfalfa, at their peak of foraging quality (i.e., during irrigation and harvest).

Potential Swainson's hawk nesting habitat would also be affected by project construction activities in 2008. NCC levee improvements are anticipated to require removal of fewer than ten (less than 0.5 acre) potentially suitable nest trees. Construction of the adjacent setback levee and seepage berms along the Sacramento River east levee is anticipated to require removal of up to 5 acres of woodland habitat that includes suitable nest sites. In addition, approximately 0.5 acre of riparian vegetation along the lateral canals is within the current footprint of the replacement canals and would require removal to accommodate the 2008 canal construction. Although these woodland areas and trees to be removed along the NCC support potentially suitable nest trees, no Swainson's hawk nests have been documented in them. One nest was documented in the woodland clump immediately south of Riego Road in Sacramento River east levee Reach 4A in 1998, adjacent to the proposed seepage berm, but this territory has not been active in the past 9 years. In general, Swainson's hawk nests in the Natomas Basin either are located on the water side of the levee or are at least several hundred feet east of the landside levee toe. Therefore, removal of woodland vegetation close to the levee would not result in removal of any active nest sites and is unlikely to result in loss of potential future nest sites.

Project construction activities in 2009–2010 would result in similar effects on potential foraging habitat as described above for 2008. Expanded levee footprints would affect existing levee maintenance corridors, irrigation ditches, and associated maintenance roads. Construction of berms, acquisition of project right-of-way, canal construction, and woodland creation activities would result in conversion of approximately 535 acres of agricultural fields, including row crops, field crops, and fallow fields. Approximately 345 acres of this former agricultural habitat would be converted to managed grassland. In addition, project construction and borrow activities that would include conversion of approximately 25 acres of existing canal, 20 acres of existing woodland, and 525 acres of existing rice cropland to managed grassland. As a result, the total loss of field cropland during 2008 and 2009/10 (estimated at 665 acres) would be offset by creation of a total of approximately 1,020 acres of managed grassland. Project construction activities in 2009–2010 along the Sacramento River east levee would require removal of an additional approximately 20 acres of woodland habitat to accommodate construction of the adjacent levee and seepage remediation (berms and relief wells), but none of these patches are known to currently support Swainson's hawk nests or have supported them in the past. The total loss of 25 acres of woodland habitat during 2008 and 2009–2010 would be offset by creation of a total of 150 acres of new woodland habitat.

Although the adverse effects on foraging habitat would be compensated for by habitat creation and preservation, a plan has not yet been prepared specifying how the grasslands would be managed to ensure that the appropriate habitat conditions are provided. Creation of replacement habitat that does not provide the essential components (e.g., an adequate prey base) and is not managed in a way that maximizes habitat quality could result in a substantial adverse effect on the species, which would be a significant impact. Because Swainson's hawks have very rarely nested within several hundred feet of the Sacramento River east levee, and the proposed project would not result in loss of any trees that have supported a nest in the past 5 years, the loss of woodland habitat is unlikely to have a substantial adverse effect on Swainson's hawk. However, potential displacement from nesting territories and disturbance and failure of active nests as a result of project construction would represent substantial adverse effects on the species. These potential impacts on foraging habitat and nesting pairs would be significant.

Mitigation Measure 3.7-f: Minimize Potential Impacts on Swainson's Hawk, Monitor Active Nests during Construction, Develop a Management Plan in Consultation with DFG, and Obtain Incidental Take Authorization.

SAFCA and its primary contractors for engineering design and construction shall ensure that the following measures are implemented to avoid, minimize, and compensate for potential project effects on Swainson's hawks.

The primary engineering and construction contractors shall ensure, through coordination with a qualified biologist retained by SAFCA, that staging areas and access routes are designed to minimize disturbance of known Swainson's hawk nesting territories. The biologist shall conduct preconstruction surveys to identify active nests within 0.25 mile of construction areas, in accordance with DFG guidelines. Surveys shall be conducted in accordance with NBHCP requirements and *Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley* (Swainson's Hawk Technical Advisory Committee 2000). If an active nest is found, an appropriate buffer that minimizes the potential for disturbance of the nest shall be determined by the biologist, in coordination with DFG. No project activities shall commence within the buffer area until a qualified biologist confirms that the nest is no longer active or the birds are not dependent on it. Monitoring shall be conducted by a qualified biologist to determine whether project activity results in detectable adverse effects on the nesting pair or their young. The size of the buffer may vary, depending on the nest location, nest stage, construction activity, and monitoring results. If implementation of the buffer becomes infeasible or construction activities result in an unanticipated nest disturbance, DFG shall be consulted to determine the appropriate course of action.

SAFCA shall develop and implement a plan to address management of grassland habitats that are created as part of the proposed project in order to ensure that the performance standard of no net loss of sensitive habitat is met. The management plan shall, at a minimum, establish specific success criteria for habitat creation, specify remedial measures to be undertaken if success criteria are not met (e.g., supplementary plantings and additional monitoring), and describe short- and long-term maintenance and management of the features. Long-term protection of the created features and funding for their management shall be provided through appropriate mechanisms to be determined by SAFCA, DFG, and other entities cooperating in implementation of the proposed project.

The management plan for the grassland habitat creation components of the project shall be reviewed and approved by USFWS and DFG before project implementation. Authorization for take of Swainson's hawk under CESA shall be obtained. All measures subsequently adopted through the permitting process shall be implemented.

Implementation of the project as proposed and the above measures would ensure that adverse effects on Swainson's hawk are minimized and an overall performance criterion of no net loss in acreage, function, and value of Swainson's hawk foraging habitat is met. This would reduce the impact on Swainson's hawk to a **less-than-significant** level.

IMPACT 3.7-g **Loss and Disturbance of Habitat for Other Special-Status Birds.** *Implementation of the proposed project could result in loss and disturbance of foraging and nesting habitat for special-status birds. It could also result in loss of occupied burrowing owl burrows and active nests of special-status birds and common birds that are protected under the MBTA and California Fish and Game Code. This impact would be* ***significant****.*

The project area provides foraging and/or nesting habitat for a variety of special-status bird species (Table 3.7-2). Temporary disturbance and permanent loss of nesting and/or foraging habitat would result from the proposed levee improvements. In general, effects on foraging habitat would be temporary or would represent conversion from one suitable foraging habitat to another and are unlikely to have a substantial adverse effect on special-status birds. Loss of potential nesting habitat would be offset by the habitat creation components of the proposed project.

A number of the special-status bird species listed in Table 3.7-2 are known to nest in the in the vicinity of the project area, including white-tailed kite, northern harrier, Cooper's hawk, burrowing owl, loggerhead shrike, and tricolored blackbird. Based on existing documentation and surveys conducted by EDAW, few nesting pairs of these species are anticipated to occur within or near the project site. Burrowing owls are known to occur only in the PGCC portion of the project area; only one tricolored blackbird nesting colony exists in the project vicinity, near the eastern end of the NCC; and white-tailed kites and Copper's hawks occur in relatively low densities in the project area. Northern harrier and loggerhead shrike nests, however, are likely to be more numerous and widely distributed. Direct removal of active nests could occur, and visual or noise disturbance of active nests could result in abandonment and nest loss of various special-status birds; destruction of burrows occupied by burrowing owls could also occur. Loss of active nests of common species would be inconsistent with the MBTA and a violation of the California Fish and Game Code, but would not constitute a significant impact under CEQA. However, potential impacts on burrowing owls and other nesting special-status birds that could result from implementation of the proposed project would be significant.

Mitigation Measure 3.7-g: Minimize Potential Impacts on Burrowing Owls and Other Special-Status Bird Species, Monitor Active Nests during Construction, and Relocate Owls as Needed.

SAFCA and its primary contractors for engineering design and construction shall ensure that the following measures are implemented to avoid, minimize, and compensate for potential project effects on special-status birds.

The primary engineering and construction contractors shall ensure, through coordination with a qualified biologist retained by SAFCA, that staging areas and access routes are designed to minimize disturbance of potential nesting habitat for special-status birds. Removal of potential nesting habitat shall be conducted during the nonnesting season, to the extent feasible and practicable, to minimize the potential for loss of active nests.

The biologist shall conduct preconstruction surveys to identify active special-status bird nests and occupied burrowing owl burrows within 500 feet of construction areas. Surveys for nesting birds shall be conducted before project activities are initiated during the nesting season (March 1–July 31), and surveys for burrowing owl shall be conducted before project activities are initiated at any time of year. Surveys shall be conducted in accordance with NBHCP requirements. If an active nest or occupied nest burrow is found, an appropriate buffer that minimizes potential for disturbance of the nest shall be determined by the biologist, in coordination with DFG. No project activities shall commence within the buffer area until a qualified biologist confirms that the nest is no longer active or the birds are not dependent on it. Monitoring shall be conducted by a qualified biologist to ensure that project activity does not result in detectable adverse effects on the nesting pair or their young. The size of the buffer may vary, depending on the nest location, nest stage, construction activity, and monitoring results.

If an occupied burrowing owl burrow that does not support an active nest is found, SAFCA shall develop and implement a relocation plan, in coordination with and subject to approval of DFG and USFWS and consistent with requirements of the NBHCP. Because the project would generally result in temporary disturbance of burrowing owl habitat or conversion from one suitable habitat type to another, relocation is likely to include

passive exclusion (via one-way doors at the burrow entrances) of owls from the project site. The owls would then be able to reoccupy the area after construction is complete.

Implementation of the above measure would ensure that destruction of occupied burrowing owl burrows and loss of active nests of this and additional special-status bird species are avoided. This would reduce the impact on other special-status birds to a **less-than-significant** level.

IMPACT 3.7-h Loss and/or Disturbance of Wildlife Corridors. *Implementation of the proposed project would result in loss and/or disturbance of habitats that serve as wildlife corridors and could substantially interfere with wildlife movements. The project would also result in creation of movement corridors, but specific requirements have not been established to ensure that appropriate habitat conditions are provided to adequately replace the habitat values that would be lost. This impact would be* ***significant****.*

Disturbance of wildlife movement corridors provided by riparian and aquatic habitats along the NCC, Sacramento River, and PGCC could occur during project construction. However, such disturbance is unlikely to substantially interfere with wildlife movement because these corridors are relatively wide and wildlife could continue to move through less-disturbed portions of the corridors. Patches of woodland habitat that would be lost on the land side of the Sacramento River east levee provide habitat for a variety of wildlife species, but do not necessarily function as a movement corridor because of their very fragmented distribution. Species that require a more continuous corridor of woodland habitat are more likely to travel on the water side of the levees.

Irrigation/drainage ditches and canals within the project area and larger Natomas Basin serve as critical corridors for movement of aquatic species. These corridors would be adversely affected by project implementation, including temporary disturbance of them and permanent loss in some cases. As mentioned previously, replacement canals would be created as part of the proposed project, including approximately 50 acres of aquatic habitat in the new GGS/Drainage Canal and expansion of the existing Western Drainage Canal. The configuration and design of these features were specifically formulated based on the goal of enhancing giant garter snake movement opportunities between populations in the northern and southern portions of the Natomas Basin. This would result in an overall, long-term enhancement in the quality of aquatic movement corridors in the western portion of the basin. However, a plan has not yet been prepared specifying how this corridor would be managed to ensure that the appropriate habitat conditions are provided. Creation of a corridor that does not provide the essential components and is not managed in a way that maximizes habitat quality and potential for its use could result in a substantial adverse effect on wildlife movement. This potential impact would be significant.

Mitigation Measure 3.7-h: Implement Mitigation Measure 3.7-d.

Implementation of the project as proposed and Mitigation Measure 3.7-d would ensure that adverse effects on irrigation/drainage ditches and canals that provide critical wildlife movement corridors are minimized and an overall performance criterion of no net loss in acreage, function, and value of these corridors is met. This would reduce the impact on wildlife corridors to a **less-than-significant** level.

IMPACT 3.7-i Consistency with the NBHCP. *Implementation of the proposed project could have substantial adverse effects on the viability of populations of species covered in the NBHCP, the effectiveness of the NBHCP's conservation strategy, and attainment of the goals and objectives of the NBHCP. These effects could, in turn, adversely affect successful implementation of the NBHCP. This impact would be* ***significant****.*

The proposed project's consistency with the NBHCP was evaluated based on the project's anticipated effects on the viability of populations of species covered by the NBHCP, the effectiveness of the NBHCP's conservation strategy, and attainment of the goals and objectives of the NBHCP. Adverse effects on these evaluation criteria could jeopardize successful implementation of the NBHCP. These potential effects are described below.

Effect on Population Viability of Covered Species

Implementation of the potential project elements would not threaten the population viability of most species covered by the NBHCP because a relatively small amount of the total habitat in the Natomas Basin available to these species would be affected by the levee improvements and/or because potential direct effects would affect a very small proportion of the population. However, potential effects on some species—giant garter snake, Swainson's hawk, and tricolored blackbird—could be substantial. Because of the relative scarcity of available habitat, the potential for reduced habitat quality, and/or the potential for adverse effects on the breeding success of relatively large numbers of individuals, the viability of populations of these species within the Natomas Basin could be threatened by project implementation. Habitat creation, enhancement, and preservation components of the proposed project are anticipated to offset potential adverse effects on habitat for these species. However, a plan has not yet been prepared specifying how these habitats would be managed to ensure that the appropriate conditions are provided.

Effect on the Conservation Strategy of the NBHCP

The NBHCP describes key components of the conservation strategy and how the components provide effective mitigation. These components are a 0.5:1 mitigation ratio, site-specific management plans for reserve lands, buffers within reserve lands, connectivity, minimum habitat block size requirements for reserve lands, and foraging habitat.

In describing the basis for the 0.5:1 mitigation ratio, the NBHCP states that the ratio mitigates the impacts of the incidental take authorized under the NBHCP because:

- much of the land to be developed does not provide habitat or provides only marginal habitat,
- the TNBC-managed reserves would provide habitat of higher quality than the eliminated habitat, and
- the land outside the permit area but within the Natomas Basin would not be developed.

The proposed project would not result in the development of land outside the permit area, but it would result in land use conversions. Land use conversion would not, however, cause a net loss in the habitat values provided by these lands for NBHCP-covered species in the Natomas Basin. Conversion from agricultural crops to managed grassland would not reduce overall habitat quality. Although approximately 530 acres of rice fields would be converted to grassland, the overall habitat quality for NBHCP species that use rice fields is unlikely to be adversely affected because up to 130 acres of existing rice fields would be acquired and brought under the management of the TNBC and 250 acres of rice fields would be converted to managed marsh with higher habitat quality. This increase in habitat quality is anticipated to offset the loss associated with conversion to grassland.

Proposed improvements to the Sacramento River east levee would encroach slightly on four existing TNBC reserves: Huffman West, Atkinson, Cummings, and Alleghany 50. A total of 10–15 acres of TNBC preserve land at Huffman West and Atkinson would be within the footprint of 2008 improvements and the anticipated maintenance easement corridor; approximately 8 acres at Cummings and Alleghany 50 would be within the 2010 footprint and easement area. Encroachment on these reserves would affect their overall size, potentially jeopardizing the ability to meet the minimum-size and mitigation-ratio requirements and requiring revision of existing management plans. It could also affect revenue-generation requirements that must be met for successful implementation of the NBHCP. Based on initial discussion with TNBC, it appears that potential conflicts with these requirements can be alleviated through implementation of several options, but the specific actions are yet to be identified and agreed upon.

The proposed project would not reduce connectivity of reserves or habitats within the Natomas Basin, and would actually improve connectivity between reserves managed for giant garter snake purposes in the northern and southern portions of the basin. The project would also benefit the establishment of large blocks of preserved habitat by creating and/or preserving grassland, woodland, marsh, and rice habitats in the western portion of the basin. In some cases, these habitats would be adjacent to existing TNBC reserves and directly increase the size of

some preserved habitat blocks. Finally, the proposed project could facilitate the creation of managed marsh habitat on several TNBC preserves as part of planned borrow activities in 2008 and 2010. These activities could occur on approximately 50 acres of the Bolen South reserve and 80 acres of the Nestor reserve in 2008. Similar opportunities may be identified for preserves in the vicinity of Fisherman's Lake for 2010.

As described in the previous impact discussions, the proposed project would not reduce the overall amount of foraging habitat available to NBHCP-covered species. Land use changes would reduce the overall amount of some habitats (i.e., agricultural crops), but these would be converted to grassland and managed marsh of comparable or higher overall foraging quality. Although agricultural crops can provide enhanced foraging opportunities during specific periods of the cultivation cycle, the grassland and marsh habitats would be more consistently available throughout the year.

Effect on Attainment of NBHCP Goals and Objectives

Several goals and objectives of the NBHCP are relevant to the proposed project. In general, they address similar issues as the conservation strategy, such as establishing and managing a habitat reserve system and ensuring connectivity between reserves. Relevant habitat-specific goals and objectives include establishing a mosaic of habitats and connecting corridors to provide breeding, wintering, foraging, and cover areas for wetland and upland species; and providing habitat to maintain viable populations of NBHCP-covered species. As described above, components of the proposed project would support attainment of these goals and objectives by creating, enhancing, and preserving habitat and creating a valuable aquatic corridor linking TNBC reserves in the northern and southern portions of the Natomas Basin. However, potential encroachment on existing reserves could have an adverse effect, and the population viability of some NBHCP-covered species could be threatened if adequate assurances regarding habitat management are not provided.

The potential for implementation of the proposed project to threaten the viability of populations of certain covered species, reduce the effectiveness of the NBHCP's conservation strategy, and adversely affect attainment of the goals and objectives of the NBHCP would be a significant impact.

Mitigation Measure 3.7-i: Ensure that Compliance with Mitigation Requirements of Established NBHCP Reserves is Not Adversely Affected and Implement Mitigation Measures 3.7-a through 3.7-g.

SAFCA shall coordinate with TNBC to determine the most effective means of ensuring that the small encroachment onto reserves that would result from project implementation does not adversely affect the ability to meet the minimum-size and mitigation-ratio requirements of the NBHCP, require revision of existing management plans, and/or affect revenue-generation requirements. SAFCA shall, in coordination with TNBC, identify and implement necessary actions to ensure that encroachment does not jeopardize successful implementation of the NBHCP. Such actions may include direct supplementation of TNBC funding to offset losses in revenue generation, management of portions of the reserve that are encroached upon by project facilities in a manner that is consistent with current habitat requirements, and/or acquisition of additional land to replace portions of reserves that are encroached upon. Actions shall be approved by TNBC, USFWS, and DFG and shall be implemented by SAFCA before encroachment occurs.

Implementation of the project as proposed, the above measure, and Mitigation Measures 3.7-a through 3.7-g would ensure that the project is implemented in a manner that is consistent with and does not jeopardize successful implementation of the NBHCP. This would reduce the impact on consistency with the NBHCP to a **less-than-significant** level.

3.8 CULTURAL RESOURCES

This section evaluates potential impacts of the proposed project on cultural resources in the project area. Cultural resources include archaeological traces such as Native American occupation sites and artifacts, historic-era buildings and structures, and places used for traditional Native American practices or other properties with special cultural significance.

3.8.1 REGULATORY SETTING

3.8.1.1 STATE

California Environmental Quality Act

CEQA includes provisions that specifically address the protection of cultural resources. CEQA requires consideration of impacts of a project on unique archaeological resources and historical resources. A unique archaeological resource, as defined in Public Resources Code (PRC) Section 21083.2(g), is an archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it:

(1) contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information;

(2) has a special and particular quality such as being the oldest of its type or the best available example of its type; or

(3) is directly associated with a scientifically recognized important prehistoric or historic event or person.

Section 15064.5(a) of the State CEQA Guidelines generally defines a historical resource as:

(1) a resource listed in, or determined to be eligible by the State Historical Resources Commission for listing in, the California Register of Historical Resources (CRHR);

(2) a resource included in a local register of historical resources or identified as significant in a historical resource survey; and

(3) any other object, building, structure, site, area, place, record, or manuscript that a lead agency determines to be historically significant, provided that the lead agency's determination is supported by substantial evidence.

California Register of Historic Resources

The CRHR includes resources that are listed in or formally determined eligible for listing in the National Register of Historic Places (NRHP) (see Section 3.8.1.2 below), as well as some California State Landmarks and Points of Historical Interest (PRC Section 5024.1, 14 California Code of Regulations [CCR] Section 4850). Properties of local significance that have been designated under a local preservation ordinance (local landmarks or landmark districts) or that have been identified in a local historical resources inventory may be eligible for listing in the CRHR and are presumed to be significant resources for purposes of CEQA unless a preponderance of evidence indicates otherwise (State CEQA Guidelines Section 15064.5[a][2]). The eligibility criteria for listing in the CRHR are similar to those for NRHP listing but focus on the importance of the resources to California history and heritage. A cultural resource may be eligible for listing in the CRHR if it:

(1) is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;

(2) is associated with the lives of persons important in our past;

(3) embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or

(4) has yielded, or may be likely to yield, information important in prehistory or history.

(See 14 CCR Section 4852.)

Native American Heritage Commission

The Native American Heritage Commission (NAHC) identifies and catalogs places of special religious or social significance to Native Americans and known graves and cemeteries of Native Americans on private lands, and performs other duties regarding the preservation and accessibility of sacred sites and burials and the disposition of Native American human remains and burial items.

3.8.1.1 FEDERAL

National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA) and its implementing regulations (36 Code of Federal Regulations [CFR] 800, as amended in 2004) require federal agencies to consider the potential effects of their proposed undertakings on historic properties. Historic properties are cultural resources that are listed on, or are eligible for listing on, the NRHP (36 CFR 800.16[l]). Undertakings include activities directly carried out, funded, or permitted by federal agencies. Federal agencies must also allow the Advisory Council on Historic Preservation (ACHP) to comment on the proposed undertaking and its potential effects on historic properties. Implementation of the proposed project would require permitting under Section 404 of the Clean Water Act and Section 408 authorization from the U.S. Army Corps of Engineers (USACE) (see Section 1.5, “Intended Uses of the EIR and Agency Roles and Responsibilities”). Therefore, USACE compliance with Section 106 is expected to be required in relation to the proposed project.

Section 106 Process

The implementing regulations for Section 106 of the NHPA (36 CFR Part 800) require consultation with the State Historic Preservation Officer (SHPO), the ACHP, federally recognized Indian tribes and other Native Americans, and interested members of the public throughout the compliance process. The four principal steps are:

- Initiate the Section 106 process (36 CFR Section 800.3).
- Identify historic properties, resources eligible for inclusion in the NRHP (36 CFR Section 800.4).
- Assess the effects of the undertaking to on historic properties within the area of potential effect (APE) (36 CFR Section 800.5).
- Resolve adverse effects (36 CFR Section 800.6).

Adverse effects on historic properties are often resolved through preparation of a memorandum of agreement or programmatic agreement (PA) developed in consultation between the federal agency, the SHPO, Indian tribes, and interested members of the public. The ACHP is also invited to participate. The agreement describes stipulations to mitigate adverse effects on historic properties.

National Register of Historic Places

The NRHP listing criteria are as follows (36 CFR Section 60.4):

The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and:

(a) that are associated with events that have made a significant contribution to the broad patterns of our history; or

(b) that are associated with the lives of persons significant in our past; or

(c) that embody the distinctive characteristics of a type, period or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

(d) that have yielded, or may be likely to yield, information important in prehistory or history.

Rural Historic Landscapes

The rural historic landscape is a category of resources that is evaluated under the Section 106 process. This resource category is relevant to this project because Reclamation District (RD) 1000, the local geographic setting of the proposed project, is eligible for NRHP listing as a Rural Historic Landscape District. National Register Bulletin 30 defines a rural historic landscape as a geographical area that historically has been used by people or shaped or modified by human activity, occupancy, or intervention and that possesses a significant concentration, linkage, or continuity of areas of land use, vegetation, buildings and structures, roads and waterways, and natural features. Rural landscapes commonly reflect the day-to-day occupational activities of people engaged in traditional work such as mining, fishing, and various types of agriculture. Often, they have developed and evolved in response to both the forces of nature and the pragmatic need of people to make a living. Landscapes that are small and that have no buildings or structures, such as an experimental orchard, are classified as sites. Most, however, being extensive in acreage and containing a number of buildings, sites, and structures—such as a ranch or farming community—are classified as historic districts. Large acreage and a proportionately small number of buildings and structures differentiate rural historic landscapes from other kinds of historic properties.

National Register Bulletin 30 distinguishes rural historic landscapes from designed landscapes. Rural landscapes usually are not the work of a professional designer and have not been developed according to academic or professional design standards, theories, or philosophies of landscape architecture. These properties possess tangible features, called landscape characteristics, that have resulted from historic human use. In this way, they also differ from natural areas that embody important cultural values but have experienced little modification, such as sites having religious meaning for Native American groups.

Existing Section 106 Compliance Agreement

USACE, the SHPO, and the ACHP executed a PA governing the Section 106 process for implementation of the American River Watershed Project, including constructing levee, channel, and related flood control improvements in the Natomas Basin and along lower Dry Creek. The PA covers implementation of the specific elements of the proposed improvements that would involve the USACE as the federal lead agency. Additional signatories of the PA include the State of California Reclamation Board (The Reclamation Board) and SAFCA.

The PA is relevant to the present study because it controls the Section 106 process for work within the American River Watershed Project, a flood control program that coincides in part with the proposed project. Furthermore, it acknowledges the following: “the Project may be modified based on public input, congressional authorization,

and ongoing negotiations among the primary sponsors." Portions of the proposed project that also coincide with the American River Watershed Project must satisfy the provisions of the PA.

The PA includes procedures for the treatment of indirect and direct impacts of the levee improvements associated with the American River Watershed Project. The executed PA specifies inventory and NRHP evaluation procedures for historic properties, as well as the process for development of Historic Properties Treatment Plans. Additionally, the PA details report format and review, participation of interested parties, curation of recovered materials, and professional qualifications. Mitigation measures may include archaeological documentation, architectural and engineering documentation, and historical documentation, following standards and guidelines promulgated by the Secretary of the Interior.

American Indian Religious Freedom Act

The American Indian Religious Freedom Act of 1978 is also applicable to federal undertakings. This act established "the policy of the United States to protect and preserve for American Indians their inherent right of freedom to believe, express, and exercise the traditional religions…including but not limited to access to sites, use and possession of sacred objects, and the freedom to worship through ceremonials and traditional rites" (Public Law 95-431).

3.8.1.3 LOCAL

The Sutter County General Plan and Sacramento County General Plan encourage the inventory and protection of cultural resources important to the cultural heritage of the local areas. The Sacramento County General Plan also directs that Native American burial sites encountered during surveys or construction shall, whenever possible, remain in situ; excavation and reburial shall occur when in situ preservation is not possible or when the archaeological significance of the site merits excavation and recording procedures, with on-site reinterment having priority.

3.8.2 ENVIRONMENTAL SETTING

In prehistoric times, the American River basin, of which the Natomas Basin is a part, was an environmental setting ideal for Native American habitation. The riparian setting, with abundant resources and a moderate year-round climate, was heavily exploited. Early Native American settlement sites and occupation mounds in the Natomas Basin, in particular, testify to prehistoric use of the river and the surrounding vicinity. More recent patterns of land use are readily visible in the form of extant farms, ranches, and RD 1000 structures in the basin.

3.8.2.1 NATURAL SETTING

The Natomas Basin is situated within California's Sacramento Valley, within the climatic band classified as the Lower Sonoran Zone. The climatic pattern is characterized as Mediterranean, with cool, wet winters and hot, dry summers. Locally, this pattern consists of approximately 17 inches of annual rainfall, high summer temperatures, and low humidity. The dominant vegetative communities in this area are prairie grasslands and tule marshes, with some areas of riparian woodland. Valley oak (*Quercus lobata*), cottonwood (*Populus fremontii*), sycamore (*Platanus racemosa*), and willow trees (*Salix spp*.) once grew on the verge of streams and rivers. Tule marshes included stands of tules, cattails, sedges, rushes, and clumps of willow trees.

Faunal species that frequented the prehistoric prairie grasslands and tule marshes included mule deer (*Odocoileus hemionus*), tule elk (*Cervus elaphus*), antelope (*Antilocapra americana*), weasel (*Mustela frenata*), river otter (*Lutra canadensis*), raccoon (*Procyon lotor*), and beaver (*Castor canadensis*). Migratory waterfowl, such as geese (*Branta canadensis*) and swans (*Olor* sp.), passed through during winter, joining resident white pelicans (*Pelecanus erythrorhynchus*), great blue and black-crowned herons (*Ardea herodias*, *Nycticorax nycticorax*), ibis (*Plegadis guarauna*), cranes (*Grus canadensis*), cormorants (*Phalacrocorax* sp.), and eagles (*Haliaetus*

leucocephalus). Badgers (*Taxidea taxus*), coyotes (*Canis latrans*), skunks (*Mephitis mephitis*), jackrabbits (*Lepus californicus*), and cottontail rabbits (*Sylvilagus audubonii*) inhabited higher ground.

Within the waterways, chinook salmon (*Oncorhynchus tshawytscha*), rainbow trout (*Salmo gairdneri*), Pacific lamprey (*Lampetra tridentate*), and white sturgeon (*Acipenser transmontanus*) seasonally joined the other fish species indigenous to the area. Predators such as mountain lions (*Felis concolor*), grizzly bears (*Ursus americanus*), wolves (*Canis lupus*), kit fox (*Vulpes macrotis*), and bobcats (*Lynx rufus*) also roamed the area (Moratto 1984).

3.8.2.2 PREHISTORIC SETTING

Paleo-Indian and Lower Archaic Periods

The earliest well-documented entry and spread of humans into California occurred at the beginning of the Paleo-Indian Period (10,000–6000 B.C.). Social units are thought to have been small and highly mobile. Known occupation sites have been identified within the contexts of ancient pluvial lake shores and coastlines, where characteristic hunting implements, such as fluted projectile points and chipped stone crescent forms, have been found. Prehistoric adaptations over the ensuing centuries have been identified in the archaeological record by numerous researchers working in the area since the early 1900s, as summarized by Fredrickson (1974) and Moratto (1984). Because of its plentiful resources and temperate climate, the Central Valley was well populated prehistorically and served as the location for some of the more substantial village sites known in California.

Beardsley (1948), Heizer and Fenenga (1939), and others conducted numerous studies that form the core of our early understanding of upper Central Valley archaeology. Little has been found archaeologically that dates to the Paleo-Indian or Lower Archaic (6000–3000 B.C.) time periods. However, archaeologists have recovered much data from sites occupied by the Middle Archaic period. The lack of discovery of sites from earlier periods may be the result of high sedimentation rates that have left the earliest sites deeply buried and inaccessible.

Middle Archaic, Upper Archaic, and Emergent Periods

During the Middle Archaic Period (3000–1000 B.C.), the broad regional patterns of foraging subsistence strategies gave way to more intensive procurement practices. Subsistence economies were more diversified, possibly including the introduction of acorn processing technology. Human populations were growing and occupying more diverse settings. Permanent villages occupied year-round were established, primarily along major waterways. The onset of status distinctions and other indicators of growing sociopolitical complexity mark the Upper Archaic Period (1000 B.C.–A.D. 500). Exchange systems become more complex and formalized. Evidence of regular, sustained trade between groups was seen for the first time.

Several technological and social changes characterized the Emergent Period (A.D. 500–1800). The bow and arrow were introduced, ultimately replacing the dart and atlatl. Territorial boundaries between groups became well established. It became increasingly common that distinctions in an individual's social status could be linked to acquired wealth. Exchange of goods between groups became more regularized with more goods, including raw materials, entering into the exchange networks. In the latter portion of this period (A.D. 1500–1800), exchange relations became highly regularized and sophisticated. The clamshell disk bead became a monetary unit for exchange, and increasing quantities of goods moved greater distances. Specialists arose to govern various aspects of production and exchange.

The Middle and Upper Archaic and Emergent Periods are further broken down under the Central California Taxonomic System. These three time periods are well represented in archaeological assemblages in the vicinity of the project area. The assemblages are discussed in detail in Bennyhoff and Fredrickson (1969) and Moratto (1984) and are summarized here.

The **Windmiller Pattern (3000–500 B.C.)** of archaeological assemblages included an increased emphasis on acorn use and a continuation of hunting and fishing activities. Ground and polished charmstones, twined basketry, baked-clay artifacts (frequently used as a substitute for stone in the Central Valley), and worked shell and bone were hallmarks of Windmiller culture. Widely ranging trade patterns brought goods in from the Coast Range and trans-Sierran sources as well as closer trading partners. Perforated charmstones were associated with some burials. Mano and metate and small mortars were used but were rare.

Distinctive burial practices (ventrally extended, oriented westward) identified with the Windmiller Pattern also appeared in the Sierra Nevada foothills, indicating possible seasonal migration into the Sierra Nevada. The specific orientation of burials reinforces the idea that summers were spent in the Sierra Nevada and winters in the Central Valley. Men were generally buried in separate areas, in deeper graves, and with more artifacts than women, possibly indicating a higher social status. However, the rich offerings found with some women and children suggest that wealth also followed lineages or some sort of social patterns as well.

The **Berkeley Pattern (200 B.C.–A.D. 700)** represented a greater reliance on acorns as a food source than was seen previously. Distinctive stone and shell artifacts distinguished it from earlier or later cultural expressions, and may indicate the arrival and spread of ancestral Plains Miwok from the Bay Area region. Burials were predominantly placed in a tightly flexed position and frequently included red ochre. Minimally shaped mortar and pestle technology was much more prevalent than mano/metate. Nonstemmed projectile points become more common.

The **Augustine Pattern (A.D. 700–1800)** was marked by increasing populations resulting from more intensive food procurement strategies, and also by a marked change in burial practices and increased trade activities. Intensive fishing, hunting and gathering, complex exchange systems, and a wider variety in mortuary patterns were all hallmarks of this period. Mortars and pestles were more carefully shaped, and bow-and-arrow technology was present. Fishing implements became more common, trade increased, and cremation was used for some higher-status individuals. A well-developed ceramic industry has been noted at a site near Sloughhouse, east of Sacramento.

3.8.2.3 ETHNOGRAPHIC SETTING

The project area is situated within the lands traditionally occupied by the Nisenan, or Southern Maidu. The language of the Nisenan, which includes several dialects, is classified within the Maiduan family of the Penutian linguistic stock (Kroeber 1925). The western boundary of Nisenan territory was the western bank of the Sacramento River and the area between present-day Sacramento and Marysville. In the Sacramento Valley, the triblet, consisting of a primary village and a few satellite villages, served as the basic political unit (Moratto 1984). Valley Nisenan territory was divided into three triblet areas, each populated with several large villages (Wilson and Towne 1978), generally located on low, natural rises along streams and rivers or on slopes with a southern exposure. One important village, *Pusune*, near Discovery Park, appears to have been recorded as CA-SAC-26. Other villages—*Wollok*, *Leuchi*, *Wishuna*, *Totola*, and *Nawrean*—were located east of the confluence of the Feather and Sacramento Rivers, near the northwestern portion of the Natomas Basin.

Nisenan houses were domed structures covered with earth and tule or grass and measured 10–15 feet in diameter. Brush shelters were used in the summer and at temporary camps during food-gathering rounds. Larger villages often had semisubterranean dance houses that were covered in earth and tule or brush and had a central smoke hole at the top and an east-facing entrance, as well as smaller sweathouses. Another common village structure was a granary, which was used for storing acorns (Wilson and Towne 1978). Valley Nisenan people followed a seasonal round of food gathering, as did most California Indians. The wide variety of food resources available was exploited year round, but hunting and gathering activities were at their most intense in late summer and early fall. Food staples included acorns, buckeyes, pine nuts, hazelnuts, various roots, seeds, mushrooms, greens, berries, and herbs. Game, roasted, baked, or dried, included mule deer, elk, antelope, black bear, beaver, squirrels, rabbits, fish,

shellfish, and other small animals and insects (Wilson and Towne 1978). Seasonal harvests were carried out by families or the larger community, engendering social behavior such as sharing, trading, and conducting ceremonies.

Euro-American contact with the Nisenan began with infrequent excursions by Spanish explorers and Hudson Bay Company trappers traveling through the Sacramento and San Joaquin Valleys in the early 1800s. In general, Nisenan lifeways remained stable for centuries until the early to middle decades of the 19th century. With the coming of Russian trappers and Spanish missionaries, cultural patterns began to be disrupted as social structures were stressed. An estimated 75% of the Valley Nisenan population died in the malaria epidemic of 1833. With the influx of Europeans during the Gold Rush era, the population was further reduced as a result of disease and violent relations with the miners. However, today the Maidu are reinvesting in their traditional culture and, through newfound political, economic, and social influence, now constitute a growing and thriving native community in California.

3.8.2.4 HISTORIC SETTING

Early Exploration

Although Russian trappers and traders associated with the Hudson's Bay Company likely traveled through Sacramento, Sutter, and Yuba Counties during earlier years, the first well-documented European exploration of the general region occurred in 1808, when Spanish explorer Gabriel Moraga led an expedition from Mission San Jose to the northern Sacramento Valley (Hoover, Rensch, and Rensch 1966). The earliest Euro-American settlement coincided with the establishment of land grants by the Mexican government in the 1840s. John A. Sutter obtained the first such grant in the region in 1841. Sutter's New Helvetia Rancho encompassed lands on the east bank of the Feather and Sacramento Rivers.

Mining

Although there are no records of large-scale mining having been conducted in the project area or in the immediate vicinity, the industry had considerable indirect effects on historical developments in the region. The diggings and mines in the Sierra Nevada foothills dramatically increased economic activity in the region, leading to increased prosperity and the rise of larger and more numerous support industries, such as cattle ranches and farms. In addition, sediments washing into the Central Valley watercourses, including the Feather, Sacramento, and American Rivers, had a negative impact on water quality and on the scale and frequency of seasonal flooding.

Hydraulic mining, first conducted in Nevada in 1852, was the most cost-effective means of recovering placer gold from deeply buried gravels along and near river and stream channels. To access these deeply buried deposits, miners used streams of water under high pressure to wash away sediments and gravels. The sands and gravels were passed through sluices that separated out the placer gold. Silt and sand washed into nearby creeks, streams, and rivers, raising watercourse beds, clogging the channels, and generally polluting the waters. Between 1849 and 1909, 195 million cubic meters of mining debris entered the channels of the American River basin. The deposition of silt in the rivers resulted in the raising of the riverbeds and increased flooding. After 1861, catastrophic floods became more common, prompting the development of a levee system and beginning the process of land reclamation for agricultural purposes.

Construction of a railroad was a natural outgrowth of Sacramento's expansion and the need to deliver supplies to the California foothills. The railroad was completed by February 1856. The first rail line ran to the town of Folsom, where at least 21 different wagon trains then carted goods from the train to outlying areas as far away as Carson City, Nevada. The Central Pacific Railroad bought the Sacramento Valley Railroad in 1865 and added its facilities to those already being built for the Transcontinental Railroad. The Central Pacific and its successor, the Southern Pacific Railroad, became the major industry in Sacramento after 1863. It is estimated that early in its history, the railroad employed 20–30% of salaried employees in Sacramento (Historic Environment Consultants 1998).

Agriculture and Flood Control

General

Agriculture and ranching were the primary industries in the present-day Sacramento and Sutter County region during the historic period. Regional ranching originated on the New Helvetia rancho in the early 1840s. The Gold Rush precipitated growth in agriculture and ranching, as ranchers and farmers realized handsome returns from supplying food and other goods to miners. Frequent floods plagued the residents of the region, however, and posed a significant threat to the viability of agricultural interests and further settlement.

Initial efforts at flood control were usually uncoordinated and consisted of small levees and drains constructed by individual landowners. These features proved insufficient to protect cultivated land, and much of the project area flooded regularly (Dames & Moore 1994a). In 1861, the California Legislature created the State Board of Swampland Commissioners to reclaim swamp and overflow lands. The State Board of Swampland Commissioners established 32 districts that attempted to enclose large areas with natural levees. Lack of cooperation among the landowners in the districts led to chronic financial crises. When the legislature terminated the State Board of Swampland Commissioners in 1866, responsibility for swamp and overflow land fell to the individual counties. Many counties offered incentives to landowners for reclaiming agriculturally unproductive land. If a landowner could certify that he had spent at least $2 per acre in reclamation, the county would refund the purchase price of the property to the owner. Speculators took advantage of this program and a period of opportunistic and often-irrational levee building followed (Thompson 1958).

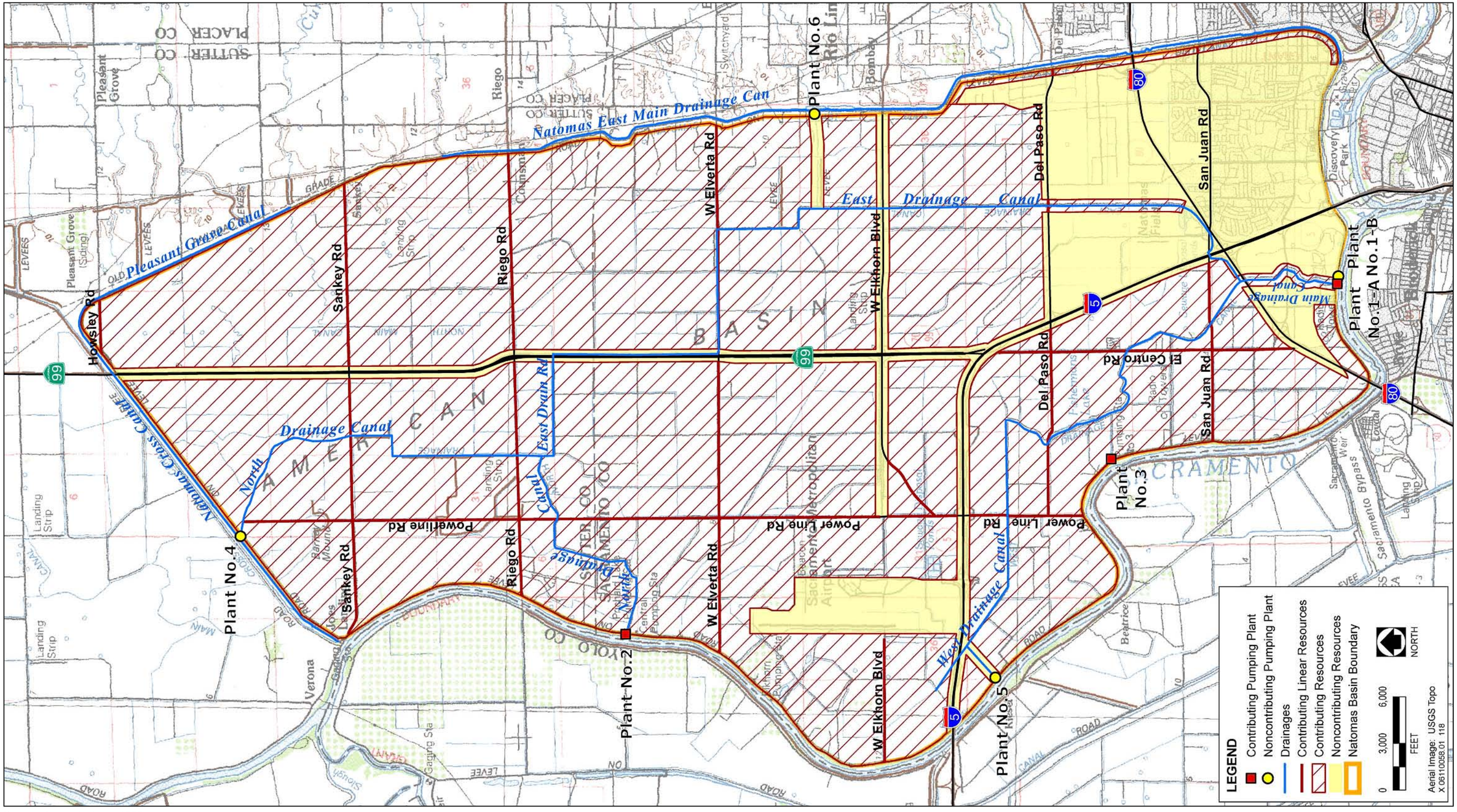
In the early part of the 20th century, the state legislature established The Reclamation Board to exercise jurisdiction over reclamation districts and levee plans. That year, the state approved and began implementation of the Sacramento River Flood Control Project (SRFCP). The ambitious project included the construction of levees, weirs, and bypasses along the river to channel floodwaters away from population centers. Under the SRFCP, new reclamation districts were created, including RD 1000, consisting of approximately 55,000 acres in the Natomas Basin. RD 1000 was largely controlled by the Natomas Company, which had access to more money than any individual landowner. The Natomas Company was formed in 1851 in Sacramento County to supply water for placer mining and irrigation. It later became involved in dredging for gold and expanded its water supply business. The Natomas Company became involved in land reclamation in part as a rebuttal of criticism that farmland was being destroyed by the company's gold dredging activities (Dames & Moore 1994a).

RD 1000 Rural Historic Landscape District

The infrastructure of RD 1000 (Exhibit 3.8-1) was completed in the 1920s. It includes levees, drainage canals, pumps, irrigation systems, agricultural fields, and roads, as well as remnant natural features. The originally constructed features included levees and exterior drainage canals, an interior drainage canal system, nine pumping plants, a series of levee and interior roads, and unpaved rights-of-way between the farm fields.

Previous efforts to document and mitigate impacts on elements of RD 1000 are relevant to the proposed project. The RD 1000 area has been identified as eligible for inclusion in the NRHP as a Rural Historic Landscape District. The evaluation process was conducted both to determine the NRHP eligibility of the district and to evaluate whether the district would be significantly affected by flood control projects planned and subsequently implemented by the USACE as part of the American River Watershed Project (Dames & Moore 1994a). The "determination of effects" statement concluded that the USACE projects would adversely affect both contributing and noncontributing elements of the Rural Historic Landscape District by allowing for greater development to occur in the region. Mitigation measures were recommended and adopted. These consisted of Historic American Engineering Record documentation, which was prepared by Peak & Associates (1997); videotapes of historic properties; and a list of repositories where copies of the information would be made available to the public.

Dames & Moore determined that RD 1000 appears to be eligible for listing as a Rural Historic Landscape District at the state level of significance for the period from 1911 to 1939 under Criterion A. The area of significance was



Source: Dames & Moore 1996

Contributing Features of the RD 1000 Rural Historic Landscape District **Exhibit 3.8-1**

listed as reclamation and the historical context was listed as the flood control and reclamation of the Sacramento River basin within the SRFCP as an important part of the history of reclamation and flood control. The district retains much of its historic integrity, including location design, setting, materials, workmanship, feeling, and association. The contributing and noncontributing elements of the district were defined as part of this effort. Contributing elements were described as follows:

- **Drainage System**: East Levee, River Levee, Cross Canal Levee; Natomas East Main Drainage Canal; Cross Canal; Pleasant Grove Canal; Pumping Plants No. 1-A, 2, and 3; the canal connecting Pumping Plant No. 3 and the West Drainage Canal, North Drainage Canal, East Drainage Canal, West Drainage Canal, Natomas Main Drainage Canal, and the drainage ditches within the areas of contributing large-scale land patterns.

- **Road System**: Garden Highway from Orchard Lane north to the Cross Canal; East Levee/Natomas Road; Sankey Road; Riego Road; Elverta Road; Elkhorn Boulevard from Garden Highway to the western boundary of the Sacramento Airport; Del Paso Road from Powerline Road to its intersection with Interstate 5 (I-5); San Juan Road from Garden Highway to its intersection with I-5; Powerline Road; El Centro Road from north of Interstate 80 (I-80) to its intersection with Bayou Way; and the right-of-way roads within fields in the areas of contributing large scale land patterns.

- **Large-Scale Land Patterns**: Land area that consists of open fields formed by the intersection of the canals and roads in the area bounded as follows: west of the East Levee; west of Sorrento Road; north of Del Paso Road between the East Levee and I-5, west of I-5 from its intersection with Del Paso Road to its intersection with I-80; north of I-80 from its intersection with I-5 to the River Levee; east of the River Levee; and south of the Cross Canal Levee.

Noncontributing resources include parts of the drainage system (some pumping plants and associated branch canals); parts of the road system; some large-scale land patterns (the area bounded by Sorrento Road to the east levee, south of Del Paso Road between I-5 and the east levee, south of I-80, and the Sacramento International Airport [Airport]); and some land uses, vegetation, boundary demarcations, buildings, and structures such as those more closely associated with agriculture than reclamation, municipal structures, commercial structures, and electric power lines.

3.8.2.5 STUDY RESULTS

The cultural resources study for the proposed project consisted of conducting inquiries regarding Native American cultural resources in the project area and contacting Native Americans to review concerns about the proposed project, gathering information on past studies from repositories of cultural resource information, and conducting field surveys in accessible portions of the 2008 project footprint.

Native American Contact Program

EDAW sent a letter of inquiry to the NAHC on June 12, 2007, asking for information or concerns regarding the project area, as well as a list of individuals or organizations that might have information or concerns regarding the project area. On June 19, 2007, Debbie Pilas-Treadway of the NAHC responded and indicated that no known sites were found in the Sacred Lands File that were located within the project area or in the immediate vicinity. Ms. Pilas-Treadway also provided EDAW with a list of individuals who could be contacted concerning cultural resources in the project area. These individuals were sent contact letters on June 21, 2007, with information regarding the proposed project and a request for any information they might provide or concerns that they might have about the project. No written responses were received; therefore, follow-up phone calls were made on July 9, 2007. Only one individual, Rose Enos (referred to by the NAHC as “Miwok/Maidu”), answered. Ms. Enos expressed general concern regarding avoidance of burial sites and asked to be contacted if work is conducted on such sites. Messages were left for the remaining people on the contact list; however, no response from any of these individuals has been received. In addition, EDAW contacted Randy Yonemura of the Ione Band of the

Miwok to request information on areas of concern. Mr. Yonemura led an EDAW archaeologist on a field visit of the project area and provided anecdotal information on areas of potential Native American burials.

Information Center Records Searches

Records searches were conducted in stages in 2006 and 2007 for different portions of the proposed project footprint. Most of the searches were conducted at the North Central Information Center (NCIC) of the California Historical Resources Information System, located at California State University, Sacramento. The NCIC records search covered portions of the project area in Sacramento County. Records searches were also conducted at the Northeast Information Center (NEIC), which maintains cultural resource records for Sutter County. The searches at both facilities included, but were not necessarily restricted to, an examination of the following resources:

- The State Office of Historic Preservation's *Historic Property Directory and Determination of Eligibility* (2006)
- The National and California Registers of Historic Places (2006)
- *California Inventory of Historic Resources* (1976 and updates)
- *Historic Properties Directory* (2006)
- *California Historical Landmarks* (1996 and updates)
- *California Points of Historical Interest* (1992 and updates)
- *Caltrans Local Bridge Survey* (1987)
- Various historic maps

The NEIC and NCIC reported that several cultural resource inventories have been conducted within the project area. These are listed in Tables 3.8-1 and 3.8-2, respectively.

Table 3.8-1
Previous Cultural Resources Surveys Conducted in the Project Area in Sutter County

NEIC Report No.	Author(s)	Title	Date
1135	Bass, H. O.	*Department of Transportation Negative Archaeological Survey Report: State Route 99*	1983
7173	Cultural Resources Unlimited	*A Cultural Resources Study for Sutter Bay Project, Sutter County, California*	1992
7175	Cultural Resources Unlimited	*A Cultural Resources Study for Sutter Bay Project Highway 99/70 Interchange/Crossroad Improvements Sutter County, California*	1992
3469B	Dames & Moore	*Rural Historic Landscape Report for Reclamation District 1000 for the Cultural Resources Inventory and Evaluations for the American River Watershed Investigation, Sacramento and Sutter Counties, California*	1996
5777	Dames & Moore	*Historic Property Treatment Plan for Reclamation District 1000 Rural Historic Landscape District for the Cultural Resources Inventory and Evaluations for the American River Watershed Investigation, Sacramento and Sutter Counties, California*	1994
4197	Dames & Moore	*Archaeological Inventory Report, Natomas Locality, Cultural Resources Inventory and Evaluation, American River Watershed Investigation, El Dorado, Placer, Sacramento, and Sutter Counties, California*	1994
6892	Derr, E. H.	*American Basin Fish Screen and Habitat Improvement Project, Feasibility Study: Alternative 1C, 2C, 3, Sacramento and Sutter Counties, California*	2002
6944	Ebasco Environmental	*Cultural Resources Survey of the Sacramento Energy Project Sacramento County, California*	1992
5655	Egherman, R., and B. Hatoff	*Roseville Energy Facility Cultural Resources Appendix J-1 of Application for Certification*	2002
6945	Foster, J. W., and D. G. Foster	*An Archaeological Survey of the South Sutter Industrial Center Property, Sutter County, California*	1992

Table 3.8-1
Previous Cultural Resources Surveys Conducted in the Project Area in Sutter County

NEIC Report No.	Author(s)	Title	Date
2987	Jensen, P.	*Historic Properties Survey Report for the Proposed Fifield Road at Pleasant Grove Creek Canal, Caltrans District 3, Sutter County, California*	1999
6893	Kaptain, N.	*Historic Property Survey Report for the State Route 99/Riego Road Interchange Project Sutter and Sacramento Counties*	2005
4658	Nelson, W. J., M. Carpenter, and K. L. Holanda	*Cultural Resources Survey for the Level (3) Communications Long Haul Fiber Optics Project. Segment WPO4: Sacramento to Redding*	2000
3469A	Peak & Associates	*Historic American Engineering Record Reclamation District 1000 HAER No. CA-187*	1997
1141	Wilson, K.L.	*Sacramento River Bank Protection Unit 34 Cultural Resources Survey Final Report*	1978

Note: NEIC = Northeast Information Center
Source: Data provided by the Northeast Information Center in 2007

Table 3.8-2
Previous Cultural Resources Surveys Conducted in the Project Area in Sacramento County

NCIC Report No.	Author(s)	Title	Date
–	Banek, B.	*An Archaeological Reconnaissance of the South Natomas Area for the River Bank Holding Company, Sacramento County, California*	1982
4188	Billat, L. B.	*Nextel Communications Wireless Telecommunications Service Facility—Sacramento County*	2001
–	Bouey, P. D.	*Cultural Resources Inventory and Evaluation: Sacramento River Bank Protection (Unit 44) Project*	1989
4206, part 1	Bouey, P. D., and R. Herbert	*Intensive Cultural Resources Survey and National Register Evaluation: Sacramento Urban Area Flood Control Project*	1990
6519	Bouey, P., J. Berg, J., and C. A. Hunter	*Cultural Resources Test Excavations, Sacramento Urban Area Flood Control Project, Sacramento County, California*	1991
4457	California Department of Transportation	*Negative Historic Property Survey Report for the Proposed Installation of Automatic Vehicle Census Systems on Interstate 80 East of the West El Camino Over-Crossing and on Highway 51 East of the "E" Street Ramps, Sacramento County, California*	2003
4194	Chavez, D., L. H. Shoup, C. Desgrandchamp, and W. G. Slater	*Cultural Resources Evaluations for the North Natomas Community Plan Study Area, Sacramento, California*	1984
4193	County of Sacramento Department of Environmental Review and Assessment	*Draft Environmental Impact Report for Teal Bend Golf Course Use Permit*	1995
4190	CRS Archaeological Consulting and Research Services	*Sacramento Metro Airport Airmail Facility*—letter report	1988
3409	Cultural Resources Unlimited	*A Cultural Resources Study for Sacramento Area Flood Control Agency Borrow Sites Project Sacramento County*	1993

Table 3.8-2
Previous Cultural Resources Surveys Conducted in the Project Area in Sacramento County

NCIC Report No.	Author(s)	Title	Date
4463	Cultural Resources Unlimited	*A Cultural Resources Survey and Archival Review for the Arden-Garden Connector Project Sacramento County, California*	1992
3469B	Dames & Moore	*Rural Historic Landscape Report for Reclamation District 1000 for the Cultural Resources Inventory and Evaluations for the American River Watershed Investigation, Sacramento and Sutter Counties, California*	1996
4197	Dames & Moore	*Archaeological Inventory Report, Natomas Locality, Cultural Resources Inventory and Evaluation, American River Watershed Investigation, El Dorado, Placer, Sacramento, and Sutter Counties, California*	1994
5777	Dames & Moore	*Historic Property Treatment Plan for Reclamation District 1000 Rural Historic Landscape District for the Cultural Resources Inventory and Evaluations for the American River Watershed Investigation, Sacramento and Sutter Counties, California*	1996
4195	Derr, E.	*Cultural Resources Report: North Natomas Comprehensive Drainage Plan; Levee Improvements, Canal Widening and Additional Pumping Capacity*	1997
4466	Derr, E.	*Historic Resource Evaluation Report for the Arden-Garden Connector Project CT-03-30274.B1 Sacramento County, California*	1983
6892	Derr, E. H.	*American Basin Fish Screen and Habitat Improvement Project, Feasibility Study: Alternative 1C, 2C, 3, Sacramento and Sutter Counties, California*	2002
6944	Ebasco Environmental	*Cultural Resources Survey of the Sacramento Energy Project Sacramento County, California*	1992
5655	Egherman, R., and B. Hatoff	*Roseville Energy Facility Cultural Resources Appendix J-1 of Application for Certification*	2002
3489A	Far Western Anthropological Research Group	*Report on the First Phase of Archaeological Survey for the Proposed SMUD Gas Pipeline Between Winters and Sacramento Yolo and Sacramento Counties, California*	1993
3489B	Far Western Anthropological Research Group	*Addendum to the Report on the First Phase of Archaeological Survey for the Proposed SMUD Gas Pipeline Between Winters and Sacramento Yolo and Sacramento Counties, California*	1993
4206, part 2	Far Western Anthropological Research Group	*Intensive Cultural Resources Survey and National Register Evaluation: Sacramento Urban Area Flood Control Project*—letter report to SHPO	2005
–	Foster, J. W.	*A Cultural Resource Investigation of the Blue Oaks Skilled Nursing Facility Site Auburn, California*	1995
–	Glover, L. C., and P. D. Bouey	*Sacramento River Flood Control System Evaluation, Mid-Valley Area Cultural Resources Survey, Colusa, Sacramento, Sutter, Yolo, and Yuba Counties, California*	1990
4449	Herbert, R. F.	*Report on the National Register Eligibility of the Sacramento River Docks Building 37 McClellan Air Force Base, Sacramento, California*	1995
5803	Herbert, R. F.	*Report on the National Register Eligibility of the Sacramento River Dock Complex including Building 4635 (Dock) and Building 4637 (Warehouse) McClellan Air Force Base, Sacramento, California*	1995
4202	Humphreys, S., and L. McBride	*A Review of the Work Carried Out at Sacramento 16, the Bennett Mound*	1966
4178	Jones & Stokes	*Archaeological Survey Report for the North Natomas Drainage System's San Juan Pump Station*	1992

Table 3.8-2
Previous Cultural Resources Surveys Conducted in the Project Area in Sacramento County

NCIC Report No.	Author(s)	Title	Date
2956	Nadolski, J. A.	*Archaeological Survey Report for the Jibboom Street Bridge Project Sacramento, California*	2001
4435	Nadolski, J. A.	*Archaeological Investigations for the Sacramento-KOVR Diverse Lateral Overbuild in Sacramento and Yolo Counties*	2001
5810	PAR Environmental Services, Inc.	*Northgate Boulevard/Arden-Garden Intersection Cultural Resources Investigation, City of Sacramento, Sacramento County, California*	n.d.
4187	Pastron, A. G., and R. K. Brown	*Historical and Cultural Resource Assessment Proposed Telecommunications Facility Natomas Park, Site No. SA-750-01 2450 Del Paso Road, Sacramento County, California*	2001
173	Peak, A. S.	*American River Parkway An Archaeological Perspective*	1973
2764	Peak & Associates	*Historic Property Survey Report and Finding of No Adverse Effect for the Proposed American River Parkway Bike Trail Improvement Project, City and County of Sacramento, California*	2001
2765	Peak & Associates	*Archaeological Survey Report for the Proposed American River Parkway Bike Trail Improvement Project, City and County of Sacramento, California*	
3469A	Peak & Associates	*Historic American Engineering Record Reclamation District 1000 HAER No. CA-187*	1997
4173	Peak & Associates	*Report on the Archaeological Testing Within the Riverbend Classics Project Area, City of Sacramento, California*	1999
4181	Peak & Associates	*Cultural Resources Overview for the North Natomas Long-Term Planning Area, Sacramento County, California*	4181
6830	Peak & Associates	*Determination of Eligibility and Effect for the Natomas Panhandle Annexation Project Area Sacramento County, California*	2005
4201	Peak, A. S., H. L. Crew, and R. Gerry	*The 1971 Archaeological Salvage of the Bennett Mound, CA-SAC-16, Sacramento, CA*	1984
4456	Ritchie, M.	*Finding of Effect for the Proposed Safety Improvements and Rehabilitation of the Jibboom Street Bridge on Jibboom Street, Bridge No. 24C-022, Sacramento, Sacramento County, California*	2001
–	Snyder, J.W.	*Historic Property Survey Report (Positive) for the Jibboom Street Bridge Safety Improvements and Rehabilitation Project Jibboom Street, Sacramento County, California*	2003
4441	Sonoma State Anthropological Studies Center	*Archaeological Surface Reconnaissance and Backhoe Testing for the South Natomas Projects (P92-122, P92-160) Sacramento County, California*	
3408	Theodoratus Cultural Research	*Discovery Park Construction Site Examination for Archaeological Resources in the Area of CA-Sac-26*—letter report	1981
4458	True, D. L.	*8-Acre Survey at 1801 Garden Highway, Sacramento, California*	1983
1141	Wilson, K. L.	*Sacramento River Bank Protection Unit 34 Cultural Resources Survey Final Report*	1978

Note: SHPO = State Historic Preservation Officer
Source: North Central Information Center Record Search 2007

Numerous archaeological investigations have covered portions of the Natomas Basin. These have generally focused on areas closest to the rivers and levees. There has been very little archaeological inventory of lands more than 100 feet from the levee toes, and ground surface visibility has frequently been poor even in surveyed areas.

The most comprehensive of these investigations were completed by Dames & Moore and Far Western. In 1994, Dames & Moore (1994b) conducted a broad survey in the Natomas Basin as part of the American River Watershed Investigation. Surveying of selected parcels along the Sacramento River resulted in the identification of 17 primarily historic sites. During the same effort, Dames & Moore visited an additional 10 previously identified cultural resources to update site records for those locations. At the same time, Dames & Moore (1994a) prepared a draft Historic Property Treatment Plan that explored the history and elements of RD 1000. In 1996, Dames & Moore completed its evaluation of RD 1000, concluding that it appeared to be eligible for listing on the NRHP under Criterion A at a state level of significance as an example of reclamation and flood control in the Sacramento River basin during the period 1911–1939. This report extensively documents both the contributing and noncontributing resources of RD 1000. Previously, in 1990, Far Western had conducted surveys of areas along the same route surveyed by Dames & Moore in 1994 (Dames & Moore 1994b), as well as of additional areas (Bouey and Herbert 1990). Far Western (Bouey, Berg, and Hunter 1991) followed up with limited test excavations of two sites that may be within or near the footprint of 2009–2010 project components (borrow areas) that have not yet been fully defined.

Numerous cultural resources were identified in the course of previous survey efforts, including ranches and farms; agricultural, transportation, and reclamation features; and debris scatters, as well as prehistoric occupation and burial sites, frequently seen as mounds or the disturbed remnants of mounds (Tables 3.8-3 and 3.8-4).

EDAW Field Surveys

Fieldwork undertaken by EDAW in 2007 focused on the areas that would be affected by project construction in 2008: the NCC south levee, Sacramento River east levee Reaches 1–4B to Station 214+00, the proposed right-of-way of the relocated Elkhorn Canal and the new GGS/Drainage Canal, and potential borrow sites. EDAW conducted pedestrian surveys of those portions of these areas that were accessible; only a small proportion of the land area in the potential project footprint for 2008 was accessible to surveys, mainly because of the presence of crops.

In April/May 2007, an EDAW archaeologist examined the NCC south levee and adjacent lands within the existing maintenance right-of-way. In July/August 2007, a crew of EDAW archaeologists conducted field surveys in accessible parcels within Sacramento County–owned Airport bufferlands north of the Airport. On the Airport bufferlands, the surveys covered a 400-foot-wide strip east of the Sacramento River east levee and small portions of the proposed borrow sites in the Airport north bufferlands. Survey areas within 1,000 feet of the Sacramento River and the locations of prehistoric lakebeds were walked using transects 50 feet apart. Farther from the Sacramento River and prehistoric lakebeds, the transect interval was widened to 100 feet. The potential borrow sites were almost completely inaccessible because they contained rice crops.

As mentioned above, Randy Yonemura of the Ione Band of the Miwok also showed an EDAW archaeologist the locations of subsurface cultural resources that have not been recorded in any of the previously prepared documentation filed with the NCIC and NEIC, which are known to him from anecdotal information.

Two new historic sites, NLIP-1 and NLIP-2, were identified during the surveys adjacent to Garden Highway, and four groups of farm buildings, NLIP-3 through NLIP-6, were also identified and evaluated.

EDAW also conducted a small-scale shovel testing program along the eastern side of CA-Sac-485/H, a former residence and prehistoric occupation site, to support preliminary engineering design efforts related to canal alignment.

Known Cultural Resource Sites in the Sutter County Portion of the Project Area

Table 3.8-3 lists the known cultural resource sites in the Sutter County portion of the project area. Most of the listed sites are in areas proposed for 2009–2010 construction. Potential effects of the proposed project on those sites are evaluated in Section 3.8.3.2 at a general, program level and would be addressed in detail in future project-specific CEQA documentation. The sites that may be affected by 2008 construction are shown with an asterisk. Effects on these sites are evaluated at a project level of detail in Section 3.8.3.2. The sites listed in Table 3.8-3 are described below.

Table 3.8-3
Cultural Resources in the Sutter County Portion of the Project Area

Trinomial	P-No.	Historic/ Prehistoric	Description	Date Recorded	Quadrangle	NRHP/CRHR Evaluation
CA-SUT-84H*	51-000084	Historic	Natomas Cross Canal/Pleasant Grove Creek Canal levees	1994	Pleasant Grove, Verona	Eligible
	51-000096H*	Historic	1950s-era ranch	2002	Taylor Monument	
NLIP-3*		Historic	Farm Complex	2007	Verona	Not eligible
NLIP-4*		Historic	Farm Complex	2007	Verona	Not eligible
NLIP-5*		Historic	Farm Complex	2007	Verona	Not eligible
NLIP-6*		Historic	Farm Complex	2007	Verona	Not eligible
Barney Mound*		Prehistoric	Intact occupation mound site	not	Verona	Potentially eligible

Notes: CRHR = California Register of Historic Resources; NRHP = National Register of Historic Places. Sites that would be or may be affected by the 2008 construction elements are marked with an asterisk.
Source: Data compiled by EDAW in 2007

CA-SUT-84H (P-51-000084)

This trinomial includes both the NCC south levee and the Pleasant Grove Creek Canal (PGCC) west levee, the northernmost contributing resources to RD 1000. The NCC levee measures approximately 25 feet wide at the top, 75 feet wide at the base, and is 15 feet high. The top has been graded and graveled for vehicle traffic. The PGCC levee is smaller, measuring approximately 20 feet wide at the top, 60 feet wide at the base, and 10 feet high. There is also an associated retention basin, constructed of concrete and measuring 50 feet by 35 feet across and 15 feet deep. A concrete and steel pump foundation is located within the basin. Concrete footings running from a hole in the side of the basin to the top of the NCC levee indicate that a large pipe once connected the two features.

Archaeologists reported that the levee (unclear which one) was raised and strengthened twice, after flooding during 1938–1939 and after flooding in RD 1001 during 1955. RD 1000 modified the NCC south levee and its adjacent canals in 1987 and SAFCA modified them in 1996. SAFCA is completing cutoff wall construction in the western portion of the NCC south levee in fall 2007.

P-51-000096H

Located on the Sacramento/Sutter county line and at the edge of a proposed borrow area, this resource consists of a historic ranch complex that includes two residences, four sheds or barns, and a trailer. The archaeological survey crew was not allowed on the property to record the structures in more detail.

NLIP-3, 7240 Garden Highway

The Sutter County Assessor's records currently list this property along the Sacramento River east levee south of Sankey Road as vacant. No construction date is on file for the buildings. The construction methods and materials appear to date to the early 20th century. This property appears to have always functioned as a residential and agricultural complex. The buildings are in good condition but lack the historic associations or architectural distinctions that would make them eligible for listing on the CRHR or NRHP.

NLIP-4, 11000 Garden Highway

This property is near the Sacramento River east levee north of Riego Road. The Sutter County Assessor's records list one of the two residences on the property as being constructed in 1957. The property has been in the Lauppe family since that time. The land, originally listed as Assessor's Parcel Number 35-020-15, was split into separate parcels several years ago as part of a lot-line adjustment. Because of the split, the 35-020-15 parcel number was retired, and additional parcel numbers (35-020-18, 35-020-19) were assigned.

Research did not reveal this property to be significantly associated with an important historic event, and the historic-era building located here is not known to be associated with an individual considered important in local history. The property itself has undergone regular periods of construction over the years, with new buildings added and older structures modified. The buildings lack the historic associations or architectural distinctions that would make them eligible for listing on the CRHR or NRHP.

NLIP-5, Howsley Road at the Natomas Cross Canal

This small complex includes a mid-20th century residence and several turn-of-the-century horse stalls. The buildings are in good condition but lack the historic associations or architectural distinctions that would make them eligible for listing on the CRHR or NRHP.

NLIP-6, Howsley Road at the Pleasant Grove Creek Canal

This is a small residential complex dating to the mid-20th century. The buildings are in good condition but lack the historic associations or architectural distinctions that would make them eligible for listing on the CRHR or NRHP.

Barney Mound

This is an unrecorded prehistoric occupation mound with a residence on top, located along Powerline Road north of Sankey Road. Although the site has not been recorded officially, it is well known in the region and, as an intact prehistoric mound site in an area where almost all such sites have been destroyed, is likely to be eligible for CRHR and NRHP listing.

Known Cultural Resource Sites in the Sacramento County Portion of the Project Area

Table 3.8-4 lists the known cultural resource sites in the Sacramento County portion of the project area. The listing does not include several known sites in the southeastern portion of the Natomas Basin (located mainly along the Natomas East Main Drainage Canal [NEMDC]/Steelhead Creek) because there are no proposed project elements in that part of the basin. Most of the listed sites are in areas proposed for 2009–2010 construction. Potential effects of the proposed project on those sites are evaluated in Section 3.8.3.2 at a general, program level and would be addressed in detail in future project-specific CEQA documentation. The sites that may be affected by 2008 construction are shown with an asterisk. Effects on these sites are evaluated at a project level of detail in Section 3.8.3.2. The sites listed in Table 3.8-4 are described below.

Table 3.8-4
Cultural Resources in the Sacramento County Portion of the Project Area

Trinomial	P-No.	Historic/ Prehistoric	Description	Date Recorded	Quadrangle	NRHP/CRHR Evaluation
CA-Sac-15/H	34-000042	Both	Occupation mound with historic debris	1934, 1990, 1993	Taylor Monument	
CA-Sac-16/H	34-000043	Both	Occupation/burial mound with historic debris and foundations	1934, 1966, 1984, 1987, 1990, 1993	Taylor Monument	Potentially eligible
CA-Sac-17 *	34-000044	Prehistoric	May have been destroyed	1934, 1990	Taylor Monument	
CA-Sac-18	34-000045	Prehistoric	Lithic scatter	1934, 1994	Taylor Monument	
CA-Sac-160/H	34-000187	Both	Occupation/burial mound with historic farm	1947, 1949, 1994	Taylor Monument	
CA-Sac-164	34-000191	Prehistoric	Occupation/burial site nominated to NRHP	1972, 1982, 1988, 1989, 1990, 1991, 2001–2007	Sacramento West	Eligible
CA-Sac-430H	34-000457	Historic	West drainage canal	1991, 1993, 1997	Taylor Monument	
CA-Sac-485/H*	34-000512	Both	Occupation mound and historic home site	1994	Taylor Monument	Potentially eligible
CA-Sac-486H	34-000513	Historic	Historic home site	1994	Taylor Monument	
CA-Sac-487H	34-000514	Historic	Historic debris and vegetation	1994	Taylor Monument	
CA-Sac-488H	34-000515	Historic	Historic debris and vegetation	1994	Taylor Monument	
CA-Sac-489H	34-000516	Historic	Historic debris and vegetation	1994	Taylor Monument	
CA-Sac-490H	34-000517	Historic	Historic debris and vegetation	1994	Taylor Monument	
CA-Sac-491H	34-000518	Historic	Historic debris and vegetation	1994	Taylor Monument	
CA-Sac-492H	34-000519	Historic	Historic well, pipes and vegetation	1994	Taylor Monument	
CA-Sac-493H	34-000520	Historic	Historic debris	1994	Taylor Monument	
CA-Sac-494H	34-000521	Historic	Historic debris	1994	Taylor Monument	
CA-Sac-569H	34-000741	Historic	Paved road	1994, 1998	Taylor Monument, Rio Linda	
CA-Sac-836H*	34-001354	Historic	Farm complex	2005	Taylor Monument	Not eligible
	34-000883	Historic	Paved road	1998	Taylor Monument	
	34-000884	Historic	Paved road	1998	Taylor Monument	

Table 3.8-4
Cultural Resources in the Sacramento County Portion of the Project Area

Trinomial	P-No.	Historic/ Prehistoric	Description	Date Recorded	Quadrangle	NRHP/CRHR Evaluation
	34-000886	Historic	Paved road	1998	Rio Linda, Taylor Monument	
	34-001552	Historic	House	2002	Taylor Monument	
	34-001557*	Historic	Pumping plant	2006	Taylor Monument	
	34-001558*	Historic	Pumping plant	2006	Taylor Monument	
	34-001559*	Historic	Pumping plant	2006	Taylor Monument	
NLIP-1*		Historic	Lean-to and shed	2007	Taylor Monument	Not eligible
NLIP-2*		Historic	Historic debris scatter	2007	Taylor Monument	Not eligible

Note: Sites that would be or may be affected by the 2008 construction elements are marked with an asterisk.
Source: Data provided by EDAW in 2007

CA-Sac-15/H

This site, near the Sacramento River east levee south of I-5, consists of a prehistoric occupation midden mound with a concentration of debitage, flaked stone tools, shell artifacts, faunal remains, fire-cracked rock, and baked clay objects. The mound has been heavily affected by farming and ranching activities. There is a ranch complex including a bunkhouse, garden, shed, chicken coop, water tower, garage, and driveway on the mound; historic debris on the site includes glass and broken ceramic fragments.

A limited auger testing program was carried out west of the mound along the Sacramento River east levee and found no cultural materials along that transect (Bouey and Herbert 1990).

CA-Sac-16/H (P-34-000043)

CA-Sac-16/H is south of the Airport on a property that would be a potential borrow source for the proposed project. This site has been variously called the Bennett Mound, Mound Ranch, Willey Mound, and S-16. It includes the remains of a prehistoric occupation mound, possibly the largest in the Sacramento Valley, but has been leveled in stages by agricultural activities. The site location corresponds to the ethnographic village of *Nawrean*. What remains today consists of dark midden soils in plowed fields with fragments of human remains, shell, fire-cracked rock, baked clay objects, groundstone, faunal bone, flaked stone artifacts, and debitage. A few historic artifacts, such as brick and ceramic fragments, are also present. Today, two separate loci have been identified and recorded as CA-Sac-16/H; the larger, Locus I, represents the approximate original location of the mound. Locus II is an area of redeposited soil taken from the mound in the past. There is also a historic-era component of the site from the remnants of a slaughterhouse and brick factory present before the 1930s. Historic artifacts noted include bricks, sawed mammal bone, a filled-in privy, bottles, ceramic and metal fragments, and glass.

The site was originally described as very large, up to 7 acres in area, and 20 feet high. The earliest investigations were conducted in 1923 by Zallio, who excavated at the site a number of times and recovered projectile points, bone tools, Haliotis ornaments, and other artifacts (Bouey, Berg, and Hunter 1991). It was first formally recorded in 1934 by Heizer, who identified it as a large mound with stone artifacts and freshwater shell on the surface. Sacramento Junior College excavated pits and trenches up to 18 feet deep in 1936–1937. The main focus of this effort was on recovery of mortuary remains; however, considerable quantities of nonburial associated artifacts were also documented. More excavations were conducted by Sacramento State College in 1953 and by American

River College between 1966 and 1971, and more artifacts and burials were salvaged by Peak, Crew, and Gerry (1984) when what was left of the mound was leveled. At that time, Peak, Crew, and Gerry estimated that as much as 13 feet of the mound might still be present below the plowed surface. As an interesting side note—and as an indication of the original CA-Sac-16/H mound's prominence—Peak, Crew, and Gerry mention that Heinrich Schliemann (an amateur archaeologist and later the discoverer of Troy) visited the site in 1851–1852.

More recently, Bouey and Herbert (1990) completed a surface survey and excavated two auger holes at the toe of the levee that forms the western boundary of the site; they reported evidence of subsurface cultural deposits, including shell midden. Larger-scale excavations (Bouey, Berg, and Hunter 1991), dug within 100 feet of the levee toe and the ramp leading up to Garden Highway, confirmed that midden deposits still exist; however, agricultural activity seems to have destroyed any stratigraphic integrity the deposits might have had that close to the levee. It may be that Bouey and Herbert were looking strictly at redistributed mound soils.

The summary of the research done by 1991 (Bouey, Berg, and Hunter 1991) agreed with the conclusions of Derr (1983) that the site was a large, permanent habitation locus occupied from the Upper Archaic (ca. 1000 B.C.) to just after the beginning of European contact. Derr found that the upper 20–60 centimeters of soil (in the areas he examined near the levee) consisted of redistributed midden with artifacts and isolated human remains. What appears to be missing from any of these analyses is an attempt to define the original mound or to find intact elements of the site that may have been located beyond the original mound. If there are intact subsurface deposits associated with CA-Sac-16/H, then the site may be eligible for listing on the CRHR or NRHP because of the potential information contained in those deposits.

The earliest documentation, Heizer's site record form from 1934, does not give dimensions for the mound and does not contain specific enough information to provide for relocation of the original boundaries of the mound. It is presumed that the dispersed midden from the mound now covers a larger surface area than the mound used to occupy. However, it is unclear exactly how large an area that is because various investigations have reported Locus I (the larger site deposit) as measuring 110 meters by 185 meters (Bouey and Herbert 1990), 250 meters by 250 meters (Kauffman and Kauffman 1983), and 450 meters by 850 meters (Dames & Moore 1993). The Dames & Moore site record form appears to be the only one that maps out the secondary Locus II area, northeast of the main deposit and east of a drainage ditch (as of 1993).

CA-Sac-17 (P-34-000044)

This is the location of a mound site reported by Heizer in 1934 west of Fisherman's Lake; however, none of the mound remains. In 1990, Bouey and Herbert attempted to locate any cultural remains but could not find any evidence of cultural deposits on the surface or in auger holes. The site is at the edge of the proposed Airport north borrow area.

CA-Sac-18 (P-34-000045)

This site, landward of the Sacramento River east levee north of San Juan Road, consists of a sparse scatter of basalt debitage, one cryptocrystalline biface fragment, a polished stone, and possible fire-cracked rock. It was originally described by Heizer as a mound 30 yards in diameter and 5 feet high; however, Heizer may have misinterpreted a natural rise in the landscape as a mound. CA-Sac-18 appears to be lacking the intensive cultural deposits that are the hallmark other nearby known mound sites (Dames & Moore 1994).

CA-Sac-160/H (P-34-000187)

This is a multicomponent site near the Sacramento River east levee north of San Juan Road. It includes a prehistoric occupation mound with a farm complex situated on top. Excavations in the 1940s removed numerous burials and artifacts including groundstone, flaked stone tools, shell beads and ornaments, fire-cracked rock, baked clay objects, stone beads, faunal remains, bone awls, bird bone tubes and whistles, obsidian drills, quartz

crystals, charmstones, and historic glass trade beads, as well as historic debris related to farming and occupation of the top of the mound.

CA-Sac-164 (P-34-000191)

CA-Sac-164 is a very large, deeply stratified prehistoric occupation and burial mound near Sand Cove Park on the Sacramento River that has been explored a number of times using archaeological techniques; however, in spite of these efforts, the true boundaries of the site remain unknown. The site includes shell midden with abundant cultural materials including fire-cracked rock, flaked and ground stone tools, charmstones, polished bone implements, debitage, quartz crystals, bone and shell beads, baked clay objects, and plentiful faunal remains. Large fire-cracked rock features and hearths have also been noted. Because of its significant scientific value and the integrity, CA-Sac-164 was nominated for NRHP listing in 2001.

The site was first recorded in 1951, after a newspaper article reported that human remains and stone tools were eroding out of the cutbank and into the Sacramento River. Observers who walked along the edge of the cutbank in summer and fall when the river was at its lowest noted that site deposits, interspersed with flood-deposited silt, extended at least 4 meters below the current-day surface. Excavations in the 1970s, 1980s, and 1990s confirmed the depth of intact and resource-bearing cultural strata at the site. Work on the land side of the Sacramento River levee indicated that downward-trending cultural strata might be found there as well, beginning well over a meter below the ground surface.

Annual river height fluctuation, wave action resulting from boat wakes, and looting combined to cause continual erosion and collapse of the cutbank. This resulted in artifacts and remains falling onto the beach area below, where they either washed into the river or collected by the public. To address this issue, a site stabilization program was implemented in 2005 that included placing dirt and plantings over the cutbank and creating a wave break near the river's edge of the site.

CA-Sac-430H (P-34-000457)

This feature is the West Drainage Canal, a relatively unmodified canal that originates at Fisherman's Lake and flows southeast to the East and Main Drainage Canals.

CA-Sac-485/H (P-34-000512)

This site, between the Sacramento River east levee and the proposed location of the relocated Elkhorn Canal, was once a prehistoric occupation and burial mound that has been leveled by agricultural activities and was documented by Dames & Moore in 1994. The remains of a historic-era homestead, consisting mainly of ornamental vegetation, driveway, and historic debris, were noted on top of the prehistoric site. Dames & Moore archaeologists noted that the prehistoric component was large, measuring 220 meters by 160 meters with two depositional loci—a larger area near Garden Highway and a smaller deposit to the east. Prehistoric artifacts noted at the time included obsidian and basalt flakes and tools, shell beads and ornaments, faunal remains, groundstone fragments, charmstones, baked clay, imported exotic tool stone, and shell.

In August 2007, EDAW archaeologists undertook a limited shovel testing program at CA-Sac-485/H to determine whether there was an undisturbed subsurface deposit that could be affected by the proposed canal construction in the vicinity of this site. The August investigation began with a survey of the site area where a sparse assortment of artifacts was visible; because no concentrations of artifacts were identified on the surface, the Dames & Moore archaeological site map was used to guide the placement of shovel test pits (STPs). Brian Padilla, of the El Dorado Miwok, was present while the STPs were excavated.

During the course of excavations, archaeologists uncovered artifacts including obsidian and basalt flakes; clamshell disk beads; burned earth; faunal remains, including freshwater mussel shell; and fire-cracked rock. Human remains were uncovered in three of the STPs; the Sacramento County coroner and NAHC were contacted,

excavation of each of those three STPs was halted immediately, and the remains were reburied where they were found. None appeared to be part of a larger, intact burial and all were found in the upper 50 centimeters of soil.

In general, site soils consisted of dry compact silts with a small sand and clay content; excavation and screening were difficult because the soils were very dry and hard. If artifacts were recovered, excavation generally proceeded to 100 centimeters below surface (cmbs); where no artifacts were found, excavations terminated around 80 cmbs. A deeply buried midden layer was identified in each of the four STPs (Nos. 4, 6, 21, and 24) closest to the levee, beginning anywhere from 55 cmbs to 80 cmbs. Excavation halted at approximately 100 cmbs in these STPs without reaching the bottom of the midden deposit; a split-spoon probe was used in STP No. 21 to find the bottom of the deposit, which was reached at approximately 160 cmbs. Although the northern and southern edges of the midden deposit were not located, the STP program was halted on the assumption that a more formal testing program, using a combination of test units and additional STPs, would be implemented as part of more detailed design of the proposed project. Based on the data collected during the brief testing at CA-Sac-485/H, it appears that significant intact prehistoric deposits may be found below capping soils at the site. If this is true, CA-Sac-485/H may be eligible for listing on the CRHR or NRHP for the site's data potential.

CA-Sac-486H (P-34-000513)

This site near the Sacramento River east levee below the North Drainage Canal consists of the remains of a historic-era homestead. The structure that once stood on the site has been demolished. Remnant landscape plantings and debris consisting of ceramic fragments, bottle glass, ceramic, bricks, mortar, and metal fragments were noted. The structures were visible in a 1937 aerial photograph and were depicted on the 1967 U.S. Geological Survey topographic quadrangle map. The archaeologists who identified the site in 1994 noted that some of the trees appeared to be less than 30 years old, although a fragment of amethyst glass (generally associated with the turn of the century) was noted.

CA-Sac-487H (P-34-000514)

Like CA-Sac-486H, this location near the Sacramento River east levee below the North Drainage Canal includes historic debris, such as concrete fragments, milled lumber, metal fence posts, wire, farm machinery parts, clear and green glass, window glass, and ornamental plantings, all of which indicate that a structure existed at the site at one point but has since been demolished. Also like the previous site, a structure was visible in this location in a 1937 aerial photograph; several structures were indicated on the 1950 and 1975 topographic quadrangle maps for the area.

CA-Sac-488H (P-34-000515)

This is another site near the Sacramento River east levee below the North Drainage Canal where a structure appeared on a 1937 aerial photograph and 1950 topographic quadrangle map, although no building is on the site today. Historic debris, ornamental vegetation, and a fence line remain. The debris included various concrete fragments, corrugated metal, wire, culvert pipe, and a large section of iron pipe.

CA-Sac-489H (P-34-000516)

This is another site near the Sacramento River east levee below the North Drainage Canal where a structure appeared on a 1937 aerial photograph and 1950 topographic quadrangle map, although no building is on the site today. The associated debris includes a fenced-off well head, concrete fragments, lumber, window glass, wooden posts, galvanized pipes, old fencing overgrown by an oak tree, an enamelware bucket, tires, ceramic fragments, bottle glass, and a metal bucket. Ornamental landscaping plants were also noted.

CA-Sac-490H (P-34-000517)

This site, near the south end of Powerline Road, had three structures that appeared on a 1937 aerial photograph and 1950 topographic quadrangle map, although no building is on the site today. The historic debris is similar to the debris found at sites CA-Sac-486H through CA-Sac-489H, including concrete, brick, iron piping, a fence post, bottle glass, ceramic fragments, and galvanized metal pipe, as well as remnant ornamental vegetation.

CA-Sac-491H (P-34-000518)

This site, also near the south end of Powerline Road, was likely used in association with four structures that appeared on the 1950 topographic quadrangle map. The 1937 aerial photograph associated with other sites listed here includes coverage of this property; however, only trees are clearly visible in the photograph. The artifacts consist of a sparse scatter, including a wood fence, concrete fragments, bricks, and metal fence posts. Ornamental vegetation was noted nearby.

CA-Sac-492H (P-34-000519)

This site, near the south end of Powerline Road, consists of a concrete-capped well, associated water pipes, and remnant ornamental vegetation and fruit trees that were likely associated with a structure visible on the 1950 topographic quadrangle map of the area. A cluster of trees is visible in the 1937 aerial photograph, but no structures are clearly visible. The site is now used to keep honeybees.

CA-Sac-493H (P-34-000520)

The 1950 topographic quadrangle map and 1937 aerial photograph of the region indicate that there was once a large barn and associated structure at this location near the Sacramento River east levee south of I-5. Today, scattered historic debris—clear and colored glass, porcelain and earthenware, iron pipe, bone fragments, brick, and a white ceramic insulator—is all that remains.

CA-Sac-494H (P-34-000521)

This is another site, west of Fisherman's Lake, where a structure appeared on a 1937 aerial photograph and 1950 topographic quadrangle map, although no building is present today. Associated debris documented by an archaeological team in 1994 included concrete and brick fragments, an iron water pipe, white ceramic insulators, and clear bottle glass. In addition, the archaeologists noted abundant modern debris on the site, making it difficult to distinguish between modern and historic artifacts.

CA-Sac-569H (P-34-000741)

This is a segment of Del Paso Road, a two-lane paved road that extends from Powerline Road to East Levee Road. Del Paso Road likely originated as a dirt farm road and has subsequently been modernized, paved, and widened.

CA-Sac-836H (P-34-001354)

This resource, located near the Sacramento River east levee south of Elverta Road, consists of the Yuki Pear Farm complex with a relocated ranch house, a 1930s barn, a 1940s bunkhouse/workshop/garage, a 1960s bunkhouse, a 1974 residence, and a mid-1970s barn. A 1903 map shows the Farmers and Merchants Bank as the property owners; no improvements were listed on any maps in the next several years. By 1939, the property belonged to the California Trust and Savings Band; it later was owned by Thomas and Nancy McDermott. The McDermotts sold the land to A. R. Galloway, who never lived on the property but rented it to Masami Yuki as a tenant farmer. The Yuki family originally grew asparagus at the farm but switched to tomatoes in 1968 and planted the pear orchard in 1969.

P-34-000883H

This is El Centro Road, a north-south, paved two-lane road that dates to the period before 1921. It runs between I-80 to the south and Bayou Road to the north. It is likely that this was originally a dirt farm road that has been paved a number of times.

P-34-000884H

This is San Juan Road, an east-west, paved two-lane road that dates to the period before 1921. It runs between I-80 and the Sacramento River east levee. It is likely that this was originally a dirt farm road that has been paved a number of times in the past.

P-34-000886H

This is Elkhorn Boulevard, an east-west, paved two-lane road that dates to the period before 1921. It runs between the Sacramento River east levee and the NEMDC/Steelhead Creek. It is likely that this was originally a dirt farm road that has been paved a number of times in the past.

P-34-001552H

This site includes a 1950s-era house and shed, surrounded by a chain link fence. The house is located along Garden Highway, near the northern Sacramento County line.

P-34-001557H

This structure is a concrete valve tank associated with the Prichard Lake Pumping Plant at the end of the North Drainage Canal.

P-34-001558H

This resource consists of a concrete-lined sump 50 feet long and 25 feet wide associated with the Prichard Lake Pumping Plant.

P-34-001559H

This is a concrete pad near the P-34-001558H sump. It is also associated with the Prichard Lake Pumping Plant.

NLIP-1

This site was found near the Sacramento River east levee south of Riego Road during the EDAW surveys. It lies in a dense cluster of trees, poison oak, and blackberry brambles and consists of the dilapidated remains of a lean-to and shed. Modern debris noted in the area between the two structures included white earthenware, tires, glass, window blinds, clear and brown bottle glass, corrugated metal sheets, and rusted metal objects. None of the site components appeared to be more than 40–50 years old. This site did not appear to contain values that would make it eligible for listing on the CRHR or NRHP.

NLIP-2

This site, found during the EDAW surveys along the Sacramento River east levee north of Elverta Road, consists of a small historic debris scatter noted in a dirt farm road east of the Sacramento River east levee and a drainage ditch. It appears to contain a mix of modern debris and a fragment of amethyst glass. It is presumed that this deposit was relocated from one of the nearby farm sites. The mixture of historic and modern debris and the

location in an area disturbed by levee, ditch, and road construction all indicate that this site does not retain sufficient integrity to make it eligible for listing on the CRHR or NRHP.

3.8.3 Environmental Impacts and Mitigation Measures

3.8.3.1 Significance Criteria

The thresholds for determining the significance of impacts for this analysis are based on the environmental checklist in Appendix G of the State CEQA Guidelines. The proposed project was determined to result in a significant effect on cultural resources if it would:

- cause a substantial adverse change in the significance of a unique archaeological resource as defined in PRC Section 21083.2(g) or a historical resource as defined in PRC Section 21084.1 (see also Section 15064.5 of the State CEQA Guidelines), or
- disturb any human remains, including those interred outside of formal cemeteries.

See Section 3.8.1.1 for the definitions of unique archaeological resources and historical resources. A substantial adverse change in the significance of a historical resource means physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of the historical resource would be materially impaired.

3.8.3.2 Impact Analysis

Project construction would involve a range of soil-disturbing impacts in a region that is highly sensitive for cultural resources, particularly prehistoric archaeological sites, and would alter structures and landscapes associated with RD 1000. Levee improvements would require the excavation of inspection trenches and extensive soil stripping and grading in the footprint of the adjacent setback levee along the existing Sacramento River east levee and the 100- to 300-foot-wide seepage berms along many reaches of the Sacramento River east levee and the PGCC west levee. Cutoff walls would be constructed in the NCC south levee and some reaches of the Sacramento River east levee. Borrow material would be removed from several hundred acres of land in the Natomas Basin. Highline irrigation canals along the landside toe of the Sacramento River east levee would be relocated and a new GGS/Drainage Canal would be excavated over several miles to connect habitat areas in the northern and southern parts of the basin. Large trees would be removed from the proposed footprint of the flood control works.

Table 3.8-5 lists the cultural resource sites shown in Tables 3.8-3 and 3.8-4 that may be affected by project activities proposed for 2008; these include impacts resulting from levee improvements, canal excavation, and excavation of borrow materials.

The remaining sites listed in Tables 3.8-3 and 3.8-4 could be affected by project activities proposed for 2009–2010. Of those remaining sites, four are sites with prehistoric features that either have been determined to be eligible or are considered potentially eligible for NRHP and CRHR listing. In addition, CA-Sac-485/H could be affected by levee improvements in 2009–2010. These five known sites of significant or potentially significant cultural resources that may be affected by 2009–2010 construction and the contributing elements of the RD 1000 Rural Historic Landscape District that would be affected by proposed 2009–2010 elements are listed in Table 3.8-6.

Table 3.8-5
Known Cultural Resources that May Be Affected by 2008 Project Elements

Trinomial	P-No.	Historic/ Prehistoric	Description	Project Activity at or Near Resource	NRHP/CRHR Evaluation
	51-000096H	Historic	1950s-era ranch	Borrow removal (site is at edge of property)	–
CA-Sac-836H	34-001354H	Historic	Farm complex	Canal construction	Not eligible
CA-Sac-485/H	34-000512	Both	Occupation mound and historic home site	Canal construction	Potentially eligible
Sacramento River east levee		Historic	Contributing resource to RD 1000	Sacramento River east levee improvements	Eligible
NLIP-1		Historic	Lean-to and shed	Sacramento River east levee improvements	Not eligible
NLIP-2		Historic	Historic debris scatter	Canal construction	Not eligible
NLIP-3		Historic	Farm Complex	Sacramento River east levee improvements	Not eligible
NLIP-4		Historic	Farm Complex	Sacramento River east levee improvements	Not eligible
NLIP-5		Historic	Farm Complex	NCC south levee improvements	Not eligible
NLIP-6		Historic	Farm Complex	NCC south levee improvements	Not eligible
CA-SUT-84H	51-000084	Historic	Natomas Cross Canal/ Pleasant Grove Creek Canal levees	NCC south levee improvements	Eligible
Barney Mound		Prehistoric	Intact occupation mound site	Borrow removal (corner of property)	Potentially eligible
Sankey Road, Riego Road		Historic	Contributing resources to RD 1000	Sacramento River east levee improvements	Eligible

Source: Data compiled by EDAW in 2007

Table 3.8-6
Known Significant or Potentially Significant Cultural Resources that May Be Affected by 2009–2010 Project Elements

Trinomial	P-No.	Historic/ Prehistoric	Description	Project Activity at or Near Resource	NRHP/CRHR Evaluation
CA-Sac-15/H	34-000042	Both	Occupation mound with historic debris	Sacramento River east levee improvements	
CA-Sac-16/H	34-000043	Both	Occupation/burial mound with historic debris and foundations	Borrow removal	Potentially eligible
CA-Sac-160/H	34-000187	Both	Occupation/burial mound with historic farm	Sacramento River east levee improvements	
CA-Sac-164	34-000191	Prehistoric	Occupation/burial site nominated to NRHP	Sacramento River east levee improvements	Eligible
CA-Sac-485/H	34-000512	Both	Occupation mound and historic home site	Sacramento River east levee improvements	Potentially eligible
West Drainage Canal		Historic	Contributing resource to RD 1000	West Drainage Canal improvements	Eligible
Sacramento River east levee		Historic	Contributing resource to RD 1000	Sacramento River east levee improvements	Eligible

Source: Data compiled by EDAW in 2007

IMPACT 3.8-a **Changes to Elements of RD 1000.** *The RD 1000 area has been identified as eligible for inclusion in the NRHP as a Rural Historic Landscape District. The proposed project would alter contributing elements of the district. Mitigation has been implemented by the USACE to compensate for the loss of integrity of the contributing elements of the district that have resulted or would result from USACE flood control projects. SAFCA's proposed project would also alter contributing elements of the drainage system and road system. While the loss of the integrity of the contributing elements may have already been addressed and mitigated through previous flood control projects implemented by the USACE, further impacts on the same or other contributing elements of RD 1000 may result from the proposed project. This impact would be* ***significant****.*

As previously described, an evaluation of RD 1000 was conducted both to determine the NRHP eligibility of the district and to evaluate whether the district would be significantly affected by flood control projects (levee modifications) planned and subsequently implemented by the USACE as part of the American River Watershed Project. RD 1000 was identified as eligible for inclusion in the NRHP as a Rural Historic Landscape District. The "determination of effects" statement concluded that the USACE projects would adversely affect both contributing and noncontributing elements of RD 1000 (see "RD 1000 Rural Historic Landscape District" in Section 3.8.2.4, "Historic Setting," above) by allowing for greater development to occur in the region. As a result, mitigation measures were adopted and incorporated into the USACE's project. These consisted of Historic American Engineering Record documentation, which was prepared by Peak & Associates (1997); videotapes of historic properties; and a list of repositories where copies of the information would be made available to the public.

As part of 2008 construction, SAFCA would alter contributing elements of RD 1000 by:

- raising the NCC south levee and flattening the landside slope,
- constructing an adjacent setback levee along the Sacramento River east levee in Reaches 1–4B with seepage berms, and
- realigning Sankey Road at the intersection with Garden Highway to accommodate changes to the levee resulting from adjacent setback levee construction and raising the Riego Road intersection with Garden highway.

As part of 2009–2010 construction, SAFCA would alter contributing elements of RD 1000 by:

- continuing the adjacent setback levee, with many seepage berms and areas of relief wells near the levee toe, through Sacramento River east levee Reaches 4B–20A; and
- improving the West Drainage Canal to provide giant garter snake habitat.

These changes are consistent with the current land use pattern and the long-term operation of a levee system and rural irrigation and drainage system. However, they may alter or diminish the integrity of contributing elements of the district. These impacts of 2008 and 2009–2010 construction are significant.

Mitigation Measure 3.8-a: Document Alterations Made to Any RD 1000 Contributing Resources and Distribute the Information to the Appropriate Repositories.

Before performing any work that would alter contributing elements of RD 1000, SAFCA shall retain a qualified architectural historian to assess the impact of the work on the district. Because many of the planned improvements are consistent with the operation and long-term maintenance of a levee system, they may be consistent with the character-defining elements of the district. Such impacts would not require further mitigation.

If planned improvements would alter or diminish the integrity of contributing elements of the district, the architectural historian shall examine and review existing documentation regarding the existing structures and

elements (photographs, maps, drawings, and other methods specified in the Historic American Engineering Record standards) and determine whether any augmentation of this documentation is needed. Any additional documentation that is needed shall be distributed to appropriate public repositories.

Implementing Mitigation Measure 3.8-a would reduce the impact on contributing elements of RD 1000 to a **less-than-significant** level.

IMPACT 3.8-b Construction Impacts on Other Known Historic-Era Resources. *Numerous historic cultural resource sites are known to be present in the vicinity of the flood control system in the project area. None of them appear to meet federal significance criteria that make them eligible for listing on the NRHP and CRHR. These resources do not possess the characteristics, as defined under CEQA, of historical resources or unique archaeological resources. Because they are neither historical resources nor unique archaeological resources within the meaning of CEQA, project-related impacts on these sites would be less than significant.*

Previous investigations by Dames & Moore and Far Western, as well as the EDAW effort in 2007, identified a number of historic-era residences, farm complexes, debris scatters, and light industrial remnants. The following historic-era resources would be in the footprint of 2008 project work: P-51-000096H, P-34-001354H, and NLIP-1 through NLIP-6. Although they date to the historic era, these resources all lack association with important historic themes, stylistic values, and data potential that might make them eligible for listing on the CRHR; they are neither historical resources nor unique archaeological resources as defined by CEQA. Therefore, project-related impacts on these sites, structures, and artifacts would be less than significant.

Several prehistoric resources with historic-era components would be in the footprint of the 2009–2010 project elements. These resources are discussed in Impact 3.8-c below.

Mitigation Measure: No mitigation is required.

IMPACT 3.8-c Potential Construction Impacts on Known Prehistoric Resources. *Numerous prehistoric archaeological sites are known to be present in the vicinity of the flood control system in the project area; several of them appear to meet federal significance criteria that make them eligible for listing on the NRHP and CRHR. Project-related impacts on these sites would be significant.*

Project work proposed for 2008 includes canal construction in the vicinity of CA-Sac-485/H, a prehistoric mound site potentially eligible for the NRHP and CRHR, and potential borrow excavation near the Barney Mound. Prehistoric mounds in the Sacramento region typically contain a rich assemblage of burials and associated mortuary goods as well as outlying habitation areas and debris. The majority of these sites have been destroyed by urban development. CA-Sac-485/H and the Barney Mound are potentially eligible for inclusion on the CRHR because they may contain archaeological materials that would be useful in prehistoric research domains. The proposed alignments of the Elkhorn Canal and the new GGS/Drainage Canal were adjusted to accommodate the known boundaries of CA-Sac-485/H. However, this site and the Barney Mound may also contain outlying and ancillary deposits. Despite the adjustment of the proposed canal alignments, the proposed canal construction has the potential to cause a substantial adverse change in the significance this resource. Similarly, borrow excavation could disturb deposits associated with the Barney Mound, causing a substantial adverse change in the significance this resource.

Improvements scheduled for 2009 and 2010 may affect several prehistoric sites with mortuary components: CA-Sac-15/H, CA-Sac-16/H, CA-Sac-160/H, CA-Sac-164, and CA-Sac-485/H, either through Sacramento River east levee improvements or borrow excavation. Because these sites have mortuary components and associated prehistoric materials, they may contain data useful in prehistoric research domains, and are therefore potentially eligible for inclusion on the CRHR. CA-Sac-164 was nominated to the NRHP. Impacts on these resources would be significant.

Mitigation Measure 3.8-c(1): Avoid Ground Disturbance Near Known Prehistoric Archaeological Sites CA-Sac-485/H and the Barney Mound to the Extent Feasible, and Conduct Resource Documentation and Data Recovery at CA-Sac-485/H as Needed.

SAFCA shall implement the following measures to address potential significant impacts on known prehistoric archaeological resources that may be associated with 2008 construction elements.

For CA-Sac-485/H:

- SAFCA and its engineers for canal design and construction shall consult with a qualified professional archaeologist during project design to delineate the extent of potentially significant deposits east of the mapped location of CA-Sac-485/H and shall design ground-disturbing work to avoid the deposits as feasible and practicable.

- The archaeologist shall determine an appropriate radius around the site for monitoring adjacent construction work, and SAFCA shall retain an archaeological monitor and Native American monitor to be present during this work.

- If prehistoric resources are discovered, a professional archaeologist shall assess the significance of the find and recommend additional work such as data recovery to retrieve the materials that convey the significance of the resource.

For the Barney Mound:

- SAFCA and its engineers for borrow excavation shall consult with a qualified professional archaeologist during project design to delineate the extent of potentially significant deposits in the vicinity of the Barney Mound. SAFCA shall restrict all ground disturbance for borrow removal to areas beyond the significant deposits as feasible and practicable..

- SAFCA shall retain an archaeological monitor and Native American monitor to be present during adjacent construction work.

- If prehistoric resources are discovered, a professional archaeologist shall assess the significance of the find and recommend additional work such as data recovery to retrieve the materials that convey the significance of the resource.

Even though it may be possible to avoid resources or recover and preserve them through a treatment plan if disturbance is unavoidable, physical changes to resources eligible for CRHR or NRHR listing may still alter the significance of the resource. Therefore, this impact would remain **significant and unavoidable** with implementation of mitigation.

Mitigation Measure 3.8-c(2): Avoid Ground Disturbance near Known Prehistoric Archaeological Sites CA-Sac-15/H , CA-Sac-16/H, CA-Sac-160/H, CA-Sac-164, and CA-Sac-485/H to the Extent Feasible, and Conduct Resource Documentation and Data Recovery as Needed.

SAFCA shall implement the following measures to address potential significant impacts on known prehistoric archaeological resources that may be associated with 2009–2010 construction elements.

- If ground disturbance may be conducted within 500 feet of known prehistoric resources CA-Sac-15/H, CA-Sac-16/H, CA-Sac-160, CA-Sac-164, or CA-Sac-485/H, SAFCA and its engineers for levee design and construction shall consult with a qualified professional archaeologist during project design to delineate the extent of potentially significant deposits around the recorded locations. If feasible and practicable, the project activities shall be designed to avoid disturbance of the resource. The archaeologist shall determine an

appropriate radius around the site for monitoring adjacent construction work, and SAFCA shall retain an archaeological monitor and Native American monitor to be present during this work.

- If, in the judgment of the archaeologist, project activities would disturb the resource and these impacts cannot be avoided, the archaeologist shall prepare and implement a research design and treatment plan. Before any construction-related ground disturbance begins in the vicinity of the resource, a professional archaeologist shall carry out a testing program based on the plan to determine whether the resource meets the definition of a unique archaeological resource or a historical resource as defined by CEQA. If the construction activity is part of a federal undertaking, all actions shall be conducted in compliance with Section 106 of the NHPA.

If the resource is determined to be ineligible for listing on the CRHR or the NRHP, no further mitigation is required. If the resource appears to meet the definition of a unique archaeological resource or a historical resource or property (under NHPA), the archaeologist shall perform a program of data recovery in coordination with a Native American monitor to retrieve the materials that convey the significance of the resource.

Even though it may be possible to avoid resources or recover and preserve them through a treatment plan if disturbance is unavoidable, physical changes to resources eligible for CRHR or NRHR listing may still alter the significance of the resource. Therefore, this impact would remain **significant and unavoidable** with implementation of mitigation.

IMPACT 3.8-d Damage to or Destruction of Previously Undiscovered Cultural Resources. *Previously unknown cultural resources could be present in areas that would be subject to construction disturbance and could be damaged or destroyed by project construction. This potential impact would be significant.*

Sacramento Valley floodplains and riverbanks were extensively occupied and used by prehistoric populations. Prehistoric occupation sites frequently took the form of mounds raised above the natural ground surface, but the upper portions of many of these sites have been destroyed by modern agricultural cultivation of fields, and the remains of these sites are thus no longer easily visible above ground. Additionally, intermittent flooding deposited layers of alluvium over prehistoric deposits, leaving these resources intact below grade with no surface manifestations. The buried and truncated nature of these resources makes accurate prediction of their location before construction impossible.

Much of the footprint of the proposed construction activity for 2008 could not be surveyed for this EIR because of lack of access or ground visibility. In these unsurveyed areas and also in areas that have been surveyed, construction excavation, grading, and other ground-disturbing activities could encounter and damage previously unknown cultural resources that are historical or unique resources under CEQA. This potential impact would be significant.

Mitigation Measure 3.8-d: Perform Research and/or Surveys, Brief Workers Before Construction, Monitor Construction, Halt Potentially Damaging Activities, Investigate and Avoid Resources to the Extent Feasible, and Conduct Resource Documentation and Data Recovery as Needed.

SAFCA and its primary construction contractors shall ensure that the following measures are implemented to reduce the potential for previously undiscovered cultural resources to be encountered and damaged during project construction activities:

- A qualified archaeologist shall survey of all accessible portions of the proposed areas of project disturbance if they have not been surveyed within the previous 5 years, and shall document and evaluate the significance of any resources that are found during the surveys. If any resources are found during the surveys that may be considered historical or unique resources under CEQA, the steps described in Mitigation measure 3.8-c for known resources shall be followed.

- Before construction begins, a qualified professional archaeologist shall give a presentation and training session to all construction personnel so that they can assist with identification of undiscovered cultural materials and avoid them where possible.

- A qualified archaeologist shall monitor all ground-disturbing construction activities along the Sacramento River east levee and at other locations determined by the archaeologist to be sensitive for subsurface cultural resource deposits. If a previously unidentified archaeological resource is uncovered during construction, construction activities shall be halted within 50 feet of the find and the construction contractor, SAFCA, and other appropriate parties shall be notified regarding the discovery. The archaeologist shall determine whether the resource is significant under CEQA or the NHPA and shall develop appropriate mitigation. If the resource is found to be a unique archaeological resource or a historical resource, the archaeologist shall recommend additional actions deemed necessary for the preservation or documentation of the resource. Such actions may include (but shall not be limited to) measures such as testing for subsurface features, additional background research, additional resource documentation, avoidance of the resource, or additional monitoring of construction activity to minimize any effects. SAFCA shall ensure that necessary protection actions are implemented before construction resumes within 50 feet of the site. The preferred mitigation is preservation in place of as much of the resource as possible through project modification or protective measures. In many cases, archaeological data recovery can mitigate impacts to a less-than-significant level. However, construction activities may encounter unique or historical archaeological resources that cannot be protected or recovered and for which adequate data recovery may not be feasible.

The deep excavation for levee improvements such as construction of cutoff walls requires work where monitoring will reveal resources only after they are excavated. Preconstruction studies and surveys, avoidance measures, and monitoring are the feasible mitigation measures for these resources. It may be possible to avoid resources or recover and preserve them through a treatment plan if disturbance is unavoidable; however, physical changes to resources eligible for CRHR or NRHR listing may still alter the significance of the resource, and construction activities may encounter resources that cannot be protected and recovered and for which adequate data recovery may not be feasible. Therefore, this potential impact would remain **significant and unavoidable** with implementation of mitigation.

IMPACT 3.8-e Discovery of Human Remains during Construction. *Buried human remains could be encountered during project construction, causing damage to or destruction of such remains. This potential impact would be significant.*

Prehistoric human remains have been found at several prehistoric sites in the project area. Previously unknown buried human remains may be unearthed, damaged, or destroyed during excavation activities associated with project construction. Damage to or destruction of human remains would be a significant impact.

Mitigation Measure 3.8-e: Halt Work Within 50 Feet of the Find, Notify the County Coroner and Most Likely Descendant, and Implement Appropriate Treatment of Remains.

SAFCA and its primary construction contractors shall ensure that the following measures are implemented to address the potential discovery of human remains during construction.

- If human remains are uncovered during ground-disturbing activities, all ground-disturbing activities shall cease within a 50-foot radius of the find, and SAFCA or its designated representative shall be notified. In accordance with the California Health and Safety Code, if human remains are uncovered during ground-disturbing activities, SAFCA and/or the contractor shall notify the county coroner of the county in which the remains are uncovered (Sutter or Sacramento) and a professional archaeologist to determine the nature of the remains. The coroner is required to examine all discoveries of human remains within 48 hours of receiving notice of a discovery on private or state lands (Health and Safety Code Section 7050.5[b]). If the coroner determines that the remains are those of a Native American, he or she must contact the NAHC by phone

within 24 hours of making that determination (Health and Safety Code Section 7050[c]). The NAHC will designate a Most Likely Descendant (MLD) to dispose of the remains with appropriate dignity.

- After a determination that the remains are of prehistoric Native American origin, SAFCA shall coordinate with the MLD for reburial of the remains and associated grave goods in an appropriate location. If the MLD fails to make a recommendation or reinter the remains, further treatment will conform to PRC Section 5097 et seq. and other appropriate authorities.

- The discovery of prehistoric burials often reveals locations sensitive for the occurrence of additional archaeological material. After the initial discovery and management of human remains, a professional archaeologist working on behalf of SAFCA shall record the site with the NAHC and the appropriate Information Center and, if possible, use project features to protect the site from future disturbance.

Even though measures would be implemented to avoid human remains or, if found, to dispose of the remains with appropriate dignity, future disturbance to additional archaeological material at the site could still occur after the initial discovery and management of human remains. Therefore, this potential impact would remain **significant and unavoidable** with implementation of mitigation.

3.9 PALEONTOLOGICAL RESOURCES

Paleontological resources (fossils) are the remains or traces of prehistoric animals and plants that are 10,000 years old or older. This section assesses the potential for earthmoving activities associated with the proposed project to affect scientifically important fossil remains.

3.9.1 REGULATORY SETTING

No federal, state, or local plans, policies, regulations, laws, or ordinances related to paleontological resources are relevant to this analysis.

3.9.2 ENVIRONMENTAL SETTING

3.9.2.1 REGIONAL GEOLOGY

The project area is located in the Sacramento Valley portion of the Great Valley Geomorphic Province and the transition between the valley and the Sierra Nevada foothills. The Great Valley is composed of thousands of feet of sedimentary deposits that have undergone periods of subsidence and uplift over millions of years. During the Jurassic and Cretaceous periods of the Mesozoic era, the Great Valley existed in the form of an ancient ocean. By the end of the Mesozoic, the northern portion of the Great Valley began to fill with sediment as tectonic forces caused uplift of the basin. By the time of the Miocene epoch, approximately 24 million years ago, sediments deposited in the Sacramento Valley were mostly of terrestrial origin.

Most of the surface of the Great Valley is covered with Recent (i.e., Holocene, 10,000 years Before Present [B.P.] to present day) and Pleistocene (i.e., 10,000–1,800,000 years B.P.) alluvium. This alluvium is composed of sediments from the Sierra Nevada to the east and the Coast Range to the west that were carried by water and deposited on the valley floor. Siltstone, claystone, and sandstone are the primary types of sedimentary deposits.

3.9.2.2 PALEONTOLOGICAL RESOURCES BY ROCK UNIT

Holocene Alluvium

Sediments adjacent to the Sacramento and American Rivers are composed of Recent (Holocene) alluvial floodplain deposits (Wagner et al. 1987). In general, these deposits consist primarily of unconsolidated sand and silt. Holocene alluvial deposits overlay an older alluvial fan system composed of Pleistocene-age sediments. Construction activities that would occur within alluvial floodplain or basin deposits would be located within Holocene sediments. By definition, sediments associated with Holocene-age alluvium are too young to contain paleontologically sensitive resources.

Riverbank and Modesto Formations

Piper et al. (1939) were the first to publish detailed geologic maps in the southern Sacramento/northern San Joaquin Valley areas, and they designated the older alluvial Pleistocene deposits as the Victor Formation. However, Davis and Hall (1959) proposed a subdivision of the Victor Formation into the Turlock Lake (oldest), Riverbank (middle), and Modesto (youngest) formations. Marchand and Allwardt (1981) proposed that the name Victor Formation be abandoned and that the Turlock Lake, Riverbank, and Modesto Formations be adopted as formal nomenclature for Quaternary deposits in the Sacramento and San Joaquin Valleys. Most later researchers have followed this recommendation.

In the Sacramento Valley, the Modesto Formation is composed of alluvial terraces, some alluvial fans, and some abandoned channel ridges of the Sacramento River. The Modesto Formation can be divided into upper and lower members. The upper member is composed primarily of unconsolidated, unweathered, coarse sand and sandy silt.

The age of this member has been placed at approximately 12,000–26,000 years B.P. (Atwater cited in Helley and Harwood 1985). The lower member of the Modesto Formation is composed of consolidated, slightly weathered, well-sorted silt and fine sand, silty sand, and sandy silt. Age estimates for the lower member range from 29,000 to 42,000 years BP (Marchand and Allwardt 1981, cited in Helley and Harwood 1985).

Sediments in the Riverbank Formation consist of weathered reddish gravel, sand, and silt that form alluvial terraces and fans. In the Sacramento Valley, this formation tends toward soil-profile developments that are more easily distinguishable from the Modesto Formation (Helley and Harwood 1985). The Riverbank Formation is Pleistocene in age (Wagner et al. 1987), but it is considerably older than the Modesto Formation; estimates place the age of the Riverbank between 130,000 and 450,000 years B.P. (Helley and Harwood 1985). The Riverbank Formation forms alluvial fans and terraces of the Sacramento River. The Riverbank's fans and terraces are higher in elevation and generally have a more striking topography than those formed by the Modesto Formation.

Remains of land mammals have been found at a number of localities in alluvial deposits referable to the Riverbank and Modesto Formations. Jefferson (1991a, 1991b) compiled a database of California Late Pleistocene vertebrate fossils from published records, technical reports, unpublished manuscripts, information from colleagues, and inspection of museum paleontological collections at more than 40 public and private institutions. Jefferson lists three nearby sites in Sutter County that have yielded Rancholabrean vertebrate fossils recovered from Pleistocene-age sediments. In addition, the University of California, Berkeley Museum of Paleontology (UCMP) Database lists several localities in the project area where fossils were recovered from sediments referable to the Riverbank Formation or the Modesto Formation.

There are at least eight recorded Rancholabrean-age vertebrate fossil sites from the Riverbank Formation within the Sacramento city limits (Hilton et al. 2000, UCMP 2006, Kolber 2004). These sites have yielded remains of mammoth, bison, coyote, horse, camel, antelope, several types of reptiles, and Harlan's ground sloth.

Fossil specimens from the Riverbank and Modesto Formations have been reported by Marchand and Allwardt (1981) near their type localities in the cities of Riverbank and Modesto, respectively. Other locations are also known throughout the northern and central valley (UCMP 2006). For example, there are several sites approximately 20–30 miles away in Yolo County, near the cities of Davis and Woodland, that have yielded Rancholabrean-age rodents, snakes, horses, antelope, Harlan's ground sloth, mammoth, and saber-toothed tiger from sediments referable to the Riverbank or Modesto Formations (Hay 1927, UCMP 2006).

As shown in Exhibit 3.9-1, the project area and portions of the Reclamation District (RD) 1001 borrow site contain areas of both the Modesto Formation and the Riverbank Formation.

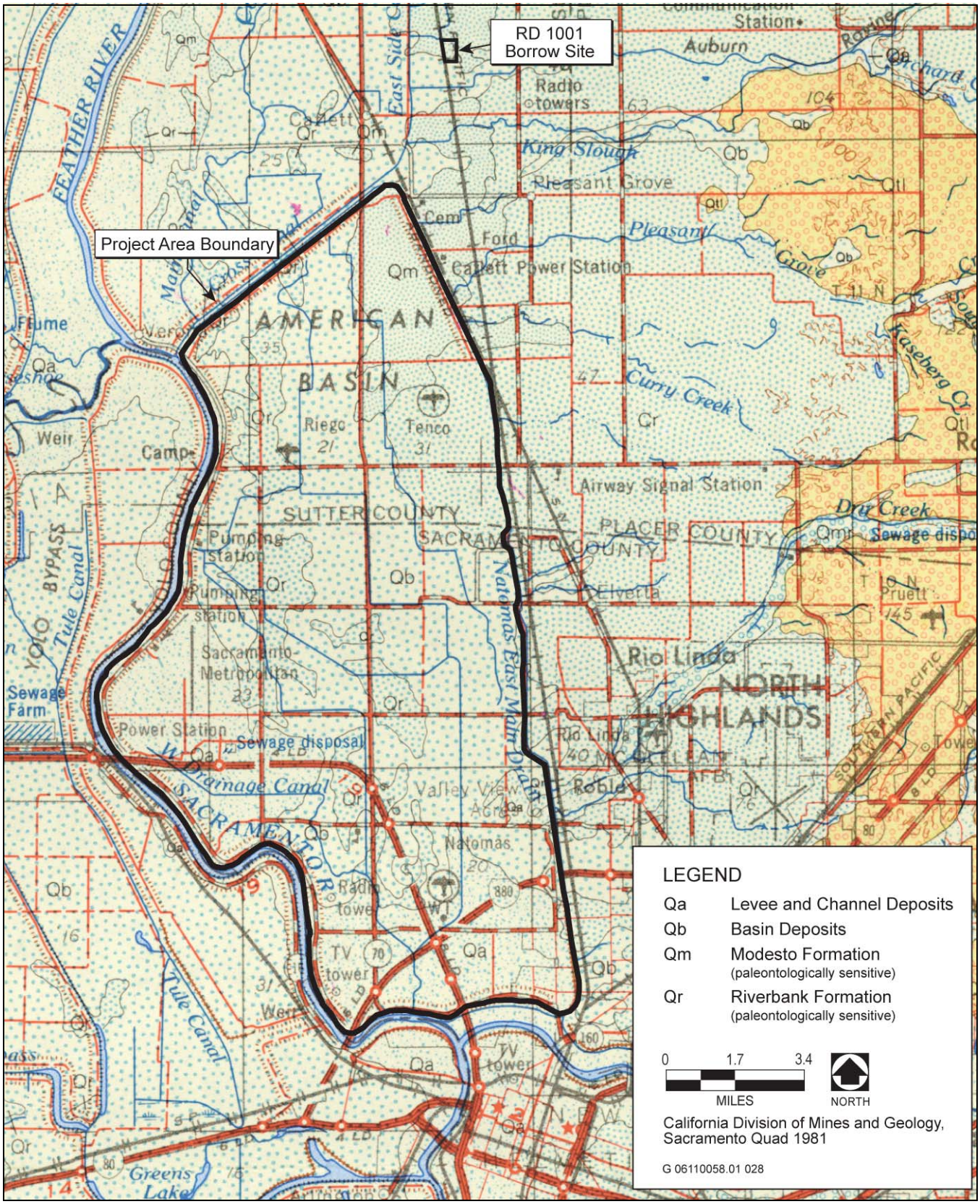
3.9.3 ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Geologic maps and reports covering the geology of the project area were reviewed to determine the exposed rock units and to delineate their respective aerial distributions in areas where construction-related excavation may occur.

3.9.3.1 SIGNIFICANCE CRITERIA

The thresholds for determining the significance of impacts for this analysis are based on the environmental checklist in Appendix G of the State CEQA Guidelines. The proposed project was considered to have a significant effect on paleontological resources if it would:

- destroy a unique paleontological resource or site.



Source: Wagner et al. 1987

Rock Formations in the Project Area **Exhibit 3.9-1**

The Society of Vertebrate Paleontology (SVP), a national scientific organization of professional vertebrate paleontologists, has established standard guidelines that outline professional practices for the conduct of paleontological resource assessments and surveys, monitoring and mitigation, data and fossil recovery, sampling procedures, specimen preparation, analysis, and curation. The SVP (1995) established three categories of sensitivity for paleontological resources—high, low, and undetermined—as described below.

- **High sensitivity.** Areas where fossils have been previously found are considered to have a high sensitivity and a high potential to produce fossils. In areas of high sensitivity that are likely to yield unique paleontological resources, full-time monitoring is typically recommended during any project ground disturbance.

- **Low sensitivity**. Areas that are not sedimentary in origin and that have not been known to produce fossils in the past typically are considered to have low sensitivity, and monitoring is usually not needed during project construction.

- **Undetermined sensitivity.** Areas or rock formations that have not had any previous paleontological resource surveys or fossil finds are considered undetermined until surveys and mapping are performed to determine their sensitivity. After reconnaissance surveys, observation of exposed cuts, and possibly subsurface testing, a qualified paleontologist can determine whether the area should be categorized as having a high or low sensitivity.

A paleontologically important rock unit is one that has a high potential paleontological productivity rating and is known to have produced unique, scientifically important fossils. The potential paleontological productivity rating of a rock unit exposed at a project site refers to the abundance/densities of fossil specimens and/or previously recorded fossil sites in exposures of the unit in and near the project site. Exposures of a specific rock unit at the project site are most likely to yield fossil remains representing particular species in quantities or densities similar to those previously recorded from the unit in and near the project site.

An individual vertebrate fossil specimen may be considered unique or significant if it is identifiable and well preserved and it meets one of the following criteria:

- a type specimen (i.e., the individual from which a species or subspecies has been described);

- a member of a rare species;

- a species that is part of a diverse assemblage (i.e., a site where more than one fossil has been discovered) wherein other species are also identifiable, and important information regarding life history of individuals can be drawn;

- a skeletal element different from, or a specimen more complete than, those now available for its species; or

- a complete specimen (i.e., all or substantially all of the entire skeleton is present).

For example, identifiable vertebrate marine and terrestrial fossils are generally considered scientifically important because they are relatively rare. The value or importance of different fossil groups varies, depending on the age and depositional environment of the rock unit that contains the fossils, their rarity, the extent to which they have already been identified and documented, and the ability to recover similar materials under more controlled conditions such as through a research project. Marine invertebrates are generally common, well developed, and well documented. They would generally not be considered a unique paleontological resource.

3.9.3.2 IMPACT ANALYSIS

IMPACT 3.9-a **Disturbance of Unknown Unique Paleontological Resources during Earthmoving Activities.** *Portions of project construction areas and borrow sites are underlain by the Riverbank and Modesto Formations, which are paleontologically sensitive rock formations. Excavations in the Riverbank or Modesto Formations could damage unknown, subsurface unique paleontological resources. This potential impact would be* ***significant.***

By definition, sediments associated with Holocene-age alluvium are too young to contain paleontologically sensitive resources. Therefore, earthmoving activities in any of these sediments would result in no impacts on paleontological resources.

However, the discovery of Pleistocene vertebrate fossil remains in sediments referable to the Riverbank and Modesto Formations from Sutter and Sacramento Counties, as well as Davis, Woodland, and numerous other areas throughout the Central Valley, suggests there is a potential for uncovering additional similar fossil remains during construction-related deep excavation within portions of the project area.

Because of the number of recorded fossil sites in the Riverbank and Modesto Formations within the Central Valley, they are both considered paleontologically sensitive rock formations under SVP criteria. Certain construction activities in the Riverbank or Modesto Formations, such as enhancing levee embankments or forming berms on top of the existing ground surface, would not cause adverse impacts on resources because Pleistocene-age fossils would not be encountered until approximately 10 feet below ground surface. However, excavations deeper than 10 feet (e.g., for borrow excavation and for the installation of relief wells) in the Riverbank Formation or the Modesto Formation have the potential to encounter and possibly damage unique paleontological resources.

Several anticipated and alternative borrow sites for 2008 construction overlie areas of Modesto and/or Riverbank Formation: portions of the Vestal, Spangler, and Nestor properties; all of the Brookfield property; portions of the Airport north bufferlands; and the RD 1001 site. Although the end result of excavation and restoration of most of the borrow sites (all except the RD 1001 site) would be a reduction in ground elevation of only 2–3 feet, soils are likely to be excavated to greater depths in some parts of these sites and then the remainder of the soil moved and graded to achieve an overall level landscape. There is the potential that unique paleontological resources could be encountered in excavation at depths of 10 feet or more. Of the areas of 2008 construction, only a few portions of the NCC south levee and small portions of Reaches 2 and 4A along the Sacramento River east levee also overlie the Riverside and/or Modesto Formation. Deep excavation, for cutoff wall construction, would be conducted at only one of the sites along the NCC south levee. Of the areas potentially excavated as part of the 2009–2010 construction, small areas around Fisherman's Lake and all of the PGCC overlie paleontologically sensitive rock units. Deep excavation is not anticipated for the PGCC west levee improvements, but borrow excavation on some properties in the Fisherman's Lake area could be deep enough to encounter fossils, should they be present.

Because deep excavation, mainly associated with borrow activity, in 2008 and 2009–2010 has the potential to destroy unique paleontological resources, this potential impact would be significant.

Mitigation Measure 3.9-a: Conduct Construction Personnel Training and, If Paleontological Resources Are Found, Cease Work in the Vicinity of the Find and Implement Mitigation in Coordination with a Professional Paleontologist.

Before the start of construction activities in the Riverbank Formation or the Modesto Formation, construction personnel involved with earthmoving activities shall be informed of the possibility of encountering fossils, the appearance and types of fossils likely to be seen during construction activities, and proper notification procedures should fossils be encountered. This worker training may be either (1) prepared and presented by an experienced field archaeologist at the same time as construction worker education on cultural resources or (2) prepared and presented separately by a qualified paleontologist.

If paleontological resources are discovered during earthmoving activities, the construction crew shall immediately cease work in the vicinity of the find. SAFCA shall retain a qualified paleontologist to evaluate the resource and prepare a proposed mitigation plan in accordance with SVP guidelines (1995). The proposed mitigation plan may include a field survey, construction monitoring, sampling and data recovery procedures, museum storage coordination for any specimen recovered, and a report of findings. Recommendations determined by SAFCA to be necessary and feasible shall be implemented before construction activities can resume at the site where the paleontological resources were discovered.

Implementing this mitigation measure would reduce potential impacts on unknown unique paleontological resources to a **less-than-significant** level.

3.10 TRANSPORTATION AND CIRCULATION

This section describes the traffic and circulation characteristics of the existing transportation corridors in the project vicinity and analyzes the potential impacts of the proposed project on traffic circulation and transportation systems. This section also analyzes the project's potential impacts related to emergency vehicle access and construction traffic hazards. Effects on flight safety related to operation of Sacramento International Airport (Airport) are addressed in Section 3.16, "Hazards and Hazardous Materials."

3.10.1 REGULATORY SETTING

3.10.1.1 FEDERAL AND STATE

Federal highway standards are implemented in California by the California Department of Transportation (Caltrans), which is responsible for planning, designing, constructing, operating, and maintaining all state-owned roadways in the Natomas Basin. Caltrans enforces various policies and regulations related to the modification of, or encroachment on, state-owned roadways.

3.10.1.2 LOCAL

The public works departments of Sutter County, Sacramento County, and the City of Sacramento are responsible for planning, designing, constructing, operating, and maintaining all the roadways in the Natomas Basin that are owned by these respective jurisdictions. Encroachments in county or city road rights-of-way are subject to encroachment permits and the provision of temporary traffic control systems as required by the respective public works departments.

3.10.2 ENVIRONMENTAL SETTING

3.10.2.1 ROADWAY NETWORK

The roadways in the project area are described in Table 3.10-1 and shown in Exhibits 2-2 and 2-8.

Table 3.10-1
Project Area Roadway Network

Roadways	Description
SR 99/70	SR 99/70 is a primary regional transportation corridor within Sutter County and supports north-south regional travel. SR 99 extends from I-5 in the project area north through Sacramento and Sutter Counties to the Butte County line. The roadway has two to four lanes over its length and provides regional access to the Sacramento metropolitan area in the south and the cities of Gridley and Chico in the north. SR 70 serves as the north-south regional travel corridor providing connection to Butte County to the north and Sacramento County to the south. SR 70 is a two-lane roadway that extends from the Yuba County line in the north, south to a junction with SR 99. At the junction with SR 99, SR 70 continues south as SR 99/70 to the Sacramento County line. The roadway provides regional access to the cities of Sacramento and Marysville.
I-5	I-5 is a primary regional transportation corridor within Sacramento County, providing connection between the city and county of Sacramento and Yolo County. It provides primary access to the Airport just west of Powerline Road.
I-80	I-80 is a primary regional transportation corridor within the city and county of Sacramento, intersecting I-5 just south of San Juan Road.

Table 3.10-1
Project Area Roadway Network

Roadways	Description
Garden Highway	Garden Highway is a north/south two-lane roadway that extends north from the Sacramento city limits along the Sacramento River to Yuba City. Garden Highway serves as an alternative north/south route to SR 99.
Howsley Road	Howsley Road is an east/west two-lane roadway that intersects SR 99/70 at the Natomas Cross Canal and crosses the Pleasant Grove Creek Canal and connects with Pleasant Grove Road just west of the Sutter/Placer County line.
Natomas Road	Natomas Road is a north/south two-lane roadway on top of the west levee of the Pleasant Grove Creek Canal in Sutter County. It extends south from Howsley Road and becomes East Levee Road between Riego Road and West Elverta Road.
Pacific Avenue	Pacific Avenue is a north/south two-lane roadway that extends from Striplin Road to Howsley Road in Sutter County.
Powerline Road	Powerline Road is a north/south two-lane roadway that parallels SR 99/70, providing an alternate north/south route to Garden Highway and SR 99/70 from Sankey Road in Sutter County to Garden Highway in Sacramento County.
Riego Road	Riego Road is an east/west two-lane roadway extending from Garden Highway in Sutter County to Base Line Road in Placer County.
Sankey Road	Sankey Road is an east/west two-lane roadway in Sutter County that extends from Garden Highway east across SR 99/70.
Striplin Road	Striplin Road is an east/west two-lane roadway that extends from Garwood Road to Pacific Avenue in Sutter County.
West Elverta Road	West Elverta Road is an east/west two-lane roadway in Sacramento County at the north/south midpoint of the Natomas Basin that extends from Garden Highway east across SR 99/70.
Elkhorn Boulevard	Elkhorn Boulevard is an east/west two-lane roadway in Sacramento County between Powerline Road and SR 99/70 and extending into the city of Sacramento to the east.
West Elkhorn Boulevard	West Elkhorn Boulevard is an east/west two-lane roadway in Sacramento County that extends from Garden Highway to west of Sacramento International Airport.
Del Paso Road	Del Paso Road is an east/west two- to four-lane roadway that extends eastward across the basin from Powerline Road in Sacramento County across I-5 to the Natomas East Main Drainage Canal/Steelhead Creek in the city of Sacramento.
San Juan Road	San Juan Road is an east/west two-lane roadway that connects the Garden Highway in Sacramento County to I-5 and the city of Sacramento.
El Centro Road	El Centro Road is a north/south two- to four-lane roadway in Sacramento County and the city of Sacramento that extends south from Del Paso Road to West El Camino Avenue.
West El Camino Avenue	West El Camino Avenue is an east/west four-lane roadway in the city of Sacramento that connects I-5 with El Centro Road.

Notes: I-5 = Interstate 5; I-80 = Interstate 80; SR = State Route

3.10.2.2 TRAFFIC VOLUMES AND LEVEL OF SERVICE CONDITIONS

All the roadways north of Interstate 5 (I-5) in the vicinity of the project sites and borrow areas are rural two-lane roads with low traffic volumes. Below I-5, nearer to and within the city of Sacramento, the roads are also two lanes but have higher use. Data on traffic volumes are available for only a few of the roadways listed above. The use of some of these roadways can also be characterized in terms of Level of Service (LOS). LOS is a qualitative description of operation of a roadway segment based on delay and maneuverability that is often calculated by counties' congestion management agencies. It can range from "A," representing free-flow conditions, to "F," representing gridlock (Table 3.10-2).

Table 3.10-2
Level of Service Descriptions

LOS	Description
A	Free-flow travel with an excellent level of comfort and convenience and the freedom to maneuver.
B	Stable operating conditions, but the presence of other road users causes a noticeable, though slight, reduction in comfort, convenience, and maneuvering freedom.
C	Stable operating conditions, but the operation of individual users is substantially affected by the interaction with others in the traffic stream.
D	High-density, but stable flow.
E	Operating conditions at or near capacity. Speeds are reduced to a low but relatively uniform value. Freedom to maneuver is difficult with users experiencing frustration and poor comfort and convenience. Unstable operation is frequent, and minor disturbances in traffic flow can cause breakdown conditions. Severe restriction in speed and freedom to maneuver, with poor levels of comfort and convenience.
F	Breakdown conditions. These conditions exist wherever the volume of traffic exceeds the capacity of the roadway. Long queues can form behind these bottleneck points with queued traffic traveling in a stop-and-go fashion.

Source: City of Sacramento 2005

The *Sutter County General Plan Background Report* (Sutter County 1996) contains the most recent traffic count and LOS data for roadways in the northern part of the Natomas Basin. In the general plan background report, Garden Highway between Sankey Road and Riego Road was rated LOS A, with an average daily traffic (ADT) volume of 340. SR 99/70 was rated LOS C with an ADT volume of 22,000. Riego Road was rated at LOS A with an ADT volume of 540, and Sankey Road was rated LOS A with an ADT volume of 440. LOS data were not available for the Natomas Basin portion of unincorporated Sacramento County. However, given that similar land uses exist south of the Sutter County line and west of SR 99/70, traffic volumes and conditions are expected to be similar.

The most recent annual traffic counts performed for select roadways by Sacramento County Department of Transportation (August 17 and 18, 2006) show the daily traffic volume on Powerline Road north of Elverta Road to be between 250 and 270 in each direction (Sacramento County 2007a). Data on other Sacramento County roads in the project area are not available.

City of Sacramento traffic count data (City of Sacramento 2007) indicate an average one-way ADT of 381 on San Juan Road between El Centro Road and Garden Highway (April 2003 data). The *City of Sacramento General Plan Background Report* (City of Sacramento 2005) and the July 2006 DEIR for the Greenbriar Development Project (City of Sacramento and Sacramento LAFCo 2006) contain LOS data for roadways for the portions of the southern Natomas Basin that are within Sacramento's city limits and sphere of influence. The city regards LOS C as unacceptable. Elkhorn Boulevard west of the SR 99/70 interchange operates at LOS A. San Juan Road, West El Camino Avenue, and Garden Highway are shown as operating at LOS A through LOS C, depending on time of day.

Segments of I-80, I-5, and SR 99/70 operate at LOS D or below during commute hours, with heavy traffic occurring during the morning hours in the direction of job centers (e.g., downtown Sacramento) and in the afternoon/evening hours in the opposite direction. According to the Sacramento International Airport Master Plan EIR (Sacramento County 2007b), I-5 between Airport Boulevard in Sacramento County and County Road 22 on the Yolo County side of the Sacramento River operates at LOS B or C in both directions during peak hours.

3.10.3 ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

The following analysis is focused on construction-related traffic effects because long-term project operation would have no effects on transportation and circulation. Traffic standards such as LOS are used typically for analyzing potential long-term effects of projects on traffic flow and were not used in this analysis.

3.10.3.1 SIGNIFICANCE CRITERIA

The thresholds for determining the significance of impacts for this analysis are based on the environmental checklist in Appendix G of the State CEQA Guidelines. The proposed project was determined to result in a significant effect on transportation and circulation if it would:

- cause an increase in traffic that is substantial in relation to the existing traffic load and capacity of the street system;
- exceed, either individually or cumulatively, an LOS standard established by the county congestion management agency for designated roads or highways;
- result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks;
- substantially increase hazards due to a design feature or incompatible uses;
- result in inadequate emergency access;
- result in inadequate parking capacity; or
- conflict with adopted policies, plans, or programs supporting alternative transportation.

Several of these thresholds do not apply to this analysis, as described below.

As noted above, LOS is used for analyzing long-term effects of projects on traffic flow. The proposed project would have no long-term traffic effects. New project facilities would not change landforms or land uses in ways that would affect transportation and circulation. The project does not involve changes to air traffic levels or other airport operations that would affect air traffic patterns.

All construction-related vehicles (i.e., equipment and worker vehicles) would be parked at construction staging areas, which would be away from any public roadways. No public parking facilities would be affected by the parking of construction-related equipment and worker vehicles.

The proposed project would not directly or indirectly eliminate alternative transportation corridors or facilities (e.g., bike paths, lanes, bus turnouts), both because of facility locations and because of the short-term nature of construction activities where potential effects could occur. In addition, the project would not include changes in policies or programs that support alternative transportation. Therefore, the proposed project would not conflict with adopted policies, plans, or programs supporting alternative transportation. These issues are not discussed further in this EIR.

With regard to the first significance criterion, the following screening criterion is recommended by the Institute of Transportation Engineers (ITE) (1989) for assessing the effects of development projects that create permanent traffic increases: "In lieu of other locally preferred thresholds, a traffic access/impact study should be conducted whenever a proposed development will generate 100 or more added (new) peak-direction trips to or from the site during the adjacent roadway's peak hours or the development's peak hours." For construction projects that create temporary traffic increases, this criterion is considered conservative by ITE (1989). However, it is intended to assess the effect of a traffic mix consisting primarily of automobiles and light trucks. To account for the large percentage of heavy trucks associated with a typical construction project, the threshold level is reduced to 50 or more new peak-direction trips. Consequently, a construction project would be considered to have a significant impact on traffic (i.e., would be considered to cause an increase in traffic that is substantial in relation to the existing traffic load and capacity of the street system) if the project would result in 50 or more new truck trips during the a.m. or p.m. peak hour.

3.10.3.2 IMPACT ANALYSIS

IMPACT 3.10-a **Temporary Increase in Traffic on Local Roadways during Construction.** *During the project's 6-month construction periods in each construction season (2008–2010), commute trips by construction workers and haul truck trips would increase traffic on local roadways. Construction-related trips could exceed the thresholds established by the ITE for temporary traffic increases on some local roadways during peak construction periods. Therefore, this impact would be* ***significant.***

Project construction would have a temporary but substantial effect on traffic during each of the three construction seasons (May to November in 2008–2010). Construction-related traffic would consist of daily commute trips by construction workers and truck trips to haul materials and supplies from outside the project vicinity, as well as truck trips to haul waste materials off-site for disposal, resulting in increased traffic levels on local roadways described in Table 3.10-1.

2008 Construction: The 2008 labor force for construction on the Natomas Cross Canal (NCC) south levee, the Sacramento River east levee Reaches 1–4B, and the Elkhorn Canal realignment and new GGS/Drainage Canal construction is estimated to reach a high of about 175–200 workers over the 6-month construction period. Construction-related commute traffic, therefore, could reach a total of 175–200 trips during the peak morning and evening commute hours at times of peak construction activity. However, construction crew members would travel to the construction sites from different directions and by way of different sets of roadways and intersections. It is also likely that some ridesharing would take place. Therefore, 175–200 trips is a conservative estimate of the maximum increase in commute traffic volume that may be associated with project construction, and this volume would likely be spread across vehicles arriving from different directions.

Approximately 90 truck round trips would be required to transport the contractor's equipment to the NCC south levee project area. A similar number of round trips would be needed to remove the equipment from both sites as the work is completed. Construction along the NCC south levee in 2008 would involve haul trucks carrying borrow material from the Reclamation District (RD) 1001 borrow site, as shown in Exhibit 2-22. Haul routes may include SR 99/70, Pacific Avenue, Striplin Road, Catlett Road, and Howsley Road and the unpaved levee maintenance access road. Personnel, equipment, and other imported construction materials would reach the NCC south levee construction areas mainly via these roadways, Garden Highway, Sankey Road, Riego Road, and Powerline Road, shown in Exhibit 2-22. For the NCC south levee improvements, haul trucks would make approximately 400-500 daily trips to deliver borrow material to the project site.

Approximately 110 round trips would be required to transport the contractor's equipment to Sacramento River east levee Reaches 1–4B. A similar number of round trips would be needed to remove the equipment from both sites as the work is completed. Construction along Sacramento River east levee Reaches 1–4B and the Elkhorn and GGS/Drainage Canals between the North Drainage Canal and Elkhorn Reservoir would involve haul trucks carrying borrow material from a combination of the borrow sites using the routes shown in Exhibit 2-25. These routes include SR 99/70, Sankey Road, Riego Road, Elverta Road, Powerline Road, and Garden Highway. An unpaved access road

would be constructed parallel to the Sacramento River east levee to allow equipment to move up and down the levee during construction. Personnel, equipment, and other imported construction materials would reach the Sacramento River east levee construction areas mainly via these roadways. For 2008 construction along Reaches 1–4B of the Sacramento River east levee, haul trucks would make approximately 980 daily trips from borrow sites to deliver fill material and additional trips to deliver drain rock and other materials, for a total of approximately 1,300 daily truck trips on public roadways, which would likely be different from those used for hauling to the NCC south levee construction areas. However, given the amount of construction activity proposed and the amount of off-site borrow material required, based on the assumption that hauling may take place for 10–14 hours per day, it is likely that truck traffic would at times exceed the ITE threshold of 50 trucks in the peak direction during the a.m. or p.m. peak hour on some local roadways for the Sacramento River east levee construction effort alone. Therefore, the increase in traffic on local roadways associated with 2008 construction trips would be significant.

2009–2010 Construction: Improvements proposed to be constructed in 2009–2010 include those along the remainder of the Sacramento River east levee in the project area (Reaches 4B–20A) and the Elkhorn and GGS/Drainage Canals, the Riverside Canal relocation, Airport West Ditch modifications, and Pleasant Grove Creek Canal (PGCC) west levee improvements. It is anticipated that the levee improvements in Sacramento River Reaches 4B–6A and 9B–11 would be constructed in 2009, and the improvements in Reaches 6B–9A and 12–20A would occur in 2010. The Sacramento River east levee improvements and canal relocations may use borrow from the Airport bufferlands north and south of the Airport operations area and from parcels in the Fisherman's Lake area (Exhibit 2-8). These improvements would involve haul trucks carrying borrow material via a combination of roadways that may include SR 99/70, Elverta Road, Powerline Road, Elkhorn Boulevard, Del Paso Road, San Juan Road, El Centro Road, and West El Camino Avenue. Personnel, equipment, and other imported construction materials would reach the construction areas via these roadways and Garden Highway. Borrow material from the RD 1001 borrow site would be hauled to the PGCC west levee construction area via Striplin Road, Pacific Avenue, and Natomas Road and via Striplin road, SR 99/70, and Howsley Road. Personnel, equipment, and other imported construction materials would reach the construction area mainly via these roadways, SR 99/70, and Sankey Road.

For 2009–2010 construction, the total of the crew sizes in each year is expected to be similar to the total of the 2008 crew sizes. Construction crew members would travel to different project sites from different directions and by way of different sets of roadways and intersections. It is also likely that some ridesharing would take place. Therefore, construction crew commute traffic is unlikely to substantially affect local roadways, even during the peak a.m. and p.m. hours. Haul trips for borrow material are anticipated to average approximately 1,050 per day during each year's 6-month construction season for the Sacramento River east levee improvements alone. Haul truck traffic between the RD 1001 borrow site and the PGCC west levee construction areas would not use the same routes as any of the borrow haul traffic for the Sacramento River east levee improvements. Nevertheless, the borrow haul traffic for the Sacramento River east levee improvements alone could exceed the ITE threshold of 50 trips in the peak direction per a.m. or p.m. peak hour during the height of construction.

Therefore, the increase in traffic on local roadways associated with 2009–2010 construction trips would be significant.

Mitigation Measure 3.10-a: Prepare and Implement a Traffic Routing Plan for Both Crew Commute Trips to the Work Sites and Construction-Related Truck Trips.

Before the start of construction in each construction season, SAFCA and its primary contractors for engineering and construction shall develop a coordinated construction traffic control plan to minimize the simultaneous use of roadways by different construction contractors for worker commute trips, material hauling, and equipment delivery to the extent feasible. The plan will outline phasing of activities and the use of multiple routes to and from off-site locations to minimize the daily amount of traffic on individual roadways. SAFCA shall ensure that the construction contractors enforce the plans throughout the construction periods.

Implementing this mitigation measure would reduce the impact; however, given the high amount of hauling required for the project and the limited number of roadways in the project vicinity that would be suitable for hauling between borrow sites and project construction sites, it is possible that the volume of traffic during some periods may still exceed the ITE threshold. Therefore, this impact would be **significant and unavoidable**.

IMPACT 3.10-b Temporary Increase in Traffic Hazards on Local Roadways during Construction. *Construction-related traffic in each construction season (2008–2010) could interfere with the flow of traffic on local roads, would require several areas of temporary road or land closures, and could result in mud and gravel being tracked onto local roadways. These conditions could pose driving hazards on affected roadways. This potential impact would be significant.*

During the anticipated 6-month construction period for proposed for 2008 (NCC south levee, Sacramento River east levee Reaches 1–4B, and Elkhorn Canal and GGS/Drainage Canal), trucks delivering materials, hauling borrow material, and removing debris would be entering and exiting the project construction areas and borrow sites along rural roadways, mostly in Sutter County. These roadways currently have a low volume of daily traffic. However, the high volumes of slow-moving truck traffic during peak hauling periods could noticeably reduce local traffic flow and introduce driving hazards at times. Construction workers entering and exiting construction areas at the beginning and end of work shift could also increase traffic hazards. In addition, trucks and other vehicles could track mud and gravel onto the local roadways, potentially posing driving hazards.

Project construction would require rerouting of traffic and several temporary closures during construction. At SR 99/70, coordination with Caltrans would be required so that portions of the highway could be shut down to allow for the installation of NCC south levee improvements (see "Traffic Control for Improvements to the Natomas Cross Canal South Levee" in Section 2.3.2.2 of Chapter 2). As part of 2008 improvements along the Sacramento River east levee, the intersection of Sankey Road and Garden Highway would be reconfigured as shown in Exhibit 2-23a. The intersections of Riego Road and private farm roads with Garden Highway would also be reconstructed to match the expanded levee's elevated profile. These intersections would be closed temporarily during construction in these areas and detours indicated. Lane or road closures of segments of Garden Highway may be necessary as well during construction of the adjacent setback levee crown and drainage improvements along Garden Highway (see Exhibit 2-23 and the text under "Reconstruction of Garden Highway at Intersections" and "Installation of Surface Drainage Outlets across Garden Highway" in Section 2.3.2.3).

During 2009–2010 construction on the remainder of the Sacramento River east levee (Reaches 4B–20A), several public roadway and farm road intersections with Garden Highway would be reconstructed across the adjacent setback levee to Garden Highway. These would include intersections at West Elverta Road, West Elkhorn Boulevard, Powerline Road, and San Juan Road. As described for the construction elements proposed for 2008, high volumes of slow-moving truck traffic would be associated with the construction activities on both rural roadways with low traffic volumes in Sacramento County for the Sacramento River east levee improvements in Reaches 4B–20A and along the PGCC west levee in Sutter County, and on some local roadways in the city of Sacramento that carry suburban traffic.

For all construction years, the combination of the high volume of slow-moving truck traffic, potentially tracking mud and debris onto roadways; workers entering and exiting construction sites; and periodic road and lane closures associated with levee improvements would increase traffic hazards on local roadways during the construction period. This potential impact would be significant.

Mitigation Measure 3.10-b: Prepare and Implement a Traffic Safety and Control Plan and Implement Measures to Avoid and Minimize Traffic Hazards on Local Roadways during Construction.

SAFCA and its primary contractors for engineering design and construction shall ensure that the following measures are implemented for each construction season to avoid and minimize potential traffic hazards on local roadways during construction.

(a) The construction contractors shall develop traffic safety and control plans for the local roadways that would be affected by construction traffic. Before the initiation of construction-related activity involving high volumes of traffic, the plan shall be submitted for review by Caltrans and the agencies of the local jurisdictions (Sutter County, Sacramento County, and/or City of Sacramento) having responsibility for roadway safety at and between project sites. The plan shall call for the following elements:

- posting warnings about the potential presence of slow-moving vehicles,
- using traffic control personnel when appropriate, and
- placing and maintaining barriers and installing traffic control devices necessary for safety, as specified in Caltrans's *Manual of Traffic Controls for Construction and Maintenance Works Zones* and in accordance with county requirements.

The contractor shall train construction personnel in appropriate safety measures as described in the plan, and shall implement the plan.

(b) All operations shall limit and expeditiously remove, as necessary, the accumulation of project-generated mud or dirt from adjacent public streets at least once every 24 hours if substantial volumes of soil have been carried onto adjacent paved public roadways during project construction.

Implementation of this mitigation measure would reduce potential traffic hazard impacts to a **less-than-significant** level.

IMPACT 3.10-c **Temporary Effect on Emergency Service Response Times and Access during Construction.** *During the project's 6-month construction period in each construction season (2008–2010), commute trips and haul truck trips would increase traffic on local roadways, and some road and/or lane closures would be required. These conditions could slow emergency service response times. This potential impact would be* ***significant****.*

The conditions discussed above in Impacts 3.10-a and 3.10-b could result in delays in emergency service response times if emergency vehicles need to pass through or near construction areas. This impact would be significant.

Mitigation Measure 3.10-c: Notify Emergency Service Providers about Project Construction and Maintain Emergency Access or Coordinate Detours with Providers.

SAFCA and its primary contractors for engineering design and construction shall ensure that the following measures are implemented to avoid and minimize the potential for increased emergency response times and access issues during construction.

(a) SAFCA shall implement Mitigation Measures 3.10-a and 3.10-b, described above.

(b) Before commencement of project construction, SAFCA shall provide notification of project construction to all appropriate emergency service providers in Sutter County, Sacramento County, and/or the city of Sacramento and shall coordinate with providers throughout the construction period to ensure that emergency access through construction areas is maintained.

Implementation of this mitigation measure would reduce the potential impact to a **less-than-significant** level.

3.11 AIR QUALITY

This section includes a summary of applicable regulations, existing air quality conditions, and an analysis of potential short-term and long-term impacts of the proposed project on air quality. The method of analysis for short-term construction-related, long-term regional (operational), local mobile-source, odorous, and toxic air emissions is consistent with the recommendations of the Sacramento Metropolitan Air Quality Management District (SMAQMD) and the Feather River Air Quality Management District (FRAQMD). In addition, mitigation measures are recommended as necessary to reduce significant air quality impacts.

3.11.1 REGULATORY SETTING

Air quality within the project area is regulated by the U.S. Environmental Protection Agency (EPA), California Air Resources Board (ARB), and local air districts. Each of these agencies develops rules, regulations, policies, and/or goals to comply with applicable legislation. Although EPA regulations may not be superseded, both state and local regulations may be more stringent than EPA regulations. The following air quality regulations focus primarily on ozone, carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter (PM), and lead. Because these are the most prevalent air pollutants known to be deleterious to human health and extensive documentation of health-effects criteria are available, these pollutants are commonly referred to as "criteria air pollutants." Criteria air pollutants are discussed in Section 3.11.1.1. Toxic air contaminants (TACs) are discussed in Section 3.11.1.4. Greenhouse gases (GHGs) are discussed in section 3.11.1.5.

3.11.1.1 FEDERAL

At the federal level, EPA has been charged with implementing national air quality programs. EPA's air quality mandates are drawn primarily from the federal Clean Air Act (CAA), which was enacted in 1970. The most recent major amendments made by Congress were in 1990.

The CAA required EPA to establish national ambient air quality standards (NAAQS). As shown in Table 3.11-1, EPA has established primary and secondary NAAQS for the following criteria air pollutants: ozone, respirable particulate matter (PM_{10}), fine particulate matter ($PM_{2.5}$), CO, NO_2, SO_2, and lead. The primary standards protect the public health and the secondary standards protect public welfare. The CAA also required each state to prepare an air quality control plan referred to as a State Implementation Plan (SIP). The federal Clean Air Act Amendments of 1990 (CAAA) added requirements for states with nonattainment areas to revise their SIPs to incorporate additional control measures to reduce air pollution. The SIP is modified periodically to reflect the latest emissions inventories, planning documents, and rules and regulations of the air basins as reported by their jurisdictional agencies. EPA reviews all SIPs to determine conformation to the mandates of the CAA and its amendments and to determine whether implementation of the SIPs will achieve air quality goals. If EPA determines that a SIP is inadequate, a Federal Implementation Plan (FIP) that imposes additional control measures may be prepared for the nonattainment area. Failure to submit an approvable SIP or to implement the plan within the mandated time frame may result in application of sanctions to transportation funding and stationary air pollution sources in the air basin.

Attainment Status

Both ARB and EPA use monitoring data to designate areas according to attainment status for criteria air pollutants established by the agencies. The purpose of these designations is to identify those areas with air quality problems and thereby initiate planning efforts for improvement. The three basic designation categories are nonattainment, attainment, and unclassified. Unclassified is used in an area that cannot be classified on the basis of available information as meeting or not meeting the standards. In addition, the California designations include a subcategory of the nonattainment designation, called nonattainment-transitional. The nonattainment-transitional designation is given to nonattainment areas that are progressing and nearing attainment. The state and national

attainment status designations for the project area are presented in Table 3.11-1. See Section 3.11.2.2, "Ambient Air Quality in the Project Area," below for air quality monitoring data that is representative of the project area.

Table 3.11-1
Ambient Air Quality Standards and Attainment Designations

Pollutant	Averaging Time	California Standards		National Standards [a]		
		Standards [b,c]	Attainment Status [d, j]	Primary [c,e]	Secondary [c,f]	Attainment Status [g,j]
Ozone	1-hour	0.09 ppm (180 µg/m^3)	N (Serious)	– [h]	Same as primary standard	– [h]
	8-hour	0.07 ppm (137 µg/m^3)		0.08 ppm (157 µg/m^3)		N (Serious)
Respirable particulate matter (PM_{10})	Annual arithmetic mean	20 µg/m^3	N	– [h]	Same as primary standard	U, N (Moderate)
	24-hour	50 µg/m^3		150 µg/m^3		
Fine particulate matter ($PM_{2.5}$)	Annual arithmetic mean	12 µg/m^3	U, N	15 µg/m^3	Same as primary standard	U/A
	24-hour	–	–	35 µg/m^3		
Carbon monoxide (CO)	1-hour	20 ppm (23 mg/m^3)	A	35 ppm (40 mg/m^3)	–	U/A
	8-hour	9 ppm (10 mg/m^3)		9 ppm (10 mg/m^3)		
Nitrogen dioxide (NO_2)	Annual arithmetic mean	0.030 ppm (56 µg/m^3)	–	0.053 ppm (100 µg/m^3)	Same as primary standard	U/A
	1-hour	0.18 ppm (338 µg/m^3)	A	–		–
Sulfur dioxide (SO_2)	Annual arithmetic mean	–	–	0.030 ppm (80 µg/m^3)	–	U
	24-hour	0.04 ppm (105 µg/m^3)	A	0.14 ppm (365 µg/m^3)	–	
	3-hour	–	–	–	0.5 ppm (1300 µg/m^3)	
	1-hour	0.25 ppm (655 µg/m^3)	A	–	–	–
Lead [i]	30-day average	1.5 µg/m^3	A	–	–	–
	Calendar quarter	–	–	1.5 µg/m^3	Same as primary standard	

Table 3.11-1
Ambient Air Quality Standards and Attainment Designations

Pollutant	Averaging Time	California Standards		National Standards [a]		
		Standards [b,c]	Attainment Status [d, j]	Primary [c,e]	Secondary [c,f]	Attainment Status [g,j]
Sulfates	24-hour	25 µg/m^3	A	**No national standards**		
Hydrogen sulfide	1-hour	0.03 ppm (42 µg/m^3)	U			
Vinyl chloride[i]	24-hour	0.01 ppm (26 µg/m^3)	U/A			
Visibility-reducing particle matter	8-hour	Extinction coefficient of 0.23 per kilometer — visibility of 10 miles or more (0.07—30 miles or more for Lake Tahoe) because of particles when the relative humidity is less than 70%.	U			

Notes: µg/m^3 = micrograms per cubic meter; mg/m^3 = milligrams per cubic meter; ppm = parts per million

[a] National standards (other than ozone, PM, and those based on annual averages or annual arithmetic means) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration in a year, averaged over 3 years, is equal to or less than the standard. The PM_{10} 24-hour standard is attained when 99% of the daily concentrations, averaged over 3 years, are equal to or less than the standard. The $PM_{2.5}$ 24-hour standard is attained when 98% of the daily concentrations, averaged over 3 years, are equal to or less than the standard.

[b] California standards for ozone, CO (except Lake Tahoe), SO_2 (1- and 24-hour), NO_2, PM, and visibility-reducing particles are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

[c] Concentration expressed first in units in which it was promulgated [i.e., parts per million (ppm) or micrograms per cubic meter (µg/m^3)]. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

[d] Unclassified (U): A pollutant is designated unclassified if the data are incomplete and do not support a designation of attainment or nonattainment.
Attainment (A): A pollutant is designated attainment if the state standard for that pollutant was not violated at any site in the area during a 3-year period.
Nonattainment (N): A pollutant is designated nonattainment if there was at least one violation of a state standard for that pollutant in the area.
Nonattainment/Transitional (NT): A subcategory of the nonattainment designation. An area is designated nonattainment/transitional to signify that the area is close to attaining the standard for that pollutant.

[e] National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health.

[f] National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

[g] Nonattainment (N): Any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for the pollutant.
Attainment (A): Any area that meets the national primary or secondary ambient air quality standard for the pollutant.
Unclassifiable (U): Any area that cannot be classified on the basis of available information as meeting or not meeting the national primary or secondary ambient air quality standard for the pollutant.

[h] The national 1-hour ozone standard was revoked on June 15, 2005. The national annual PM_{10} standard was revoked in 2006.

[i] The California Air Resources Board has identified lead and vinyl chloride as toxic air contaminants with no threshold of exposure determined for adverse health effects. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

[j] California designations separated by comma, if different, for each county, and listed in the following order: Southern Sutter, Sacramento.

Sources: ARB 2007a; EPA 2007a, 2007b

3.11.1.2 STATE

ARB is the agency responsible for coordination and oversight of state and local air pollution control programs in California and for implementing the California Clean Air Act (CCAA). The CCAA, which was adopted in 1988, required ARB to establish California ambient air quality standards (CAAQS) (Table 3.11-1). ARB has established CAAQS for sulfates, hydrogen sulfide, vinyl chloride, visibility-reducing particulate matter, and the above-mentioned criteria air pollutants. In most cases the CAAQS are more stringent than the NAAQS. Differences in the standards are generally explained by the health effects studies considered during the standard-setting process and the interpretation of the studies. In addition, the CAAQS incorporate a margin of safety to protect sensitive individuals.

The CCAA requires that all local air districts in the state endeavor to achieve and maintain the CAAQS by the earliest practical date. The act specifies that local air districts should focus particular attention on reducing the emissions from transportation and areawide emission sources, and provides districts with the authority to regulate indirect sources.

Other ARB responsibilities include:

- overseeing local air district compliance with California and federal laws,
- approving local air quality attainment plans (AQAPs),
- submitting SIPs to EPA,
- monitoring air quality,
- determining and updating area designations and maps, and
- setting emissions standards for new mobile sources, consumer products, small utility engines, off-road vehicles, and fuels.

3.11.1.3 LOCAL

Project construction activities would take place in both Sutter and Sacramento Counties (see Exhibit 2-8). FRAQMD manages air quality conditions and regulations in Sutter County, and SMAQMD has jurisdiction over air quality considerations in Sacramento County. The local air quality management districts (AQMDs) attain and maintain air quality conditions in the counties affected by projects through a comprehensive program of planning, regulation, enforcement, technical innovation, and promotion of the understanding of air quality issues. The clean-air strategy of the AQMDs includes the preparation of plans and programs for the attainment of ambient air quality standards, adoption and enforcement of rules and regulations, and issuance of permits for stationary sources. The AQMDs also inspect stationary sources, respond to citizen complaints, monitor ambient air quality and meteorological conditions, and implement other programs and regulations required by the CAA, CAAA, and the CCAA.

In an attempt to achieve the NAAQS and CAAQS and maintain healthful air quality throughout the air basin, the local AQMDs have jointly prepared and adopted AQAPs and reports. The most recent AQAP, completed in 2003, addresses:

- air quality modeling to identify the reductions needed and design effective strategies for reducing emissions,
- comprehensive programs for reducing emissions that take advantage of zero- and near-zero-emission technologies, and
- the impacts of pollutant transport in the attainment demonstration.

The AQMDs also publish CEQA guidance documents and recently have provided CEQA planning guidance on their respective Web sites to assist with identification of significant adverse air quality impacts. They suggest strategies for reducing potential project emissions early in the planning process. Because stationary sources such as industrial facilities are largely regulated, the guidelines focus on transportation and land use control measures to reduce emissions to achieve and maintain state and federal health-based air quality standards.

All projects are subject to AQMD rules and regulations in effect at the time of construction. Specific rules applicable to the construction of the proposed project may include rules pertaining to, but not limited to, visible emissions, fugitive dust, architectural coatings, and general permit requirements.

3.11.1.4 TOXIC AIR CONTAMINANTS

Air quality regulations also focus on TACs, or in federal parlance, hazardous air pollutants (HAPs). A TAC is defined as an air pollutant that may cause or contribute to an increase in levels of mortality or serious illness, or that may pose a hazard to human health. TACs are usually present in minute quantities in the ambient air; however, their high toxicity or health risk may pose a threat to public health even at low concentrations. In general, for those TACs that may cause cancer, there is no concentration that does not present some risk. In other words, there is no threshold level below which adverse health impacts may not be expected to occur. This contrasts with the criteria air pollutants, for which acceptable levels of exposure can be determined and for which the ambient standards have been established (Table 3.11-1). EPA and ARB regulate HAPs and TACs, respectively, through statutes and regulations that generally require the use of the maximum or best available control technology (MACT and BACT) for toxics to limit emissions. These statutes and regulations, in conjunction with additional rules set forth by local air districts, establish the regulatory framework for TACs.

Federal Hazardous Air Pollutant Programs

EPA has programs for identifying and regulating HAPs. Title III of the CAAA directed EPA to promulgate national emissions standards for HAPs (NESHAP). The NESHAP for major sources of HAPs may differ from the standards for area sources. Major sources are defined as stationary sources with potential to emit more than 10 tons per year (TPY) of any HAP or more than 25 TPY of any combination of HAPs; all other sources are considered area sources. The emissions standards are to be promulgated in two phases. In the first phase (1992–2000), EPA developed technology-based emission standards designed to produce the maximum emission reduction achievable. These standards are generally referred to as requiring MACT. For area sources, the standards may be different, based on generally available control technology. In the second phase (2001–2008), EPA is required to promulgate health risk–based emissions standards where deemed necessary to address risks remaining after implementation of the technology-based NESHAP standards.

The CAAA also required EPA to promulgate vehicle or fuel standards containing reasonable requirements that control toxic emissions for, at a minimum, emissions of benzene and formaldehyde. Performance criteria were established to limit mobile-source emissions of toxics, including benzene, formaldehyde, and 1,3-butadiene. In addition, Section 219 of the CAAA required the use of reformulated gasoline in selected areas with the most severe ozone nonattainment conditions to further reduce mobile-source emissions.

State and Local Toxic Air Contaminant Programs

The State of California regulates TACs primarily through the Tanner Air Toxics Act, also known as the Tanner Act (Assembly Bill [AB] 1807 [1983]) and the Air Toxics Hot Spots Information and Assessment Act, or Hot Spots Act (AB 2588 [1987]). The Tanner Act sets forth a formal procedure for ARB to designate substances as TACs. Research, public participation, and scientific peer review must occur before ARB can designate a substance as a TAC. To date, ARB has identified more than 21 TACs and has adopted EPA's list of HAPs as TACs. Most recently, diesel PM was added to the ARB list of TACs.

Once a TAC is identified, ARB adopts an Airborne Toxics Control Measure (ATCM) for sources that emit that particular TAC. If there is a safe threshold for a substance at which there is no toxic effect, the control measure must reduce exposure below that threshold. If there is no safe threshold, the measure must incorporate BACT to minimize emissions.

The Hot Spots Act requires existing facilities that emit toxic substances above a specified level to prepare a toxic-emission inventory, prepare a risk assessment if emissions are significant, notify the public of significant risk levels, and prepare and implement risk reduction measures.

ARB has adopted diesel exhaust control measures and more stringent emission standards for various on-road mobile sources of emissions, including transit buses, and off-road diesel equipment (e.g., tractors, generators). In February 2000, ARB adopted a new public-transit bus fleet rule and emission standards for new urban buses. These new rules and standards provide for:

- more stringent emission standards for some new urban bus engines, beginning with 2002 model year engines;
- zero-emission bus demonstration and purchase requirements applicable to transit agencies; and
- reporting requirements, under which transit agencies must demonstrate compliance with the urban-transit bus-fleet rule.

Upcoming milestones include the low-sulfur diesel-fuel requirement, and tighter emission standards for heavy-duty diesel trucks (2007) and off-road diesel equipment (2011).

Over time, the replacement of older vehicles will result in a vehicle fleet that produces substantially fewer TACs than under current conditions. Mobile-source emissions of TACs (e.g., benzene, 1-3-butadiene, diesel PM) have been reduced significantly over the last decade and will be reduced further in California through a progression of regulatory measures (e.g., regulations pertaining to Low-Emission Vehicle/Clean Fuels and Phase II reformulated gasoline) and control technologies. With implementation of ARB's Risk Reduction Plan, it is expected that diesel PM concentrations will be reduced by 75% in 2010 and 85% in 2020 from the estimated year-2000 level. Adopted regulations are also expected to continue to reduce emissions of formaldehyde from cars and light-duty trucks. As emissions are reduced, it is expected that risks associated with exposure to the emissions will also be reduced.

ARB's *Air Quality and Land Use Handbook: A Community Health Perspective* (ARB 2005) provides guidance on compatibility of land uses with sources of TAC emissions. Although it is not a law or adopted policy, the handbook offers recommendations for the siting of sensitive receptors near uses associated with TACs, such as freeways and high-traffic roads, commercial distribution centers, rail yards, ports, refineries, dry cleaners, gasoline stations, and industrial facilities to help keep children and other sensitive populations out of harm's way.

3.11.1.5 GREENHOUSE GAS EMISSIONS

In September 2006, Governor Arnold Schwarzenegger signed AB 32, the California Climate Solutions Act of 2006. AB 32 requires that statewide GHG emissions be reduced to 1990 levels by 2020. This reduction will be accomplished through an enforceable statewide cap on GHG emissions that will be phased in starting in 2012. To effectively implement the cap, AB 32 directs ARB to develop and implement regulations to reduce statewide GHG emissions from stationary sources. AB 32 specifies that regulations adopted in response to AB 1493 should be used to address GHG emissions from vehicles. However, AB 32 also includes language stating that if the AB 1493 regulations cannot be implemented, then ARB should develop new regulations to control vehicle GHG emissions under the authorization of AB 32.

AB 32 requires that ARB adopt a quantified cap on GHG emissions representing 1990 emissions levels and disclose how it arrives at the cap; institute a schedule to meet the emissions cap; and develop tracking, reporting, and enforcement mechanisms to ensure that the state achieves the reductions in GHG emissions necessary to meet

the cap. AB 32 also includes guidance to institute emissions reductions in an economically efficient manner and conditions to ensure that businesses and consumers are not unfairly affected by the reductions.

3.11.2 ENVIRONMENTAL SETTING

The project area is located within the southern portion of the Sacramento Valley Air Basin (SVAB), which comprises all of Butte, Colusa, Glenn, Sacramento, Shasta, Sutter, Tehama, Yolo, and Yuba Counties, the western portion of Placer County, and the eastern portion of Solano County.

3.11.2.1 FACTORS AFFECTING POLLUTANT CONCENTRATIONS

The ambient concentrations of air pollutant emissions are determined by the amount of emissions released by pollutant sources and the ability of the atmosphere to transport and dilute such emissions. Natural factors that affect transport and dilution include terrain, wind, atmospheric stability, and the presence of sunlight. Therefore, existing air quality conditions in the project area are determined by such natural factors as topography, meteorology, and climate, in addition to the amount of emissions released by existing air pollutant sources, as discussed separately below.

Topography, Climate, and Meteorology

The SVAB is relatively flat, bordered by mountains to the east, west, and north. Air flows into the SVAB through the Carquinez Strait, the only breach in the western mountain barrier, and moves across the Sacramento–San Joaquin Delta, bringing with it pollutants from the heavily populated San Francisco Bay Area. The climate is characterized by hot, dry summers and cool, rainy winters. Periods of dense and persistent low-level fog that are most prevalent between storms are characteristic of SVAB winter weather. From May to October, the region's intense heat and sunlight yield high ozone concentrations. Summer inversions are strong and frequent, but are less troublesome than those that occur in the fall. Autumn inversions, formed by warm air subsiding in a region of high pressure, have accompanying light winds that do not provide adequate dispersion of air pollutants.

Most precipitation in the area results from air masses that move in from the Pacific Ocean during the winter months. These storms usually move in from the west or northwest. More than half the total annual precipitation falls during the winter rainy season (November–February); the average winter temperature is a moderate 49 degrees Fahrenheit (°F). During the summer, daily temperatures range from 50°F to more than 100°F. The inland location and surrounding mountains shelter the area from much of the ocean breezes that keep the coastal regions moderate in temperature.

Regional flow patterns affect air quality patterns by moving pollutants downwind of sources. Localized meteorological conditions, such as moderate winds, disperse pollutants and reduce pollutant concentrations. An inversion layer develops when a layer of warm air traps cooler air close to the ground. Such temperature inversions hamper dispersion by creating a ceiling over the area and trapping air pollutants near the ground. During summer mornings and afternoons, these inversions are present over the project area. During summer's longer daylight hours, plentiful sunshine provides the energy needed to fuel photochemical reactions between reactive organic gases (ROG) and oxides of nitrogen (NO_X), which results in ozone formation.

In the winter, temperature inversions dominate during the night and early morning hours but frequently dissipate by afternoon. The greatest pollution problems during this time of year are from CO and NO_X. High CO concentrations occur on winter days with strong surface inversions and light winds. CO transport is extremely limited.

Local meteorology of the project area is represented by measurements recorded at the Sacramento station. The normal annual precipitation, which occurs primarily from November through March, is approximately 18 inches. January temperatures range from a normal minimum of 38°F to a normal maximum of 53°F. July temperatures

range from a normal minimum of 58°F to a normal maximum of 93°F (NOAA 1992). The predominant wind direction and speed is from the south-southwest at 10 miles per hour (ARB 1994).

Atmospheric Stability and Inversions

Stability describes the resistance of the atmosphere to vertical motion. The stability of the atmosphere depends on the vertical distribution of temperature. When the temperature decreases vertically at 10 degrees Celsius (°C) per 1,000 meters, the atmosphere is considered "neutral." When the change in temperature is greater than 10°C per 1,000 meters, the atmosphere is considered "unstable." When the change is less than 10°C per 1,000 meters, the atmosphere is termed "stable." In the SVAB, categories range from extremely unstable conditions, which are present in spring and summer, through neutral to stable conditions, which are both present in fall and winter. Unstable conditions occur during daytime, when solar heating warms the lower atmospheric layers sufficiently. Under extremely unstable conditions, large fluctuations in horizontal wind direction are coupled with large mixing depths, which are the vertical depths available for diluting air pollution near the ground. As solar heating decreases, fluctuations in wind direction and the vertical mixing depth become less pronounced, resulting in neutral to stable conditions. Under the most stable conditions, which are present in the SVAB in fall and winter, air pollution emitted into the atmosphere will travel downwind with poor dispersion. The dispersive power of the atmosphere decreases with progression through the categories from extremely unstable to stable.

An inversion is a layer of warmer air over a layer of cooler air. Inversions influence the mixing depth of the atmosphere, thus significantly affecting air quality conditions. The SVAB experiences two types of inversions that affect air quality. The first type of inversion layer contributes to photochemical smog problems by confining pollution to a shallow layer near the ground. This type occurs in summer, when sinking air near the ground forms a "lid" over the region. The second type of inversion occurs when the air near the ground cools while the air aloft remains warm. This type of inversion occurs during winter nights and can cause localized air pollution "hot spots" near emission sources because of poor dispersion. The shallow surface-based inversions are present in the morning, but are often broken by daytime heating of the air layers near the ground.

3.11.2.2 Ambient Air Quality In The Project Area

Ozone

Ozone is a photochemical oxidant and the primary component of smog. Ozone, typically associated with poor air quality, is not emitted directly into the air, but is formed through a series of chemical reactions between ROG and NO_X in the presence of sunlight. Motor vehicles and stationary (industrial) sources are major sources of emission of both ROG and NO_X, which are also referred to as ozone precursors.

Ozone located in the upper atmosphere (stratosphere) acts in a beneficial manner by shielding the earth from harmful ultraviolet radiation that is emitted by the sun. However, ozone in the lower atmosphere (troposphere) is a major health and environmental concern. Because sunlight and heat serve as catalysts for the reactions between ozone precursors, peak ozone concentrations typically occur during summer in the Northern Hemisphere (EPA 2007a). In general, ozone concentrations over or near urban and rural areas reflect an interplay of emissions of ozone precursors, transport meteorology, and atmospheric chemistry (Godish 2004).

The adverse health effects associated with exposure to ozone pertain primarily to the respiratory system. Scientific evidence indicates that ambient levels of ozone can affect not only sensitive receptors, such as asthmatics and children, but healthy adults as well. Exposure to ambient levels of ozone ranging from 0.10 to 0.40 part per million (ppm) for 1–2 hours has been found to significantly alter lung functions by increasing respiratory rates and pulmonary resistance, decreasing tidal volumes, and impairing respiratory mechanics. Ambient levels of ozone above 0.12 ppm are linked to such symptoms as throat dryness, chest tightness, shortness of breath, headache, and nausea. In addition to these adverse health effects, some evidence also relates ozone exposure to an increase in susceptibility to respiratory infections (Godish 2004). Ozone causes substantial damage to leaf tissues

of crops and natural vegetation and damages many materials by acting as a chemical oxidizing agent (FRAQMD 1998).

Emissions of ozone precursors in the project area have decreased in recent years and are projected to continue to decline in the future. On-road motor vehicles and other mobile sources are by far the largest contributors. More stringent mobile-source emissions standards, cleaner burning fuels, and new rules for industrial operations are largely responsible for the decline in emissions trends. However, peak ozone values in the project area have not declined as quickly over the last several years as they have in other urban areas. This is because the urbanized areas of the Central Valley are identified as both transport contributors and receptors for these pollutants. Regardless, ozone concentrations have been declining in the project area because of the decrease in precursor emissions.

Particulate Matter

Health concerns associated with suspended particles focus on those particles small enough to reach the lungs when inhaled. Few particles larger than 10 micrometers in diameter reach the lungs. Therefore, respirable particulate matter is considered to consist of particles with an aerodynamic diameter of 10 micrometers or less, referred to as PM_{10}. PM_{10} consists of particulates directly emitted into the air, such as fugitive dust, soot, and smoke from mobile and stationary sources, construction operations, fires, and natural windblown dust, and particulates formed in the atmosphere by condensation and/or transformation of SO_2 and ROG (EPA 2007b). Major sources of PM_{10} are the combustion of wood, diesel, and other fuels; industrial processes; and ground-disturbing activities such as construction and agricultural operations.

Ambient PM_{10} standards are designed to prevent respiratory disease and protect visibility. The adverse health effects associated with PM_{10} depend on the specific composition of the particulate matter. For example, health effects may be associated with metals, polycyclic aromatic hydrocarbons, and other toxic substances adsorbed onto fine particulates (the piggybacking effect), or with fine dust particles of silica or asbestos. Generally, adverse health effects associated with PM_{10} may result from both short-term and long-term exposure to elevated PM_{10} concentrations. Such health effects may include breathing and respiratory symptoms, aggravation of existing respiratory and cardiovascular diseases, alterations in the body's immune system, carcinogenesis, and premature death (EPA 2007b).

Finer particles having an aerodynamic diameter of 2.5 micrometers or less are referred to as $PM_{2.5}$. $PM_{2.5}$ poses an increased health risk because these particles can deposit deep in the lungs and contain substances that are particularly harmful to human health.

Direct emissions of PM_{10} and $PM_{2.5}$ have increased in recent years in the project area and are projected to continue increasing in the near future. Emissions are dominated by contributions from areawide sources, primarily fugitive dust from paved and unpaved roads, fugitive dust from construction and demolition, and particulate matter from residential fuel combustion.

Carbon Monoxide

Carbon monoxide is a colorless, odorless, and poisonous gas produced by incomplete burning of carbon in fuels, primarily from mobile (transportation) sources of pollution. Approximately three-quarters of all CO emissions nationwide are estimated to be from mobile (transportation) sources; the remaining CO emissions are associated with wood-burning stoves, incinerators, and industrial sources. Peak CO levels are generally found near areas with high concentrations of mobile (transportation) sources and occur typically during calm conditions in the winter months.

CO enters the bloodstream through the lungs by combining with hemoglobin, which normally supplies oxygen to the cells. However, CO combines with hemoglobin much more readily than oxygen does, resulting in a drastic reduction in the amount of oxygen available to the cells. Adverse health effects associated with exposure to CO

concentrations include such symptoms as dizziness, headaches, slow reflexes, and fatigue. CO exposure is especially harmful to individuals who suffer from cardiovascular and respiratory diseases (EPA 2007b).

Nitrogen Dioxide

Nitrogen dioxide is a brownish, highly reactive gas that is present in all urban environments. The major human-made sources of NO_2 are combustion devices, such as boilers, gas turbines, and mobile and stationary reciprocating internal-combustion engines. Combustion devices emit primarily nitric oxide (NO), which reacts through oxidation in the atmosphere to form NO_2 (EPA 2007b). The combined emissions of NO and NO_2 are referred to as NO_X, which are reported as equivalent NO_2. Because NO_2 is formed and depleted by reactions associated with photochemical smog (ozone), the NO_2 concentration in a particular geographical area may not be representative of the local NO_X emission sources.

Inhalation is the most common route of exposure to NO_2. Because NO_2 has relatively low solubility in water, the principal site of toxicity is in the lower respiratory tract. The severity of the adverse health effects depends primarily on the concentration inhaled rather than the duration of exposure. Upon exposure, an individual may experience a variety of acute symptoms, including coughing, difficulty with breathing, vomiting, headache, and eye irritation. After approximately 4–12 hours, an exposed individual may experience chemical pneumonitis or pulmonary edema with breathing abnormalities, cough, cyanosis, chest pain, and rapid heartbeat. Severe, symptomatic NO_2 intoxication after acute exposure has been linked on occasion with prolonged respiratory impairment with such symptoms as chronic bronchitis and decreased lung functions.

Sulfur Dioxide

Sulfur dioxide is produced by such stationary sources as coal and oil combustion, steel mills, refineries, and pulp and paper mills. The major adverse health effects associated with SO_2 exposure pertain to the upper respiratory tract. SO_2 is a respiratory irritant with constriction of the bronchioles occurring with inhalation of SO_2 at 5 ppm or more. On contact with the moist mucous membranes, SO_2 produces sulfurous acid, which is a direct irritant. Concentration rather than duration of the exposure is an important determinant of respiratory effects. Exposure to high SO_2 concentrations may result in edema of the lungs or glottis and respiratory paralysis.

Lead

Lead is a metal found naturally in the environment as well as in manufactured products. The major sources of lead emissions have historically been mobile and industrial sources. As a result of the phase-out of leaded gasoline (discussed in detail below), metal processing is currently the primary source of lead emissions. The highest levels of lead in air are generally found near lead smelters. Other stationary sources are waste incinerators, utilities, and manufacturers of lead-acid batteries.

Twenty years ago, mobile sources were the main contributor to ambient lead concentrations in the air. In the early 1970s, EPA set national regulations to gradually reduce the lead content in gasoline. In 1975, unleaded gasoline was introduced for motor vehicles equipped with catalytic converters. EPA banned the use of leaded gasoline in highway vehicles in December 1995 (EPA 2007b).

As a result of EPA's regulatory efforts to remove lead from gasoline, emissions of lead from the transportation sector have declined dramatically (by 95% between 1980 and 1999), and levels of lead in the air decreased by 94% between 1980 and 1999. Transportation sources, primarily airplanes, now contribute only 13% of lead emissions. A recent National Health and Nutrition Examination Survey reported a 78% decrease in the levels of lead in people's blood between 1976 and 1991. This dramatic decline can be attributed to the move from leaded to unleaded gasoline (EPA 2007b).

The decrease in lead emissions and ambient lead concentrations over the past 25 years is California's most dramatic success story with regard to air quality management. Primarily as a result of the phase-out of leaded

gasoline during the 1970s and subsequent ARB regulations, virtually all lead has been eliminated from gasoline now sold in California. All areas of the state are currently designated as attainment for the state lead standard (EPA does not designate areas for the national lead standard). Although the ambient lead standards are no longer violated, lead emissions from stationary sources still pose "hot spot" problems in some areas. As a result, ARB identified lead as a TAC.

Air Pollutant Sources and Concentrations

Air pollutant concentrations are measured at several monitoring stations in the SVAB. The Sacramento–3801 Airport Road station is the closest monitoring station to the levee improvement sites with data to meet EPA and ARB criteria for quality assurance for all criteria pollutants, except for $PM_{2.5}$. The Yuba City air quality monitoring station on Almond Street is the closest monitoring station with $PM_{2.5}$ data. In general, the ambient air quality measurements from these monitoring stations are representative of the air quality in the project area.

Table 3.11-2 summarizes the air quality data from this monitoring station for the years 2004–2006.

Table 3.11-2
Summary of Annual Air Quality Data

	2004	2005	2006
Sacramento–3801 Airport Road			
Ozone			
State standard (1-hour/8-hour avg., 0.09/0.07 ppm)			
National standard (8-hour avg., 0.08 ppm)			
Maximum concentration (1-hour/8-hour avg., ppm)	0.090/0.072	0.100/0.087	0.105/0.086
Number of days state standard exceeded	0	4	5
Number of days national 8-hour standard exceeded	0	1	1
Respirable Particulate Matter (PM_{10})			
State standard (24-hour avg., 50 $\mu g/m^3$)			
National standard (24-hour avg., 150 $\mu g/m^3$)			
Maximum concentration ($\mu g/m^3$)	87.1	99.8	84.0
Number of days state standard exceeded	12	25	4
Number of days national standard exceeded	0	0	0
Nitrogen Dioxide (NO_2)			
State standard (1-hour avg., 0.18 ppm)			
National standard (annual, 0.053 ppm)			
Maximum concentration ($\mu g/m^3$) (1-hour avg., ppm)	0.082	0.074	0.072
Number of days state standard exceeded	0	0	0
Carbon monoxide (CO)			
State standard (1-hour/8-hour avg., 20/9.1 ppm)			
National standard (1-hour/8-hour avg., 35/9.5 ppm)			
Maximum concentration (1-hour/8-hour avg., ppm)	4.00/3.53	3.90/2.97	4.70/3.15
Number of days state standard exceeded	0	0	0
Number of days national 1-hour/8-hour standard exceeded	0/0	0/0	0/0

Table 3.11-2
Summary of Annual Air Quality Data

	2004	2005	2006
Yuba City–Almond Street Monitoring Station			
Fine particulate matter ($PM_{2.5}$)			
No separate state standard			
National standard (24-hour avg., 35 $\mu g/m^3$)			
Maximum concentration	41.0	47.2	51.6
Number of days national standard exceeded	0	0	0

Notes: $\mu g/m^3$ = micrograms per cubic meter; NA = not available; ppm = parts per million by volume

[a] Measured days are those days when an actual measurement was greater than the level of the state daily standard or the national daily standard. Measurements are typically collected every 6 days. Calculated days are the estimated number of days that a measurement would have been greater than the level of the standard had measurements been collected every day. The number of days above the standard is not necessarily the number of violations of the standard for the year.

[b] The number of days a measurement was greater than the level of the national daily standard. Measurements are collected every day, every 3 days, or every 6 days, depending on the time of year and the site's monitoring schedule. The number of days above the standards is not directly related to the number of violations of the standard for the year.

Sources: ARB 2007b, EPA 2007b

Greenhouse Gases and Global Climate Change

Various gases in the earth's atmosphere, classified as atmospheric GHGs, play a critical role in determining the earth's surface temperature. Solar radiation enters the earth's atmosphere from space. A portion of the radiation is absorbed by the earth's surface, and a smaller portion of this radiation is reflected back toward space. The earth emits this radiation, which was initially absorbed, back to space, but the properties of the radiation have changed from high-frequency solar radiation to lower frequency infrared radiation. The frequencies at which bodies emit radiation are proportional to temperature. The earth has a much lower temperature than the sun; therefore, the earth emits lower frequency radiation. Most solar radiation passes through GHGs; however, infrared radiation is absorbed by these gases. As a result, radiation that otherwise would have escaped back into space is instead "trapped," resulting in a warming of the atmosphere. This phenomenon, known as the Greenhouse Effect, is responsible for maintaining a habitable climate on Earth. Without the Greenhouse Effect, Earth would not be able to support life as we know it.

GHGs are global pollutants, unlike criteria air pollutants and TACs, which are pollutants of regional and local concern, respectively. Prominent GHGs contributing to the Greenhouse Effect are carbon dioxide (CO_2), methane (CH_4), ozone, nitrous oxide, hydrofluorocarbons, chlorofluorocarbons, and sulfur hexafluoride. Human-caused emissions of these GHGs in excess of natural ambient concentrations are responsible for intensifying the Greenhouse Effect and have been identified as promoting a trend of unnatural warming of the earth's climate, known as global climate change or global warming (Ahrens 2003). Emissions of GHGs contributing to global climate change are attributable in large part to human activities associated with the industrial/manufacturing, utility, transportation, residential, and agricultural sectors (CEC 2006a). Emissions of CO_2 are byproducts of fossil fuel combustion. Methane, a highly potent GHG, results from off-gassing (the release of chemicals from nonmetallic substances under ambient or greater pressure conditions) associated with agricultural practices and landfills. CO_2 sinks, or reservoirs, include sequestration by vegetation or dissolution into the ocean, among other processes.

Carbon dioxide equivalent is a measurement used to account for the fact that different GHGs have different potential to retain infrared radiation in the atmosphere and contribute to the Greenhouse Effect. This potential, known as the global warming potential of a GHG, is dependent on the lifetime, or persistence, of the gas molecule in the atmosphere. For example, as described in Appendix C, "Calculation References," of the General Reporting Protocol of the California Climate Action Registry (2006), 1 ton of CH_4 has the same contribution to the

Greenhouse Effect as approximately 21 tons of CO_2. Therefore, CH_4 is a much more potent GHG than CO_2. Expressing emissions in carbon dioxide equivalent takes the contributions of all GHG emissions to the Greenhouse Effect and converts them to a single unit equivalent to the effect that would occur if only CO_2 were being emitted.

Combustion of fossil fuel in the transportation sector was the single largest source of California's GHG emissions in 2004, accounting for 40.7% of total GHG emissions in the state (CEC 2006a). This sector was followed by the electric power sector (including both in-state and out-of-state sources) (22.2%) and the industrial sector (20.5%) (CEC 2006a). California is the 12th to 16th largest emitter of CO_2 in the world (CEC 2006a). California produced 492 million gross metric tons of CO_2 equivalent in 2004 (CEC 2006a)..According to the Intergovernmental Panel on Climate Change (IPCC), which was established in 1988 by the World Meteorological Organization and the United Nations Environment Programme, global average temperature is expected to increase by 3–7°F by the end of the century, depending on future GHG emission scenarios (IPCC 2007). Resource areas other than air quality and atmospheric temperature could be indirectly affected by the accumulation of GHG emissions. For example, an increase in the global average temperature is expected to result in a decreased volume of precipitation falling as snow in California and an overall reduction in snowpack in the Sierra Nevada. Snowpack in the Sierra Nevada provides both water supply (runoff) and storage (within the snowpack before melting), which is a major source of supply for the state. According to the California Energy Commission (2006b), the snowpack portion of the water supply could potentially decline by 30–90% by the end of the 21st century. A study cited in a report by the California Department of Water Resources projects that approximately 50% of the statewide snowpack will be lost by the end of the century (Knowles and Cayan 2002). Although current forecasts are uncertain, it is evident that this phenomenon could lead to significant challenges in securing an adequate water supply for a growing population. An increase in precipitation falling as rain rather than snow could also lead to increased potential for floods because water that would normally be held in the Sierra Nevada until spring could flow into the Central Valley concurrently with winter storm events. This scenario would place more pressure on California's levee/flood control system (DWR 2006).

Another outcome of global climate change is sea level rise. Sea level rose approximately 7 inches during the last century (CEC 2006b), and it is predicted to rise an additional 7–22 inches by 2100, depending on the future levels of GHG emissions (IPCC 2007). If this occurs, resultant effects could include increased coastal flooding, saltwater intrusion (especially a concern in the low-lying Sacramento–San Joaquin River Delta, where pumps delivering potable water could be threatened), and disruption of wetlands (CEC 2006b). As the existing climate throughout California changes over time, the ranges of various plant and wildlife species could shift or be reduced, depending on the favored temperature and moisture regimes of each species. In the worst cases, some species would become extinct or be extirpated from the state if suitable conditions are no longer available.

3.11.3 Environmental Impacts and Mitigation Measures

3.11.3.1 Methods and Assumptions

Almost all increased pollutant emissions that would be associated with the proposed levee improvements would be generated by construction activities. Construction emissions are described as "short term" or temporary in duration. These short-term emissions, especially emissions of ozone precursors (ROG and NO_X) and PM_{10}, have the potential to represent a significant air quality impact.

Fugitive dust emissions are associated primarily with site preparation and excavation and vary as a function of such parameters as soil silt content, soil moisture, wind speed, acreage of disturbance area, and vehicle miles traveled on-site and off-site. Emissions of ROG and NO_X are associated primarily with gas and diesel equipment exhaust and the application of architectural coatings. CO emissions are a direct function of vehicle idling time and, thus, traffic flow conditions.

3.11.3.2 SIGNIFICANCE CRITERIA

The thresholds for determining the significance of impacts for this analysis are based on the environmental checklist in Appendix G of the State CEQA Guidelines. The proposed project was determined to result in a significant effect on air quality if it would:

- conflict with or obstruct implementation of the applicable air quality plan,
- violate any air quality standard or contribute substantially to an existing or projected air quality violation,
- result in a cumulatively considerable net increase of a criteria air pollutant for which the project region is nonattainment under any applicable federal or state ambient air quality standards (including releasing emissions that exceed quantitative thresholds for ozone precursors),
- result in exposure of sensitive receptors to substantial concentrations of toxic air emissions or criteria air pollutants, or
- create objectionable odors affecting a substantial number of people .

As stated in Appendix G of the State CEQA Guidelines, the significance criteria established by the applicable AQMD or air pollution control district may be relied upon to make the above determinations. Thus, the appropriate district-recommended emission thresholds as published in their respective CEQA guidance documents shall also apply to individual projects under their jurisdiction. For portions of the proposed project that would occur in Sacramento County, based on SMAQMD's *Guide to Air Quality Assessment in Sacramento County* (SMAQMD 2004), the proposed project was determined to result in a significant effect on air quality if it would:

- generate construction-related emissions of criteria air pollutants or precursors that exceed the SMAQMD-recommended threshold of 85 pounds per day (lb/day) for NO_X, or result in or substantially contribute (at a level equal to or greater than 5%) to emissions concentrations that exceed the NAAQS or CAAQS (e.g., 50 micrograms per cubic meter [$\mu g/m^3$] and 2.5 $\mu g/m^3$, respectively, for PM_{10}); or
- generate long-term regional criteria air pollutant or precursor emissions that exceed the SMAQMD-recommended threshold of 65 lb/day for ROG and NO_X, or result in or substantially contribute (at a level equal to or greater than 5%) to emissions concentrations that exceed the NAAQS or CAAQS (e.g., 50 $\mu g/m^3$ and 2.5 $\mu g/m^3$, respectively, for PM_{10}).

For levee improvements conducted in Sutter County, the FRAQMD *Indirect Source Review Guidelines* and CEQA planning guidance (FRAQMD 1998, 2007) provide recommended thresholds of significance for project-generated emissions of ozone precursors and PM_{10}.

In accordance with these recommended thresholds, the proposed project was determined to result in a significant effect on air quality if:

- project construction would result in emissions that exceed:
  - 25 lb/day of ROG,
  - 25 lb/day of NO_X, or
  - 80 lb/day of PM_{10}; or if
- operation of the project would result in regional emissions that exceed:
  - 25 lb/day of ROG,
  - 25 lb/day of NO_X, or
  - 80 lb/day of PM_{10}.

Project implementation would not result in any major sources of odor, and the proposed project would not involve operation of any of the common types of facilities that are known to produce odors (e.g., landfill, coffee roaster, wastewater treatment facility). Diesel exhaust, which is sometimes considered an objectionable odor source, would be associated with the use of on-site construction equipment, but it would be intermittent and temporary and would dissipate rapidly from the source with an increase in distance. Thus, project implementation would not expose sensitive receptors to odorous emissions, and this issue is not discussed further.

No air district in California, including the FRAQMD or SMAQMD, has identified a significance threshold for analyzing GHG emissions generated by a proposed project or a methodology for analyzing air quality impacts related to global warming. Although, by adoption of AB 32, California has identified GHG reduction goals, the effect of GHG emissions as they relate to global climate change is inherently a cumulative impact issue. While the emissions of one single project will not cause global climate change, GHG emissions from multiple projects throughout the world could result in a cumulative impact with respect to global climate change.

To meet AB 32 goals, California would need to generate less GHG than current levels. It is recognized, however, that for most projects there is no simple metric available to determine if a single project would substantially increase or decrease overall GHG emission levels.

While AB 32 focuses on stationary sources of GHG emissions, the primary objective of AB 32 is to reduce California's contribution to global warming by reducing California's total annual production of GHG emissions. The impact that GHG emissions have on global climate change does not depend on whether they were generated by stationary, mobile, or area sources or whether they were generated in one region or another. Thus, the net change in total GHG levels generated by a project or activity is the best metric for determining whether the proposed project would contribute to global warming. In the case of the proposed project, if the size of the increase in emissions from the project is considered to be substantial, then the impact of the project would be cumulatively considerable.

Because of the cumulative nature of GHG-related impacts, discussion of these impacts is presented in Section 4.2.5.6 in Chapter 4, "Cumulative Impacts."

3.11.3.3 IMPACT ANALYSIS

IMPACT 3.11-a **Temporary Emissions of ROG, NO_X, and PM_{10} during Construction.** *Because of the large amount of construction activity that would take place under the proposed project in all construction years, daily unmitigated emissions of ROG, NO_X, and PM_{10} would exceed air district-recommended significance thresholds. Therefore, project construction could result in or substantially contribute to an existing or projected violation of the CAAQS. This impact would be* ***significant.***

Construction emissions are "short term" or temporary in duration, but have the potential to represent a significant impact with respect to air quality, especially in the case of PM_{10}. Fugitive PM_{10} emissions are associated primarily with site preparation and earth-movement activities and vary as a function of such parameters as soil silt content, soil moisture, wind speed, acreage of disturbance area, and vehicle miles traveled (VMT) on paved and unpaved roads. Ozone precursor emissions of ROG and NO_X are associated primarily with construction equipment exhaust and asphalt paving.

With respect to project construction that would occur in 2008, construction of the proposed levee improvements would result in the temporary generation of ROG, NO_X, and PM_{10} emissions from excavation, vegetation clearing, grading, cut-fill, concrete pouring, paving, motor vehicle exhaust associated with construction equipment, construction employee commute trips, material transport (especially on unpaved surfaces), and other construction activities. Improvement of the NCC south levee (located entirely within Sutter County and under FRAQMD's jurisdiction) would involve cutoff wall construction and levee raise work to be completed during May–November 2008. Reaches 1–3 and the majority of Reach 4A of the Sacramento River east levee portion of the proposed

project are also located in Sutter County, and are under FRAQMD's jurisdiction. A portion of Reach 4A and Reach 4B are located in Sacramento County, and are under the jurisdiction of SMAQMD. It is assumed that all borrow sites for 2008 construction would be in Sutter County.

Worst-case daily and annual construction emissions were calculated for completion of the 2008 construction from EPA-recommended AP-42 emission factors for fugitive dust, and EMFAC 2002 emission factors for mobile-equipment. Total unmitigated worst-case (i.e., worst-day) emissions for the 2008 construction season were calculated to be 207 lb/day of ROG, 1,052 lb/day of NO_X, and 4,252 lb/day of PM_{10}. See Appendix C for detailed emission sources and assumptions.

Based on the project information presented in Section 2.3, "Description of the Proposed Project," construction of the proposed improvements in 2008 would result in maximum unmitigated daily emissions in excess of applicable FRAQMD thresholds for ROG, NO_X, and PM_{10} and SMAQMD thresholds for NO_X and PM_{10}. Because of the large size of the project, large extent, and high intensity of construction activities to be conducted concurrently, as well as the nonattainment status of the project area, and based on the modeling conducted, it is foreseeable that unmitigated construction-generated emissions would result in or substantially contribute to a violation of air quality standards and/or conflict with applicable air quality planning efforts. Project construction activities that would occur during the 2009–2010 construction seasons would result in emissions similar to those calculated for the 2008 construction season. This impact would be significant for all construction years.

Mitigation Measure 3.11-a: Implement District-Recommended Control Measures to Minimize Temporary Emissions of ROG, NO_X, and PM_{10} during Construction.

SAFCA shall implement mitigation measures as recommended by FRAQMD or SMAQMD, as applicable, and shall comply with all applicable rules and regulations of, FRAQMD or SMAQMD, as described below.

Construction in Sutter County (FRAQMD)

For portions of the project occurring in Sutter County, FRAQMD's *Indirect Source Review Guidelines* and online CEQA guidance provide mitigation measures for reducing short-term air quality impacts. As recommended by FRAQMD, SAFCA shall ensure that the following mitigation measures are implemented during all project construction activities to the extent practicable. In addition, construction of the proposed levee improvements are required to comply with all applicable FRAQMD rules and regulations, in particular Rule 3.0 (Visible Emissions), Rule 3.16 (Fugitive Dust Emissions), and Rule 3.15 (Architectural Coatings).

1. SAFCA shall require the contractor to implement a Fugitive Dust Control Plan that includes the following measures:

   - All earth-moving operations should be suspended when winds exceed 20 miles per hour or when winds carry dust beyond the property line despite implementation of all feasible dust control measures.

   - Construction sites shall be watered as directed by the Sutter County Department of Public Works or FRAQMD and as necessary to prevent fugitive dust violations.

   - An operational water truck should be on-site at all times. Apply water to control dust as needed to prevent visible emissions violations and off-site dust impacts.

   - On-site dirt piles or other stockpiled particulate matter should be covered, wind breaks installed, and water and/or soil stabilizers employed to reduce wind blown dust emissions. Incorporate the use of approved nontoxic soil stabilizers to all inactive construction areas according to manufacturers' specifications.

- All transfer processes involving a free fall of soil or other particulate matter shall be operated in such a manner as to minimize the free-fall distance and fugitive dust emissions.

- Apply approved chemical soil stabilizers to all inactive construction areas (previously graded areas that remain inactive for 96 hours), including unpaved roads and employee/equipment parking areas, according to the manufacturers' specifications.

- To prevent track-out, wheel washers should be installed where project vehicles and/or equipment exit onto paved streets from unpaved roads. Vehicles and/or equipment shall be washed before each trip. Alternatively, a gravel bed or rumble strip may be installed as appropriate at vehicle/equipment site exit points to effectively remove soil buildup on tires and tracks to prevent/diminish track-out.

- Paved streets shall be swept frequently (at least once per day by water sweeper with reclaimed water recommended; wet broom) if soil material has been carried onto adjacent paved, public thoroughfares from the project site.

- Provide temporary traffic control as needed during all phases of construction to improve traffic flow, as deemed appropriate by the Sutter County Department of Public Works and/or the California Department of Transportation and to reduce vehicle dust emissions. An effective measure is to enforce vehicle traffic speeds at or below 15 miles per hour on unpaved roads.

- Reduce traffic speeds on all unpaved surfaces to 15 miles per hour or less and reduce unnecessary vehicle traffic by restricting access. Provide appropriate training, on-site enforcement, and signage.

- Reestablish ground cover on the construction site as soon as possible, through seeding and watering.

- Open burning is yet another source of fugitive gas and particulate emissions, and it shall be prohibited at the project site. No open burning of vegetative waste (natural plant growth wastes) or other legal or illegal burn materials (trash, demolition debris, etc.) may be conducted at the project site. Vegetative wastes should be chipped or delivered to waste to energy facilities (permitted biomass facilities), mulched, composted, or used for firewood. It is unlawful to haul waste materials off-site for disposal by open burning.

2. Construction equipment exhaust emissions shall not exceed FRAQMD Regulation III, Rule 3.0, Visible Emissions Limitations (40% opacity or Ringelmann 2.0). Operators of vehicles and equipment found to exceed opacity limits shall take action to repair the equipment within 72 hours or remove the equipment from service. Failure to comply may result in a notice of violation.

3. The primary contractor shall be responsible for ensuring that all construction equipment is properly tuned and maintained before and during on-site operation.

4. Minimize idling time to 10 minutes, to conserve fuel and minimize emissions.

5. Use existing power sources (e.g., power poles) or clean fuel generators rather than temporary power generators.

6. Portable engines and portable engine-driven equipment units used at the project work site, with the exception of on-road and off-road motor vehicles, may require California Air Resources Board (ARB) Portable Equipment Registration with the state or a local district permit. The owner/operator shall be responsible for arranging appropriate consultations with ARB or FRAQMD to determine registration and permitting requirements before equipment is operated at the site.

7. The proponent shall assemble a comprehensive inventory list (i.e. make, model, engine year, horsepower, and emission rates) of all heavy-duty off-road (portable and mobile) equipment (50 horsepower [hp] and greater) that will be used an aggregate of 40 or more hours for the construction project and apply the following mitigation measure:

- Reducing NO_X emissions from off-road diesel-powered equipment: The project shall provide a plan for approval by FRAQMD demonstrating that the heavy-duty (equal to or greater than 50 hp) off-road equipment to be used in the construction project, including owned, leased and subcontractor vehicles, will achieve a project wide fleet-average 20% NO_X reduction and 45% particulate reduction[1] compared to the most recent ARB fleet average at time of construction.

Implementing the FRAQMD measures is expected to achieve a 75% reduction in fugitive dust emissions, 5% reduction in ROG emissions from construction equipment, 20% reduction in NO_X emissions from construction equipment, and 45% reduction in PM_{10} emissions from construction equipment (SMAQMD 2004). The resulting maximum average daily construction-generated emissions with mitigation incorporated, shown in Table 3.11-3, are calculated to be 160 lb/day of ROG, 697 lb/day of NO_X, and 921 lb/day of PM_{10} in Sutter County.

These mitigated emissions would be above the FRAQMD-recommended thresholds of 25 lb/day for ROG, 25 lb/day for NO_X, and 80 lb/day for PM_{10}. Therefore, although the impact would be reduced, implementing the mitigation measures described above would not reduce the impact related to construction-related emissions in Sutter County to a less-than-significant level.

Construction in Sacramento County (SMAQMD)

For construction that would occur in Sacramento County, the following measures apply and shall be implemented:

SAFCA shall pay SMAQMD an off-site mitigation fee for implementation of any proposed alternatives for the purpose of reducing impacts to a less-than-significant level. Based on the construction information presented in Section 2.3, "Description of the Proposed Project," and the emissions calculations shown in Appendix C, if the proposed project is selected for implementation, the specific fee amount to offset NO_X emissions for 2008 work that would occur in Sacramento County would be $45,550 (see Appendix C for fee calculations). Mitigation fees for work to occur in 2009 and 2010 are expected to be similar and would be calculated when the construction emissions can be more accurately determined. This calculation would occur when an alternative has been selected, improvement plans have been prepared, and accurate project-specific information is available. Calculation of fees associated with subsequent improvement plans/project phases shall be conducted at the time of project approval. The applicable fee rate shall be determined and the total fee shall be calculated based on the fee rate in effect at the time that subsequent environmental documents are prepared. The fee for subsequent construction projects shall be remitted to SMAQMD before groundbreaking.

SAFCA shall pay into SMAQMD's off-site construction mitigation fund to further mitigate construction-generated emissions of NO_X that exceed SMAQMD's daily emission threshold of 85 lb/day. The calculation of daily NO_X emissions is based on the cost to reduce 1 ton of NO_X at the time when the document is prepared (currently $14,300 per ton). The determination of the final mitigation fee shall be conducted in coordination with SMAQMD before any demolition or ground disturbance occurs for any project phase.

Calculation of and payment of the fee for all subsequent project phases shall also be included in the Mitigation Monitoring and Reporting Program for the project.

[1] Acceptable options for reducing emissions may include use of late-model engines, low-emission diesel products, alternative fuels, engine retrofit technology (Carl Moyer Guidelines), and after-treatment products; voluntary off-site mitigation projects; providing funds for air district off-site mitigation projects; and/or other options as they become available. FRAQMD should be contacted to discuss alternative measures.

Table 3.11-3
Summary of Maximum Daily Average Emissions during 2008 Construction

	Pollutant		
	ROG	NO_X	PM_{10}
Worst-Case Emissions within Sutter County—FRAQMD Emissions			
Natomas Cross Canal			
Total Unmitigated NCC Emissions	58 lb/day	317 lb/day	184 lb/day
Sacramento River East Levee			
Total Unmitigated Sacramento River East Levee Emissions—Reaches 1–3, 4A	110 lb/day	555 lb/day	3,499 lb/day
Total Unmitigated Emissions (lb/day)	168 lb/day	872	3,683
FRAQMD Threshold (lb/day)	**25**	**25**	**80**
Significant?	**Yes**	**Yes**	**Yes**
Total Mitigated Emissions (lb/day)[1]	160	697	921
Significant with Mitigation Incorporated?	Yes	Yes	Yes
Worst-Case Emissions within Sacramento County—SMAQMD Emissions			
Sacramento River East Levee			
Total Unmitigated Sacramento River East Levee Emissions—Reaches 4A–4B	12 lb/day	62 lb/day	389 lb/day
Elkhorn Canal Relocation			
Total Unmitigated Elkhorn Canal Emissions	27 lb/day	118 lb/day	180 lb/day
Total Unmitigated Emissions (lb/day)	39	180	569
SMAQMD Threshold	**–**	**85 lb/day**	**50 µg/m^3**
Significant?	**–**	**Yes**	**Yes[2]**
Total Mitigated Emissions (lb/day)[1]	37	144	142
Significant with Mitigation Incorporated?	–	No[3]	Yes[2]

Notes: FRAQMD = Feather River Air Quality Management District; lb/day = pounds per day; µg/m^3 = micrograms per cubic meter; NO_X = oxides of nitrogen; PM_{10} = respirable particulate matter with an aerodynamic diameter of 10 micrometers or less; ROG = reactive organic gases; SMAQMD = Sacramento Metropolitan Air Quality Management District

[1] Implementation of all recommended standard mitigation measures listed under Mitigation Measure 3.11-a would result in reductions of ROG, NO_X, and PM_{10} emissions by approximately 5%, 20%, and 75%, respectively.

[2] SMAQMD does not have an adopted mass emission-based threshold for PM_{10}. Instead, SMAQMD relies on a concentration-based threshold equivalent to the CAAQS for PM_{10}. If construction activities would result in or substantially contribute to a violation of the CAAQS at the project boundary, then construction-generated emissions of PM_{10} would be significant. Because of the intensity of earthmoving activities that would be involved during the construction of the Sacramento River east levee improvements, it is likely that a substantial contribution to a violation of the applicable air quality standard would occur.

[3] Payment into SMAQMD's Off-site Construction Mitigation Fee Program to offset NO_X emissions in excess of would reduce impacts for this pollutant in SMAQMD's jurisdiction to a less-than-significant level.

See Appendix C for assumptions and modeling results for each activity and subphase.

Source: Data provided by EDAW in 2007

SAFCA shall reduce NO_X and visible emissions from heavy-duty diesel equipment by implementing the following measures:

- A plan shall be developed, in consultation with SMAQMD, demonstrating that the heavy-duty (>50 hp), off-road vehicles to be used in the construction project (including owned, leased, and subcontractor vehicles) will achieve a projectwide fleet-average 20% NO_X reduction and 45% particulate reduction compared to the most recent ARB fleet average at the time of construction. Acceptable options for reducing emissions include the use of late-model engines, low-emission diesel products, alternative fuels, particulate-matter traps, engine retrofit technology, after-treatment products, and/or such other options as become available.

- A comprehensive inventory of all off-road construction equipment equal to or greater than 50 hp that will be used for an aggregate of 40 or more hours during any portion of project construction shall be submitted to SMAQMD. The inventory shall be updated and submitted monthly throughout the duration of the project, except that an inventory shall not be required for any 30-day period in which no construction operations occur. At least 48 hours before heavy-duty off-road equipment is used, SAFCA shall provide SMAQMD with the anticipated construction timeline, including the start date, and the name and phone number of the project manager and on-site foreman.

- Emissions from off-road, diesel-powered equipment used on the project site shall not exceed 40% opacity for more than 3 minutes in any 1 hour. Any equipment found to exceed 40% opacity (or Ringlemann 2.0) shall be repaired immediately, and SMAQMD shall be notified of noncompliant equipment within 48 hours of identification. A visual survey of all in-operation equipment shall be made at least weekly. A monthly summary of visual survey results shall be submitted to SMAQMD throughout the construction period, except that the monthly summary shall not be required for any 30-day period in which no construction operations occur. The monthly summary shall include the quantity and type of vehicles surveyed, as well as the dates of each survey. SMAQMD and/or other officials may conduct periodic site inspections to determine compliance.

All Project Construction

SAFCA shall implement the following additional dust control measures to reduce construction emissions throughout the project area:

- SAFCA shall submit a construction emission/dust control plan to SMAQMD and FRAQMD and shall receive approval of the plan before groundbreaking. All grading operations shall be suspended when fugitive dust levels exceed levels specified by SMAQMD or FRAQMD rules. SAFCA and its primary construction contractors shall ensure that dust is not causing a nuisance beyond the property line of the construction site.

- Open burning of removed vegetation shall be prohibited. Vegetative material shall be chipped on-site or delivered to waste-to-energy facilities.

- An operational water truck shall be on-site at all times. Water shall be applied to control dust as needed to prevent dust impacts off-site.

- Unpaved areas subject to vehicle traffic, including employee parking areas and equipment staging areas, shall be stabilized by being kept wet, treated with a chemical dust suppressant or soil binders, or covered.

- The track-out of bulk material onto public paved roadways as a result of operations, or erosion, shall be minimized by the use of track-out and erosion control, minimization, and preventive measures, and removed within 1 hour from adjacent streets such material anytime track-out extends for a cumulative distance of greater than 50 feet onto any paved public road during active operations.

- All visible roadway dust tracked out upon public paved roadways as a result of active operations shall be removed at the conclusion of each work day when active operations cease, or every 24 hours for continuous operations. Wet sweeping or a HEPA filter equipped vacuum device shall be used for roadway dust removal.
- Low-sulfur fuel shall be used for stationary construction equipment.
- Existing power sources or clean fuel generators shall be used rather than temporary power generators to the extent feasible.
- Low-emission on-site stationary equipment shall be used.
- Vehicle speeds on unpaved roadways shall be limited to 15 miles per hour.
- Idling time for all heavy-duty equipment shall be limited to 10 minutes.

Summary of Impact Significance After Mitigation

Because of the intensity of construction operations, time constraints to which it is assumed the proposed project must adhere to avoid other environmental impacts and adverse weather conditions, and the nonattainment status of the project area, the measures described above are not expected to be sufficient to reduce 2008 construction emissions below the applicable thresholds. As described above and summarized in Table 3.11-3, emissions of ozone precursors ROG and NO_X and PM_{10} emissions that would occur in Sutter County would still exceed the applicable FRAQMD significance criteria of 25, 25, and 80 lb/day, respectively. Similarly, emissions of PM from earth movement activities in Sacramento County would still be expected to result in or substantially contribute to a violation of applicable air quality standards. This impact would be similar for the 2009 and 2010 construction seasons. However, mitigated emissions of ozone precursors under SMAQMD's jurisdiction would be reduced to a less-than-significant level through payment into SMAQMD's Off-site Construction Mitigation Fee Program. Nonetheless, because of the large extent and intensity of construction required, this impact would remain **significant and unavoidable** for all construction seasons.

IMPACT 3.11-b **Long-Term Changes in Emissions of ROG, NO_X, and PM_{10} Associated with Project Implementation.** *Long-term regional (i.e., operational) emissions of criteria air pollutants or precursors would not result in or substantially contribute to an existing or projected violation of the CAAQS. As a result, this impact would be less than significant.*

Long-term operation of the proposed project would not result in increased regional emissions of ROG, NO_X, and PM_{10} from mobile-, stationary-, or area-source emissions. The project would require a negligible increase in operational maintenance activities at the proposed facilities, and associated vehicle trips. In addition, the levee system does not require extensive landscape maintenance or other activities that would result in a substantial net increase in emissions in comparison with existing conditions.

Furthermore, project implementation would not result in the operation of any new major stationary emission sources. A new pump station would be constructed as part of the 2009–2010 work program at the end of the North Drainage Canal, and would be a minor stationary source of emissions, located in Sacramento County. The pump station would consist of two 300-hp pumps that would be operated by electricity. A diesel-powered backup generator would be used in emergency situations and would be tested monthly. Emissions of ozone precursors and PM_{10} associated with pump station operation would be negligible. No other stationary sources of emissions would be associated with the project.

Therefore, impacts of the proposed project on long-term air quality would be less than significant.

Mitigation Measure: No mitigation is required.

IMPACT 3.11-c **Exposure of Sensitive Receptors to Toxic Air Emissions.** *The proposed project does not involve the siting of any new major sources of TACs, and project implementation would not result in the exposure of sensitive receptors to substantial TAC emissions. As a result, this impact would be* ***less than significant****.*

Project construction and operation would generate emissions of diesel PM, which is identified by ARB as a TAC. TAC emission sources are discussed separately below.

Project construction would result in short-term generation of diesel exhaust emissions from the use of off-road diesel equipment required for site grading and excavation, paving, and other construction activities, in addition to diesel-fueled on-road haul trucks used for hauling borrow material. As described previously, the dose to which the receptors are exposed (a function of concentration and duration of exposure) is the primary factor used to determine health risk (i.e., potential exposure to TAC emission levels that exceed applicable standards). According to the Office of Environmental Health Hazard Assessment, health risk assessments (HRAs), which determine the exposure of sensitive receptors to TAC emissions, should be based on a 70-year exposure period; however, such assessments should be limited to the period/duration of activities associated with the project (Salinas, pers. comm., 2004).

The duration of mobilized equipment used near sensitive receptors located along the levee system and borrow sites would be short (less than 3 full years for the entire project (construction seasons would last approximately 6 months each). In addition, as improvements are completed, mobile equipment would progress along the levees and canal alignments and would not operate near (within approximately 500 feet of) any one receptor for more than a few weeks at a time. Receptors located near (within 500 feet of) the borrow areas would likely experience longer exposure periods than receptors located along the levee alignments but would be located a greater distance from most of the borrow activities. The proposed project would represent less than 0.1% of the 70-year exposure period for any nearby sensitive receptor in the area. Finally, neither FRAQMD nor SMAQMD has any current guidance on TAC emissions from mobile equipment, and neither has a threshold of significance for exposure to emissions from this equipment. Because the exposure period for receptors in the vicinity of the project would be minimal, and because the local air districts do not have guidance for preparation of HRAs for construction equipment, an HRA is not recommended for the proposed project's construction activities.

As discussed above under Impact 3.11-b, a new pump station would be constructed as part of the 2009–2010 work program at the end of the North Drainage Canal and would be a minor stationary source of TAC emissions, located in Sacramento County. A diesel-powered backup generator would be used in emergency situations and would be tested monthly. Consequently, diesel PM emissions associated with the pump station would be infrequent. Furthermore, this category of stationary source (i.e., portable equipment), in addition to any other stationary sources that may emit TACs, would be subject to SMAQMD permitting and toxic best available control technology (T-BACT) requirements. If the implementation of T-BACT would not reduce emissions to an acceptable level, then SMAQMD would deny the required permit for this piece of equipment. Therefore, operation of this stationary source would not result in the exposure of sensitive receptors to substantial concentrations of TACs. No other stationary sources of emissions would be associated with the project.

Because of the temporary nature of construction activities and the limited exposure period for receptors to diesel exhaust associated with construction equipment and on-road haul trucks, and because the project would include no substantial stationary sources of diesel emissions, this impact would be less than significant.

Mitigation Measure: No mitigation is required.

3.12 NOISE

This section describes regulations that apply to noise, noise-sensitive land uses and existing noise sources in the project area, and potential noise impacts on the human environment from project construction and operation. Noise-related effects on wildlife are addressed in Section 3.7, "Terrestrial Biological Resources." Noise-sensitive land uses generally include those uses for which exposure to noise would result in significant adverse effects, as well as uses where quiet is an essential element of the intended purpose of the land uses. Noise-sensitive uses include residences, schools, hospitals, community centers, and places of worship. Noise effects are evaluated according to the standards of the jurisdiction in which they are generated, regardless of where they are perceived.

Sound levels are represented throughout this section in terms of the "A-weighted" decibel (dBA) scale. The dBA scale is an expression of sound pressure levels in logarithmic units called decibels (dB) that discriminates among (i.e., weights) sound frequencies in a manner approximating the sensitivity of the human ear. Section 3.12.2.1, "Sound and the Human Ear," provides an overview of acoustic fundamentals, including definitions of noise terminology used in this section and an explanation of the dBA scale.

3.12.1 REGULATORY SETTING

3.12.1.1 FEDERAL

U.S. Environmental Protection Agency

In response to the Federal Noise Control Act of 1972, the U.S. Environmental Protection Agency (EPA) has identified noise levels requisite to protect public health and welfare against hearing loss, annoyance, and activity interference (EPA 1974). One of the purposes of this document is to provide a basis for state and local governments' judgments in setting standards (e.g., maximum allowable noise levels specified in the noise ordinance or general plan noise element for residential land uses).

A 24-hour exposure level of 70 A-weighted decibels (dBA) or lower is the level of environmental noise that will not cause any measurable hearing loss over a lifetime (EPA 1974). Likewise, levels of 55 dBA or lower outdoors and 45 dBA or lower indoors are identified as preventing interference with activities and annoyance. These noise levels are considered those that will permit spoken conversation and other activities such as sleeping, working, and recreation, which are part of the daily human condition. The levels are not single-event or "peak" levels. Instead, they represent averages of acoustic energy over periods of time such as 8 or 24 hours and over even longer periods of time (e.g., years).

U.S. Department of Transportation

The Federal Transit Administration (FTA) of the U.S. Department of Transportation (DOT) has established a methodology for the assessment of noise levels from construction (FTA 2006). Unless local noise ordinances apply, this methodology can be used to develop criteria on a project-specific basis. For major construction projects where a known noise-sensitive receptor (e.g., residential land use) is adjacent to the site, the DOT 8-hour standard is an energy-equivalent noise level (L_{eq}) of 80 dBA and 70 dBA L_{eq} for daytime and nighttime hours, respectively. DOT also sets a 30-day standard of 75 dBA day-night average noise level (L_{dn}).

To address the human response to groundborne vibration, FTA has guidelines for maximum-acceptable vibration criteria for different types of land uses. These guidelines recommend 65 vibration decibels (VdB) referenced to 1 microinch per second (μin/sec) and based on the root mean square (RMS) velocity amplitude for land uses where low ambient vibration is essential for interior operations (e.g., hospitals, high-tech manufacturing, laboratory facilities); 80 VdB for residential uses and buildings where people normally sleep; and 83 VdB for institutional land uses with primarily daytime operations (e.g., schools, churches, clinics, offices) (FTA 2006).

The Committee of Hearing, Bio Acoustics, and Bio Mechanics (CHABA), at the request of EPA (FTA 2006), established standards to address the potential for groundborne vibration to cause structural damage to buildings. For fragile structures, CHABA recommends a maximum limit of 0.25 inch per second (in/sec) peak particle velocity (PPV) (FTA 2006).

3.12.1.2 STATE

Governor's Office of Planning and Research

The Governor's Office of Planning and Research (OPR) published the *State of California General Plan Guidelines* (OPR 2003), which provide guidance for the acceptability of projects within specific L_{dn} contours. Generally, residential uses (e.g., mobile homes) are considered to be acceptable in areas where exterior noise levels do not exceed 60 dBA L_{dn}. Residential uses are normally unacceptable in areas exceeding 70 dBA L_{dn} and conditionally acceptable within 55–70 dBA L_{dn}. Schools are normally acceptable in areas up to 70 dBA L_{dn} and normally unacceptable in areas exceeding 70 dBA L_{dn}. Commercial uses are normally acceptable in areas with a community noise equivalent level (CNEL) of up to 70 dBA. Commercial uses are conditionally acceptable where the L_{dn} is between 67.5 and 77.5 dBA, depending on the noise insulation features and the noise reduction requirements. The guidelines also provide adjustment factors for determining noise acceptability standards that reflect the noise control goals of the community, the particular community's sensitivity to noise, and the community's assessment of the relative importance of noise pollution.

California Code of Regulations

Title 24 of the California Code of Regulations establishes standards governing interior noise levels that apply to all new multifamily residential units in California. These standards require that acoustical studies be performed before construction begins at locations where the existing L_{dn} exceeds 60 dBA. Such acoustical studies are required to establish mitigation measures that limit maximum L_{dn} levels to 45 dBA in any habitable room. Although no generally applicable interior noise standards are pertinent to all uses, many communities in California have adopted an L_{dn} of 45 dBA as an upper limit on interior noise in all residential units.

California Department of Transportation

For the protection of fragile, historic, and residential structures, the California Department of Transportation (Caltrans) recommends a more conservative threshold of 0.2 in/sec PPV for normal residential buildings and 0.08 in/sec PPV for old or historically significant structures (Caltrans 2002). These standards are more stringent than the federal standard established by CHABA, presented above.

3.12.1.3 LOCAL

Construction activities associated with the proposed project could affect noise-sensitive land uses in Sutter and Sacramento Counties and the city of Sacramento. Most jurisdictions have adopted standards for both transportation and nontransportation noise sources in the noise elements of their general plans and/or in noise ordinances. Below is a summary of the applicable noise standards for this project.

A project could have a significant effect on the environment if it conflicts with the applicable adopted noise standards, substantially increases the ambient noise levels for adjacent areas, or causes adverse noise impacts for sensitive receptors, such as residences and schools. All jurisdictions where project-related construction vehicle traffic would occur have adopted local ordinances regulating noise levels to minimize impacts on sensitive land uses. These local standards have been established for both nontransportation and transportation noise sources. Table 3.12-1 lists the nontransportation noise standards in the relevant jurisdictions, and Table 3.12-2 lists the transportation noise standards in those jurisdictions where the project may involve trucks hauling materials.

Table 3.12-1
Local Government Nontransportation Noise Standards (dBA)

Noise Element Jurisdiction/ Land Use Category	Maximum Allowable Exterior Noise Levels					
	Daytime 7 a.m.–7 p.m.		Evening 7 p.m.–10 p.m.		Nighttime 10 p.m.–7 a.m.	
Sutter County	Daytime Hourly		Evening Hourly		Nighttime Hourly	
	L_{eq}	L_{max}	L_{eq}	L_{max}	L_{eq}	L_{max}
	50	70	50	70	45	65
	Construction noise is not exempt from Sutter County noise standards during any hours of the day.					
Sacramento County Residential Areas	Hourly		Hourly		Hourly	
	L_{50}	L_{max}	L_{50}	L_{max}	L_{50}	L_{max}
	50	70	50	70	45	65
	Construction noise is exempt from the Sacramento County noise regulations provided that construction does not take place before 6 a.m. or after 8 p.m. Monday through Friday, and before 7 a.m. or after 8 p.m. on Saturday and Sunday.					
City of Sacramento Residential Areas	Exterior L_{dn}/CNEL			Interior L_{dn}/CNEL		
	60			45		
	Construction noise is exempt from the City of Sacramento noise regulations provided that construction does not take place before 7 a.m. or after 6 p.m. Monday through Saturday, and before 9 a.m. or after 6 p.m. on Sunday.					

Notes: dBA = A-weighted decibel; L_{50} = noise level exceeded 50% of the time; L_{max} = maximum noise level; L_{dn} = day-night average noise level; CNEL = community noise equivalent level; L_{eq} = energy-equivalent noise level.
Sources: City of Sacramento 1988, Sacramento County 1998, Sutter County 1996

Table 3.12-2
Local Government Transportation Noise Standards (dBA)

Noise Element Jurisdiction/Land Use Category	Maximum Allowable Noise Levels	
	Exterior L_{dn}/CNEL[1]	Interior L_{dn}/CNEL
Sutter County[2]		
Residential areas	60	45
Commercial areas—office buildings	–	–
Other sensitive areas—playground, parks and riding stables	70	–
Other sensitive areas—hospitals, nursing homes, churches, transient lodging	60	45
Sacramento County and City of Sacramento		
Residential areas	60	45

Notes: dBA = A-weighted decibel; L_{dn} = day-night average noise level; CNEL = community noise equivalent level.
[1] The jurisdictions with standards for transportation noise impacts have adopted a maximum L_{dn}/CNEL noise limit of 60 dBA for residential land uses, with a potential allowable L_{dn}/CNEL exceedance level 65 dBA, if 60 dBA is not feasible in a situation given the application of the best-available noise reduction measures.
[2] Worst-case 1-hour L_{eq} noise standards for interior spaces of 35–45 dBA have been adopted for theaters, auditoriums, music halls, churches, meeting halls, office buildings, schools, libraries and museums.
Sources: City of Sacramento 1988, Sacramento County 1998, Sutter County 1996

Construction noise may affect receptors in unincorporated areas of Sutter and Sacramento Counties and in the city of Sacramento. These jurisdictions either have nontransportation noise standards based on time of day and land use sensitivity or provide exemptions for construction as long as those activities occur during the daytime. Residential areas are considered the most noise-sensitive land use, and the most restrictive noise standards apply.

Other noise-sensitive land uses, such as; riding stables, playgrounds, and parks, have restrictive noise standards for nontransportation noise as well. Each of the jurisdictions has established maximum allowable exterior noise standards for both daytime and nighttime hours as shown in Table 3.12-1.

Noise generated by a transportation source is also regulated according to land use. All the jurisdictions with standards for transportation noise impacts have adopted a normally acceptable L_{dn}/CNEL noise standard of 60 dBA for residential land uses and a conditionally acceptable L_{dn}/CNEL noise standard of 65 dBA, provided that the best available noise reduction measures have been applied. Many of the jurisdictions have adopted a maximum L_{dn}/CNEL noise limit of 70 dBA for playgrounds and parks.

For the purposes of this analysis, the local noise level standards presented in Table 3.12-1 are applied to evaluate the impacts of noise generated by construction equipment and the local noise level standards presented in Table 3.12-2 are applied to evaluate the impacts of noise generated by construction-related truck trips.

Both the City of Sacramento Noise Control Code and the Sacramento County Noise Control conditionally exempt construction activity but during different times of the day and week. The City Noise Control Code exempts noise generated by construction activity that occurs during the hours of 7 a.m. to 6 p.m. Monday through Saturday, and from 9 a.m. to 6 p.m. on Sunday (8.68.080 Exemptions, Noise Control Standards, City of Sacramento Municipal Code). The Sacramento County Noise Control Code exempts noise generated by construction activity that occurs during the hours of 6 a.m. to 8 p.m. Monday through Friday, and 7 a.m. to 8 p.m. on Saturday and Sunday (Chapter 6.68 Noise Control, County of Sacramento Code). Sutter County does not have noise ordinances nor exemptions for construction noise; therefore, the performance standards contained in Table 13.12-1 are applied to construction noise (Follas, pers. comm., 2007).

3.12.2 ENVIRONMENTAL SETTING

3.12.2.1 SOUND AND THE HUMAN EAR

Noise is generally defined as sound that is loud, disagreeable, or unexpected. Sound, as described in more detail below, is mechanical energy transmitted in the form of a wave due to a disturbance or vibration. Because of the ability of the human ear to detect a wide range of sound pressure fluctuations, sound pressure levels are expressed in logarithmic units called dB. The sound pressure level in decibels is calculated by taking the log of the ratio between the actual sound pressure and the reference sound pressure squared. The reference sound pressure is considered the absolute hearing threshold (Caltrans 1998).

Because the human ear is not equally sensitive to all sound frequencies, a specific frequency-dependent rating scale was devised to relate noise to human sensitivity. A dBA scale performs this compensation by discriminating against frequencies in a manner approximating the sensitivity of the human ear. The basis for compensation is the faintest sound audible to the average ear at the frequency of maximum sensitivity. This dBA scale has been adopted by most authorities for the purpose of regulating environmental noise. Typical indoor and outdoor noise levels are presented in Exhibit 3.12-1.

Because the decibel scale is logarithmic, sound levels measured in decibels are not additive. For example, a 65-dBA source of sound, such as a truck, when joined by another 65-dBA source results in sound amplitude of 68 dBA, not 130 dBA (i.e., doubling the source strength increases the sound pressure by 3 dBA). Amplitude is interpreted by the ear as corresponding to different degrees of loudness. Laboratory measurements correlate a 10-dBA increase in amplitude with a perceived doubling of loudness and establish a 3-dBA change in amplitude as the minimum difference perceptible to the average person (Caltrans 1998).

3.12.2.2 SOUND PROPAGATION

As sound (or noise) propagates from the source to the receptor, the attenuation, or manner of noise reduction in relation to distance, depends on surface characteristics, atmospheric conditions, and the presence of physical barriers. The inverse square law describes the attenuation caused by the pattern of sound traveling from the source to the receptor. Sound travels uniformly outward from a point source in a spherical pattern with an attenuation rate of 6 dBA per doubling of distance. However, from a line source (e.g., a road), sound travels uniformly outward in a cylindrical pattern with an attenuation rate of 3 dBA per doubling of distance. The surface characteristics between the source and the receptor may result in additional sound absorption and/or reflection. Atmospheric conditions such as wind speed, temperature, and humidity may affect noise levels.

Furthermore, the presence of a barrier between the source and the receptor may also attenuate noise levels. The actual amount of attenuation depends on the barrier size and frequency of the noise. A noise barrier may be any natural or human-made feature such as a hill, tree, building, wall, or berm (Caltrans 1998).

3.12.2.3 NOISE DESCRIPTORS

The selection of a proper noise descriptor for a specific source depends on the spatial and temporal distribution, duration, and fluctuation of the noise. The noise descriptors most often encountered when dealing with traffic, community, and environmental noise are defined below (Caltrans 1998, Lipscomb and Taylor 1978).

- **L_{max} (Maximum Noise Level)**: The maximum instantaneous noise level during a specific period of time. The L_{max} may also be referred to as the "peak (noise) level."

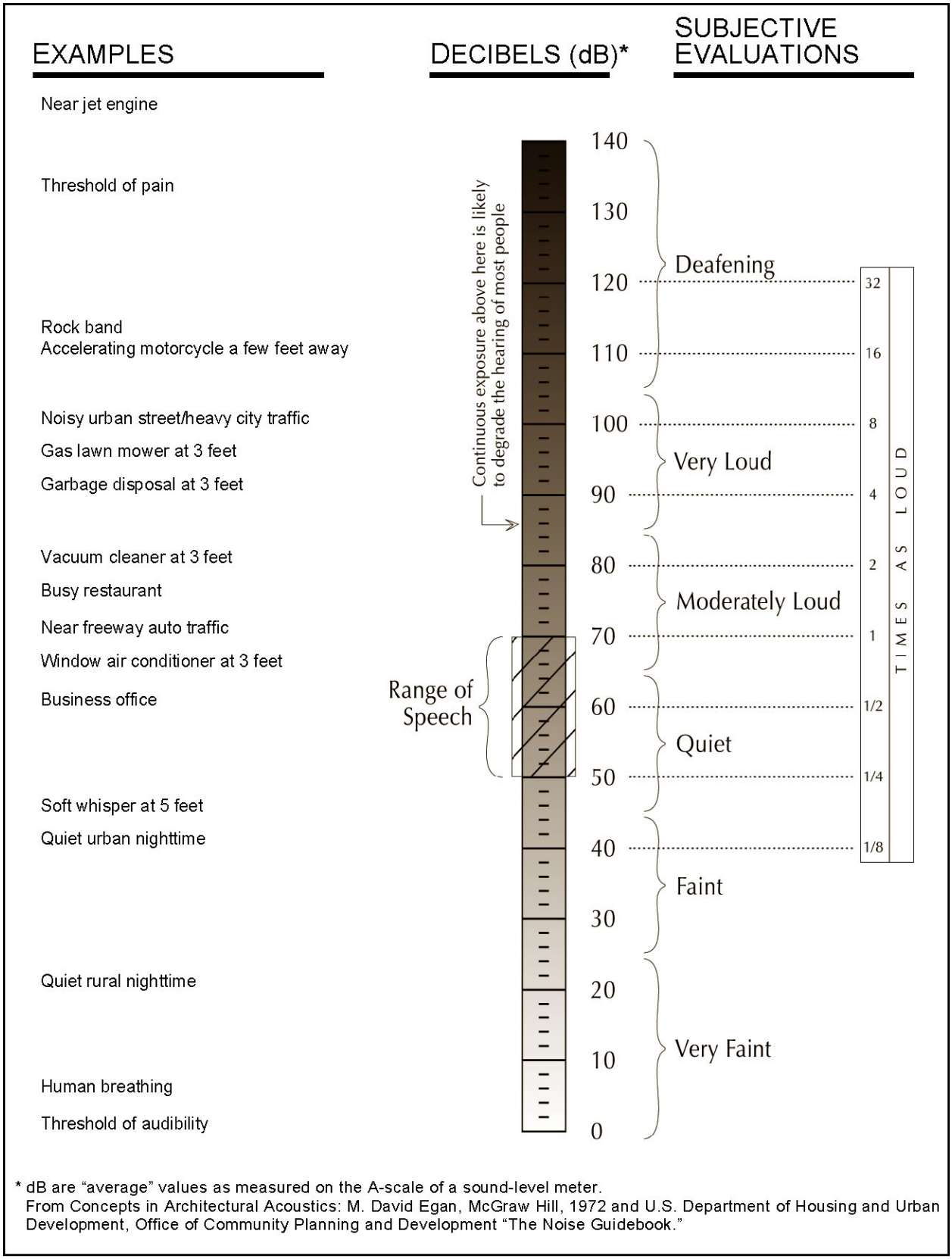
- **L_{min} (Minimum Noise Level)**: The minimum instantaneous noise level during a specific period of time.

- **L_X (Statistical Descriptor):** The noise level exceeded X% of a specific period of time. The L_{50} is the noise level exceeded 50% of the time, for example.

- **L_{eq} (Equivalent Noise Level)**: The energy mean (average) noise level. The instantaneous noise levels during a specific period of time in dBA are converted to relative energy values. From the sum of the relative energy values, an average energy value is calculated, which is then converted back to dBA to determine the L_{eq}.

- **L_{dn} (Day-Night Noise Level)**: The 24-hour L_{eq} with a 10-dBA "penalty" for the noise-sensitive hours between 10:00 p.m. and 7:00 a.m. In calculating the L_{dn}, 10 dBA is added to each noise event occurring in the nighttime hours, resulting in a higher reported sound level than would occur without the penalty. The L_{dn} is intended to account for the fact that noise during this specific period of time is a potential source of disturbance with respect to normal sleeping hours.

- **CNEL (Community Noise Equivalent Level)**: The CNEL is similar to the L_{dn} described above, but with an additional 5-dBA "penalty" for the noise-sensitive hours between 7:00 p.m. to 10:00 p.m., which are typically reserved for relaxation, conversation, reading, and television. If the same 24-hour noise data are used, the CNEL is typically approximately 0.5 dBA higher than the L_{dn}.



Source: Data compiled by EDAW in 2007

Typical Noise Levels **Exhibit 3.12-1**

3.12.2.4 EXISTING NOISE CONDITIONS AND NOISE-SENSITIVE LAND USES IN THE PROJECT AREA

2008 Construction Area

The proposed 2008 construction elements include the Natomas Cross Canal (NCC) south levee improvements, construction of the adjacent setback levee along Sacramento River east levee Reaches 1–4B and seepage berms in Reaches 2–4B, and construction of the relocated Elkhorn Canal and the new GGS/Drainage Canal between the North Drainage Canal and Elkhorn Reservoir. The area consists primarily of rural/agricultural land uses and residential uses located adjacent to the existing levee system.

A few noise-sensitive residential uses and an Arabian horse training ranch are located along Howsley Road east of State Route (SR) 99/70 adjacent to, and south of, the NCC construction area (Exhibit 2-9). Noise-sensitive land uses adjacent to the Sacramento River east levee area are Verona Village Resort; residential uses located along the water side of the Sacramento River east levee to the west of the construction area; and a few homes east of Reach 4A (Exhibit 2-10). Some waterside residences along the Sacramento River east levee are located within 150 feet of the construction area and some residences east of the Reach 4A construction area are located within approximately 700 feet.

Vehicle traffic, Sacramento International Airport (Airport) operations, and agricultural activities are the primary noise sources in these areas. The major roadways in the area are SR 99/70, Garden Highway, Powerline Road, Riego Road, and West Elverta Road (Exhibit 2-8).

2009–2010 Construction Areas

The proposed 2009–2010 construction elements include construction of the adjacent setback levee and seepage remediation along the Sacramento River east levee in Reaches 4B–20A, completion of the Elkhorn Canal relocation and the new GGS/Drainage Canal below Elkhorn Reservoir, construction of the replacement Riverside Canal, Airport West Ditch improvements, reconstruction of Pumping Plant No. 2, and Pleasant Grove Creek Canal west levee improvements. Existing noise sources in the construction areas include traffic on area roadways, aircraft flyovers and other Airport noise sources, railroad operations, machinery and activities associated with commercial and industrial uses, and miscellaneous sources within residential communities. The most substantial roadway traffic source within the area is vehicle traffic along Interstate 5, Interstate 80, and SR 99/70. Arterial roadways and stationary sources have a localized influence on the noise environment.

3.12.3 ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

3.12.3.1 SIGNIFICANCE CRITERIA

The thresholds for determining the significance of impacts for this analysis are based on the environmental checklist in Appendix G of the State CEQA Guidelines. The proposed project was determined to result in a significant effect on the noise environment if it would:

- result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project,
- expose people residing or working in the project area to excessive noise levels;
- expose persons to or generate excessive groundborne vibration or groundborne noise levels;
- for a project located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, expose people residing or working in the project area to excessive noise levels; or

- for a project within the vicinity of a private airstrip, expose people residing or working in the project area to excessive noise levels.

The following considerations apply to the first three significance thresholds:

- **Short-term construction noise impacts:** Short-term construction noise impacts would be significant if construction-generated noise levels exceed the levels shown in Table 3.12-1 at nearby noise-sensitive land uses.

- **Noise impacts from haul truck traffic:** For all affected residential land uses, noise generated by haul truck traffic associated with the project would be significant if it would cause the overall exterior noise level to exceed the "normally acceptable" exterior land use compatibility noise standard of 60 dBA L_{dn}/CNEL for residential land uses or would exceed the interior noise standard of 45 dBA L_{dn}/CNEL in any inhabitable residence (Table 3.12-2).

- **Exposure of sensitive receptors to or generation of excessive vibration levels.** Short- and long-term vibration impacts would be significant if construction or operation of the proposed project would result in the exposure of sensitive receptors to, or would generate, vibration levels that exceed Caltrans's recommended standard of 0.2 in/sec PPV with respect to the prevention of structural damage for normal buildings (Caltrans 2002) or the FTA's maximum acceptable vibration standard of 80 VdB with respect to human response for residential uses (i.e., annoyance) (FTA 2006) at any nearby existing sensitive land uses.

Portions of the proposed project activities for 2008 and 2009–2010 would be located inside the Airport land use plan area. Some areas where construction would occur are as close as 3,000 feet to the Airport.

There are no private airstrips in the vicinity of the project area. Therefore, the last significance threshold does not apply to this project and is not discussed further.

3.12.3.2 IMPACT ANALYSIS

IMPACT 3.12-a Generation of Short-Term Construction Noise. *Construction activities associated with the proposed improvements could generate noise levels that exceed the local noise standards for stationary sources at nearby sensitive receptors in all construction seasons. In addition, because some construction activity would occur during the noise-sensitive evening and nighttime hours, it would have the potential to cause sleep disturbance at nearby residential land uses. This impact would be* ***significant****.*

General construction activities that would apply to levee improvements include:

- clearing, grubbing, stripping, and grading;

- demolishing canals and removing trees and structures along the land side, and a limited portion of the water side at RD1000 Plant No. 2, of the Sacramento River east levee and structures along the NCC south levee;

- excavating inspection trenches;

- hauling and placing borrow material;

- reconstructing Garden Highway at intersections;

- constructing cutoff walls, relief wells, and seepage berms; and

- demobilizing and restoring construction sites.

Construction activities that would apply to the construction of drainage and irrigation infrastructure include:

- clearing, grubbing, and stripping;
- excavation;
- foundation construction;
- pipeline installation;
- hauling and placing borrow material;
- pile driving at the Pumping Plant No. 2 site;
- electrical and mechanical equipment installation; and
- demobilization and cleanup.

These construction activities would generate temporary and intermittent noise at or near the individual noise-sensitive locations. Much of the construction activity would proceed in a linear manner along the levee and canal alignments and would have the maximum noise effect on individual residences for approximately 2–3 weeks in most locations. Noise levels would fluctuate depending on the particular type, number, duration of use of various pieces of construction equipment, and physical location of construction activities. On-site equipment required for levee improvement and canal construction activities is anticipated to include excavators, backhoes, bulldozers, scrapers, rollers, graders, loaders, compactors, and various trucks. Individual equipment maximum noise levels produced by these operations could range from 79 to 101 dBA without the implementation of feasible noise control and from 75 to 95 dBA with implementation of feasible noise control at a distance of 50 feet from the nearest noise source, as indicated in Table 3.12-3.

Table 3.12-3
Typical Construction Equipment Noise Levels

Type of Equipment	Noise Level in dBA at 50 feet[1]	
	Without Feasible Noise Control	With Feasible Noise Control[2]
Dozer or tractor	80	75
Pile driver	101	95
Excavator	88	80
Scraper	88	80
Front-end loader	79	75
Backhoe	85	75
Grader	85	75
Crane	83	75
Truck	91	75

Notes: dBA = A-weighted decibel

[1] Estimates correspond to a distance of 50 feet from the noisiest piece of equipment and 200 feet from the other equipment.

[2] Feasible noise control includes the use of intake mufflers, exhaust mufflers, and engine shrouds in accordance with manufacturers' specifications.

Source: EPA 1971

Noise-sensitive land uses (in this case, primarily residential uses) are located throughout the areas in which construction would occur in 2008 and in 2009–2010. The NCC south levee residences are shown in Exhibits 2-9 and 2-19; residences along the Sacramento River east levee are shown in Exhibits 2-10 and 2-26. Some noise-sensitive receptors are within 50–100 feet of the canal, levee, and borrow areas where construction activity would occur. This is the case in Reaches 6 and 7 of the NCC south levee construction area and at the RD 1001, Vestal, and Nestor borrow sites (2008 construction) and in Sacramento River east levee Reaches 19B and 20A (2009–

2010 construction). Residences are present along the length of the water side of the Sacramento River east levee from the lower part of Reach 2 through Reach 20A.

Construction noise attributable to the proposed project was estimated using the FTA noise methodology for the prediction of stationary noise sources (FTA 2006). Table 3.12-4 shows the results for the various stages of construction activities associated with the proposed levee and canal improvements, based on the equipment requirements for construction shown in Tables 2-4, 2-5, 2-9, 2-15, and 2-19 for 2008 construction and in Tables 2-10, 2-17, 2-21, 2-23, and 2-25 for 2009–2010 construction, and the distances to the mitigated 45-dBA and 50-dBA noise contours assuming no intervening barriers. Appendix D shows the complete listing of inputs and the methodology for predicting noise levels from construction.

Table 3.12-4
Predicted Noise Levels Attributable to Major Construction Activities

Action	Project Improvement Type	Resulting Noise Level in dBA L_{eq} at 100 Feet		Distance to Mitigated[1] Noise Contour (Feet)	
		Mitigated[1]	Unmitigated	50 dBA[2]	45 dBA[2]
Clearing and grubbing/stripping	Levee, canal	63.6	79.3	478	850
Levee degrading	Levee	63.8	79.3	488	868
Demolish canal and remove trees	Levee	72.3	79.3	1,301	2,313
Cutoff wall construction	Levee	72.3	79.3	1,301	2,313
Borrow site excavation	Levee, canal	72.3	79.3	1,301	2,313
Levee raising	Levee	63.8	79.6	488	868
Dewatering	Canal	73.3	79.3	1,460	2,500+
Excavation	Canal	63.3	67.3	462	821
Foundation construction	Canal	73.3	79.3	1,460	2,595
Concrete construction	Canal	67.3	70.6	730	1,298
Pipeline construction	Canal	65.3	79.3	581	1,033
Backfill and finish grading	Canal	65.3	79.3	581	1,033
Electrical and mechanical equipment installation	Canal	59.3	67.3	292	519
Pile driving	Canal	89.0	95.0	2,500+	2,500+
Erosion control	Levee, canal	63.3	72.3	462	821
Demobilization and cleanup	Levee, canal	63.3	67.3	462	821

Notes: dBA = A-weighted decibel; L_{eq} = energy-equivalent noise level.
[1] Outfitted with noise control equipment
[2] Distances to noise contours do not take into account intervening topography or existing structure facades.
Sources:
Reference noise levels were obtained from the National Cooperative Highway Research Program, Synthesis 218, Table 3, Construction Equipment Noise Emission Levels, page 8.
The equation: Leq(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50) is found in the NCHRP, Synthesis 218, page 11 "Noise Impact Assessment."

As shown in Table 3.12-4, the predicted highest noise level during construction would be 89.0 dBA L_{eq} at a distance of 100 feet from pile driving. Pile driving would be used only in the reconstruction of Pumping Plant No. 2 at the west end of the North Drainage Canal, a location that is approximately 50 feet from a single residence. The next predicted highest noise level associated with construction activities would be 79.3 dBA L_{eq} at 100 feet from construction activities without noise control device outfitting for heavy construction equipment, for both the levee improvement and canal improvement construction activities. In some work locations, construction noise would be short term, and impacts would generally not result in sleep disruption or annoyance. In other instances,

the levee itself may serve as a sound barrier that provides some protection to sensitive land uses. For instance, this may occur when construction activity takes place at the landside toe of the Sacramento River east levee in reaches where there are waterside residences. Along the NCC, construction of the cutoff wall along NCC south levee Reaches 3–7 could occur 24 hours per day. Thus, sustained construction-generated noise could occur, resulting in significant noise impacts on residents, riding stables (located to the south of NCC Reach 6 and west of NCC Reach 7), and other noise-sensitive groups, depending on the type of construction activity and its proximity to noise-sensitive land uses.

Assuming a standard exterior-to-interior attenuation rate of 25 dBA for typical residential buildings, noise generated by construction equipment could result in interior noise levels that exceed the state's Title 24 noise standard of 45 dBA L_{dn} for interior spaces, as well as the interior noise standard of 45 dBA L_{dn}/CNEL for residential land uses established by the City of Sacramento for nontransportation noise sources (Table 3.12-1). Although construction activity is expected to take place during daytime hours in Sacramento County and the city of Sacramento, because of the need to complete levee improvements outside of the flood season and because of other environmental constraints on project schedule, it is possible that construction may need to be conducted outside of these hours. Therefore, noise may be generated by construction equipment operating near homes during the more noise-sensitive early morning and nighttime hours (i.e., during hours that are not exempted by the applicable local ordinances in the City and County of Sacramento) and could result in sleep disturbance at nearby residents.

In all construction years (2008–2010), construction of the proposed levee and canal improvements could result in noise levels that exceed the applicable daytime and nighttime standards for nontransportation sources (Table 3.12-1), resulting in increased annoyance and/or sleep disruption to occupants of residential dwellings and other sensitive receptors. Although temporary, this impact would be significant.

Mitigation Measure 3.12-a: Implement Noise-Reducing Construction Practices, Prepare a Noise Control Plan, and Monitor and Record Construction Noise Near Sensitive Receptors.

SAFCA and its primary contractors for engineering design and construction shall ensure that the following measures are implemented at each work site in any year of project construction to avoid and minimize construction noise effects on sensitive receptors. These measures are consistent with SAFCA's standard contract specifications for noise control.

The primary construction contractors shall employ noise-reducing construction practices. Measures that shall be used to limit noise shall include the following:

- Equipment shall be used as far away as practical from noise-sensitive uses.
- All construction equipment shall be equipped with noise-reduction devices such as mufflers to minimize construction noise and all internal combustion engines shall be equipped with exhaust and intake silencers in accordance with manufacturers' specifications.
- Equipment that is quieter than standard equipment shall be used, including electrically powered equipment instead of internal combustion equipment where use of such equipment is a readily available substitute that accomplishes project tasks in the same manner as internal combustion equipment.
- Construction site and haul road speed limits shall be established and enforced.
- The use of bells, whistles, alarms, and horns shall be restricted to safety warning purposes only.
- Noise-reducing enclosures shall be used around stationary noise-generating equipment (e.g., compressors and generators).

- Fixed construction equipment (e.g., compressors and generators), construction staging and stockpiling areas, and construction vehicle routes shall be located at the most distant point feasible from noise-sensitive receptors.

- When noise sensitive uses are within close proximity and subject to prolonged construction noise, noise-attenuating buffers such as structures, truck trailers, or soil piles shall be located between noise generation sources and sensitive receptors.

- Before construction activity begins within 500 feet of one or more residences, written notification shall be provided to the potentially affected residents, identifying the type, duration, and frequency of construction activities. Notification materials shall also identify a mechanism for residents to register complaints with the appropriate jurisdiction if construction noise levels are overly intrusive. The distance of 500 feet is based on the 60-dBA contour of the loudest anticipated construction activity other than pile driving (as listed in Table 3.12-4).

- If noise-generating activities are conducted within 100 feet of noise-sensitive receptors (the 70-dBA noise contour of construction noise), the primary contractor shall continuously measure and record sound generated as a result of the proposed work activities. Sound monitoring equipment shall be calibrated before taking measurements and shall have a resolution within 2 dBA. Monitoring shall take place at each activity operation adjacent to sensitive receptors. The recorded noise monitoring results shall be furnished weekly to SAFCA.

- The primary contractor shall prepare a detailed noise control plan based on the construction methods proposed. This plan shall identify specific measures to ensure compliance with the noise limits specified above. The noise control plan shall be submitted to and approved by SAFCA before any noise-generating construction activity begins.

These measures would reduce interior and exterior noise levels at noise-sensitive receptors located near construction sites. However, standards applicable to local exterior noises would not be reduced to a less-than-significant level at every nearby receptor. Therefore, the impact of short-term construction noise on sensitive receptors would be **significant and unavoidable**.

IMPACT 3.12-b Exposure of Sensitive Receptors to or Generation of Excessive Groundborne Vibration or Noise. *Construction activities associated with the proposed flood control improvements would generate levels of groundborne vibration or groundborne noise. Pile driving for the Pumping Plant No. 2 reconstruction in 2009 would generate groundborne vibration and noise that would exceed FTA or Caltrans standards. This impact would be significant.*

Construction activities have the potential to result in varying degrees of temporary ground vibration, depending on the specific construction equipment used and operations involved. Vibration generated by construction equipment spreads through the ground and diminishes in magnitude with increases in distance. Table 3.12-5 displays vibration levels for typical construction equipment.

On-site construction equipment for the proposed improvements would include pile drivers (for the reconstruction of Pumping Plant No. 2), excavators, backhoes, bulldozers, scrapers, rollers, graders, loaders, compactors, and various trucks. With the exception of pile driving, the most intense generation of ground vibration would be associated with large bulldozers that generated levels of 0.089 in/sec PPV and 87 VdB. These levels would attenuate to 0.031 in/sec PPV or 78 VdB at a distance of 50 feet. Because there are no residential buildings within 50 feet of the construction areas, vibration generated by other off-road construction equipment would not exceed the Caltrans or FTA standards. Ground vibration would also be generated by haul trucks operating on area haul routes. As shown in Table 3.12-5, vibration levels generated by trucks could reach as high as 0.076 in/sec PPV or 86 VdB at a distance of 25 feet. At a distance of 50 feet, these levels would attenuate to 0.027 in/sec PPV and 77 VdB. These levels are also less than Caltrans's and FTA's standards and, therefore, would be less than significant.

Table 3.12-5
Typical Construction Equipment Vibration Levels

Equipment		PPV at 25 feet (in/sec)[1]	Approximate Lv at 25 feet[2]
Pile driver (impact)	Upper range	1.518	112
	Typical	0.644	104
Pile driver (sonic)	Upper range	0.734	105
	Typical	0.170	93
Large bulldozer		0.089	87
Trucks		0.076	86
Jackhammer		0.035	79
Small bulldozer		0.003	58

[1] Where PPV is the peak particle velocity

[2] Where Lv is the velocity level in decibels and based on the root mean square velocity amplitude.

Source: FTA 2006

Vibration levels associated with pile driving could be as high as 1.518 in/sec PPV) or 112 VdB (referenced to 1 μin/sec and based on the RMS velocity amplitude) at a distance of 25 feet. Using FTA's recommended procedure for applying a propagation adjustment to these reference levels, predicted worst-case vibration levels would exceed Caltrans's recommended standard of 0.2 in/sec PPV with respect to the prevention of structural damage for normal buildings within 100 feet and FTA maximum acceptable vibration standard of 80 VdB with respect to human annoyance for residential uses within 300 feet. There is one existing residence located approximately 50 feet from the site where pile driving would be performed for the reconstruction of Pumping Plant No. 2 at the west end of the North Drainage Canal. While the structure is not considered to be historically significant or particularly vulnerable to groundborne vibration, the resulting vibration levels would exceed both FTA's human disturbance-based standard and Caltrans's structural damage-based standard. As a result, this impact would be significant.

Mitigation Measure 3.12-b: Implement Measures to Avoid Construction-Related Vibration Effects.

SAFCA and its primary contractors for engineering design and construction shall ensure that the following measures are implemented to avoid and minimize construction vibration effects on sensitive receptors and the structure near the Pumping Plant No. 2 site:

- Pile driving shall be conducted as far as practicable from the residential structure.
- Vibration monitoring equipment shall be placed at the property line adjacent to large equipment and, with owner approval, at the back of the residential structure adjacent to the large equipment.
- A pre- and postconstruction survey shall be conducted to assess potential architectural damage from pile driving at the residence near the Pumping Plant No. 2 site. The survey shall include visual inspection of the structure, documentation of the structure by means of photographs and video. This documentation shall be reviewed with the individual owner prior to any construction activity. Postconstruction monitoring of the structure shall be performed to identify (and repair, if necessary) damage, if any, from construction vibrations. Any damage shall be documented with photographs and video. This documentation shall also be reviewed with the individual property owners.

Performing pile driving as far as feasiblypossible from residential structures and would reduce the probability of generating structural damage and/or human disturbance. However, these measures would not necessarily reduce ground vibration to levels below Caltrans's recommended standard of 0.2 in/sec PPV with respect to the prevention of structural damage for normal buildings or the FTA maximum acceptable vibration standard of 80

VdB with respect to human response for residential uses. Therefore, the impact of short-term construction noise on sensitive receptors would be **significant and unavoidable**.

IMPACT 3.12-c **Exposure of Residents to Increased Traffic Noise Levels from Hauling Activity.** *For residences adjacent to the proposed haul routes, truck traffic levels in all construction seasons are expected to raise noise levels above the standards for local traffic noise levels. This impact would be* ***significant****.*

Construction during 2008 and 2009–2010 would generate high volumes of haul truck trips on area roads, as described in Section 3.10, "Transportation and Circulation." Associated traffic noise levels were estimated using the Federal Highway Administration (FHWA) Traffic Noise Model (FHWA 1988) and are displayed in Table 3.12-6. These estimates are based on the amount of material to be hauled, number of days of construction, and the hours per day in which hauling would occur, as provided in Section 2.3, "Description of the Proposed Project."

As shown in Table 3.12-6, noise levels attributable to haul truck traffic in 2008 would range from 58.2 to 70.4 dBA L_{eq} at a distance of 50 feet from the roadway centerline. Noise levels generated by 2009–2010 truck trips are expected to be similar.

Because most of the project area roadways currently serve a limited volume of residential traffic, it is assumed that modeled noise levels for 2008 construction as shown in Table 3.12-6 represent substantial increases compared to existing traffic noise levels. Not only would the project result in substantially more vehicle trips on these roads, but the vehicles would be predominantly haul trucks, which generate considerably more noise than passenger vehicles. Predicted traffic noise levels along area roads would exceed local exterior noise standards at residential land uses located along these roads.

Table 3.12-6
Summary of Modeled Haul Truck Noise Levels for 2008 Construction[1]

Construction Site	Amount of Extraction Material (Cubic Yards)	Number of One-Way Trips Required per Hour	Resulting Noise Level (dBA L_{eq} 50 Feet from Roadway Centerline)
Natomas Cross Canal south levee	580,000	40	67.9
Sacramento River east levee	1,307,000	108	70.4
Canal relocation/construction	28,600	37	58.4

Notes: dBA = A-weighted decibels; L_{eq} = energy-equivalent noise level

[1] Traffic noise levels were modeled using the Federal Highway Administration Traffic Noise Model (FHWA 1988) based on traffic volumes obtained from the traffic report prepared for this project. Calculated noise levels do not consider any shielding or reflection of noise by existing structures or terrain features or noise contribution from other sources. Estimates are based on the amount of material to be hauled, number of days of construction, and the number of hauling hours per day as provided in Chapter 2, "Project Description," and assuming a speed of 35 mph. See modeling results in Appendix D for further detail.

Source: Data compiled by EDAW in 2007

Assuming a standard exterior-to-interior attenuation rate of 25 dBA for residential buildings, noise generated by haul trucks supplying material for the Sacramento River east levee improvements could result in interior noise levels of 45.4 dBA L_{eq}, which could result in an exceedance of the state's Title 24 noise standard of 45 dBA L_{dn} for interior spaces, as well as the interior noise standard of 45 dBA L_{dn}/CNEL for residential land uses established by Sutter County, Sacramento County, and the City of Sacramento for transportation noise sources (Table 3.12-2). In addition, although hauling activity is expected to take place during daytime hours, because of the need to complete levee improvements outside of the flood season and because of other environmental constraints on project schedule, it may be necessary to conduct some hauling activity during some noise-sensitive early morning and nighttime hours, potentially resulting in sleep disturbance at nearby residences. Therefore, this impact would be significant.

Mitigation Measure 3.12-c: Implement Noise-Reduction Measures to Reduce the Effects of Haul Truck Traffic Noise.

SAFCA and its primary contractors for engineering design and construction shall ensure that the following measures are implemented at each work site in any year of project construction to minimize construction traffic noise effects on sensitive receptors.

- All heavy trucks shall be equipped with noise control (e.g., muffler) devices in accordance with manufacturers' specifications.
- All haul trucks shall be inspected before use and a minimum of once per year to ensure proper maintenance and presence of noise-control devices (e.g., lubrication, nonleaking mufflers, and shrouding).
- Before haul truck trips are initiated during a construction season on roads within 600 feet of residences (the 60-dBA noise contour of haul truck traffic), written notification shall be provided to the potentially affected residents identifying the hours and frequency of haul truck trips. Notification materials shall also identify a mechanism for residents to register complaints with the appropriate jurisdiction if haul truck noise levels are overly intrusive or occur outside the exempt daytime hours for the applicable jurisdiction, as listed in Table 3.12-1.

These measures would reduce interior and exterior noise levels generated by haul truck traffic that passes noise-sensitive receptors. However, the mitigated noise levels may not meet the applicable standards for local exterior noises for residential land uses. Therefore, this impact would remain **significant and unavoidable**.

IMPACT 3.12-d Long-Term Increases in Noise. *The proposed project would establish a new stationary noise source (backup generator at Pumping Plant No. 2); however, this source would not create off-site noise levels that would exceed applicable standards at sensitive receptor locations. This impact would be* ***less than significant***

The proposed replacement of Pumping Plant No. 2 would be located east of the Sacramento east levee near the west end of the North Drainage Canal and would involve the long-term operation of noise-generating stationary equipment. The pumping station would contain two 300-horsepower pumps and a backup generator. Without proper noise control or enclosure, such equipment could result in noise levels in the range of 78–88 dBA at 3–5 feet from the source depending on the exact type and size (EPA 1971).

The two pumps would replace similarly sized pumps that existed at the Plant No. 2 site prior to removal of the pump station. The only increase in stationary and area source noise associated with the proposed replacement pump station would be mechanical equipment, such as an emergency standby generator. The generator would be used only during emergency situations and during monthly testing. Operational noise levels associated with proposed pump station would be in compliance with applicable performance standards at nearby receptors. Therefore, this impact would be less than significant.

Mitigation Measure: No mitigation is required.

IMPACT 3.12-e Exposure of Construction Workers to Excessive Noise Levels from Airport Operations. *For workers located within close proximity to the Airport, noise levels attributable to Airport operations are not expected to raise noise levels above 2008 and 2009–2010 construction noise levels. This impact would be* ***less than significant****.*

Portions of the construction areas for 2008 and 2009–2010 construction along the Sacramento River east levee and canal alignments are located within the Airport land use plan area. Some areas where construction would occur are as close as 3,000 feet of the airport. Because of the unique approach/departure path used by airplanes at the Airport, Sacramento River east levee Reaches 3, 4A, 4B, 5A, 5B, and Reaches 10–20 are all located within the 60-dB CNEL Airport noise contour (County of Sacramento 2003). Portions of Reaches 10 and 11 are located

within the 65-dB and 75-dB CNEL contours, respectively. Based upon the predicted noise levels in Table 3.12-4, the dominant noise source on the project site would be construction noise, even in proximity to the Airport. The proposed project would not permanently locate construction workers in the Airport land use plan area, and workers are not anticipated to be exposed to aircraft noise levels higher than the noise levels generated by construction equipment. Therefore, the effect of exposure of construction workers to Airport noise levels would be **less than significant**.

Mitigation Measure: No mitigation is required.

3.13 RECREATION

This section describes recreational facilities in the Natomas Basin and analyzes the potential impacts of the proposed project on these facilities. Noise effects of the proposed project are addressed in Section 3.12, "Noise." Effects on aesthetic resources are addressed in Section 3.14, "Visual Resources."

3.13.1 REGULATORY SETTING

No federal, state, or county laws, regulations, or policies related to recreational resources are relevant to this analysis.

The Sacramento City Council approved the *City of Sacramento Parks and Recreation Master Plan 2005–2010* in 2004. The plan divides the city into different community planning areas, including the South Natomas Community Planning Area, near the confluence of the American and Sacramento Rivers.

3.13.2 ENVIRONMENTAL SETTING

The Natomas Cross Canal (NCC) and the Pleasant Grove Creek Canal (PGCC) are not considered recreational resources. The width and depth of these channels do not accommodate water-based recreation. The north and south levees of the NCC are owned and maintained by Reclamation Districts (RDs) 1001 and 1000, respectively. RD 1000 also owns the PGCC west levee. These levees are used by the public for passive recreational activities such as walking and jogging. There are no recreational facilities adjacent to these levees.

The Sacramento River is a popular location for both water-related and land-based recreation. Recreational boating is one of the primary uses of the Sacramento River in the project area. Marinas and boat launches in the project area are accessible by land only from Garden Highway. Land-based activities such as camping, picnicking, and shoreline fishing also occur in limited areas along the Sacramento River in and near the project area. Several parks and two golf courses are located in the project area. Table 3.13-1 lists private and public marinas/boat launches, city and county parks, and golf courses; Exhibit 3.13-1 shows their locations.

Table 3.13-1
Recreational Facilities In or Near the Project Area

Facility	Location	Features
Verona Marina	6955 Garden Highway, north of the NCC	Boat ramp, marina
Verona Village Resort	6995 Garden Highway	Boat ramp, picnic area, RV campground
Rio Ramaza	10000 Garden Highway	Boat ramp, marina, picnic area
Teal Bend Golf Club	7200 Garden Highway	18-hole golf course, bar and grill
The Alamar Marina	5999 Garden Highway	Boat ramp, marina, picnic area, restaurant, pub
Swabbie's at Metro Marina	5871 Garden Highway	Marina, picnic area, bar and grill
Elkhorn Boat Launch (County of Sacramento)	Garden Highway at North Bayou Road	Boat ramp and dock, picnic area
Costa Park Site (City of Sacramento)	Garden Highway and Interstate 5	Undeveloped; planned neighborhood-serving park
Sand Cove Park (City of Sacramento)	2005 Garden Highway	Boat dock/landing, paved walkways, trails, picnic facilities

Table 3.13-1 Recreational Facilities In or Near the Project Area		
Facility	Location	Features
Swallows Nest Country Club	2245 Orchard Lane	Nine-hole golf course, community facility
Shorebird Park (City of Sacramento)	Kittiwake Drive and Swainson's Way	Play equipment, picnic area with shelter, lawn volleyball court
River View Marina	1801 Garden Highway	Boat ramp, marina, restaurant
Riverbank Marina	1371 Garden Highway #200	Marina, boat dock/landing, restaurant, pub
Natomas Oaks Park (City of Sacramento)	2101 Gateway Oaks Drive	Picnic area, oak preserve and interpretative center
Discovery Park (County of Sacramento)	Confluence of American and Sacramento Rivers	Boat ramp, picnic area, hiking and biking trails
Note: NCC = Natomas Cross Canal; RV = recreational vehicle Sources: Sacramento DPR 2007; Sacramento County Regional Parks 2007; Sacramento River Guide 2007; Haenggi, pers. comm., 2007		

3.13.3 Environmental Impacts and Mitigation Measures

3.13.3.1 Significance Criteria

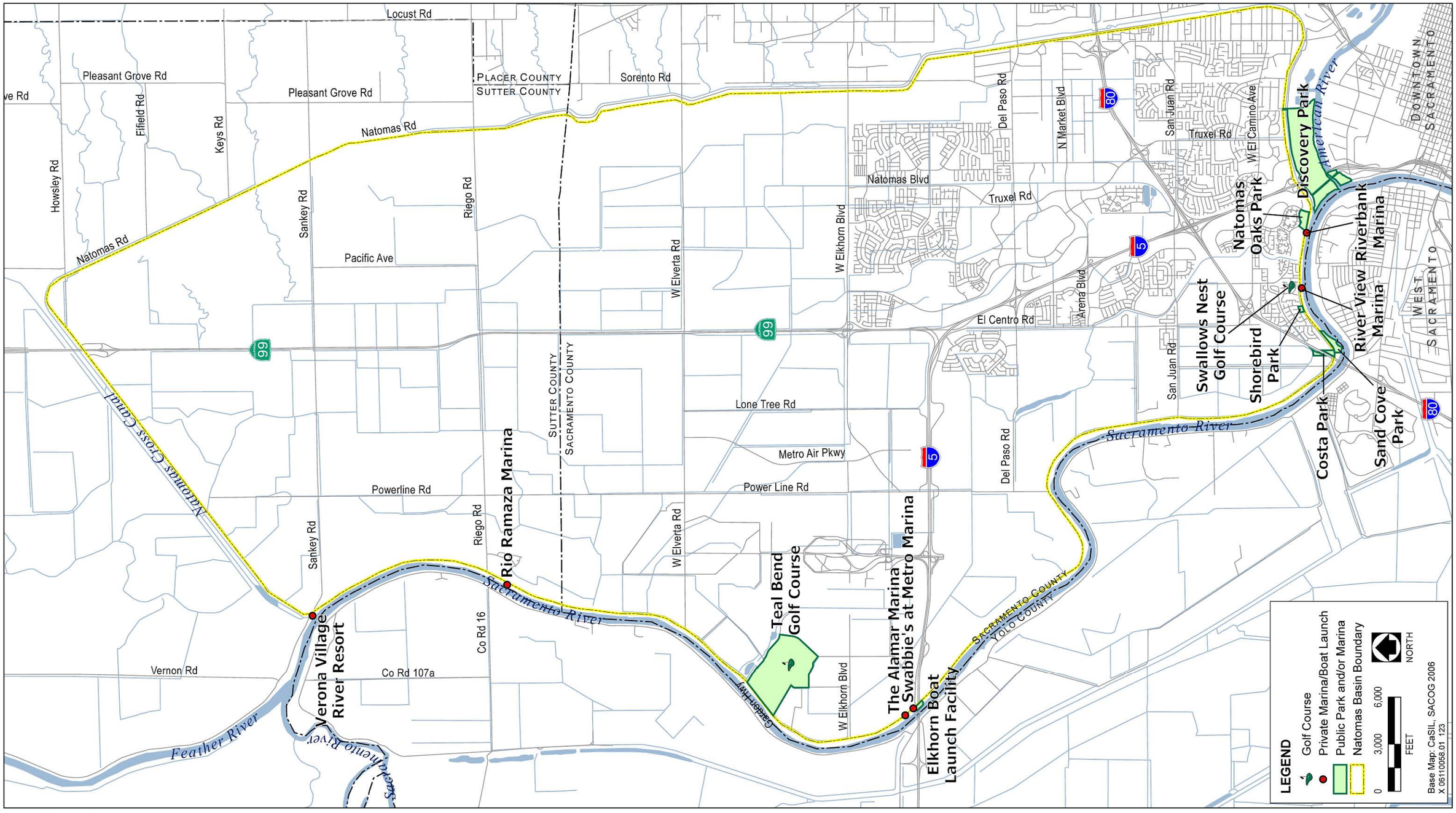
The thresholds for determining the significance of impacts for this analysis are based on the environmental checklist in Appendix G of the State CEQA Guidelines. The proposed project was determined to result in a significant effect related to recreation if it would:

- increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated,
- include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment,
- substantially restrict or reduce the availability or quality of existing recreational opportunities in the project vicinity, or
- implement operational or construction-related activities related to the placement of project facilities that would cause a substantial long-term disruption of any institutionally recognized recreational activities.

The proposed project would not increase the use of existing recreational facilities or involve the construction of additional recreational facilities or expansion of existing facilities. Therefore, the first and second significance thresholds do not apply and are not discussed further below.

3.13.3.2 Impact Analysis

No recreational facilities exist along the NCC or PGCC or at the proposed and potential borrow sites. No institutionally recognized recreational activities or substantial recreational uses take place along the NCC or the PGCC or at or near the borrow sites. Therefore, the impact analysis is limited to the proposed modifications of the flood control facilities along the Sacramento River east levee and associated construction activity.



Source: EDAW 2007

Recreation Facilities In or Near the Project Area **Exhibit 3.13-1**

IMPACT 3.13-a **Temporary Changes in Recreational Opportunities during Project Construction Activities.** *Construction of the adjacent setback levee and seepage remediation measures along the Sacramento River east levee during 2008 and 2009–2010 construction could adversely affect the recreational experience of boaters, golfers, and campers. However, the location and timing of disturbances would be temporary, and recreational uses could be temporarily relocated within the project region. This impact would be* ***less than significant****.*

Several marinas, parks, and golf courses are located in the vicinity of the Sacramento River east levee within the project area. Construction of the adjacent setback levee and seepage berms and cutoff walls along the Sacramento River east levee would entail the use of heavy construction equipment, with construction operating 24 hours per day for approximately 6-month-long construction periods in 2008, 2009, and 2010. Lane closures, and possibly periodic closures of roadway segments with detours for nonlocal traffic, would be needed along Garden Highway during some phases of the construction effort: reconstruction of intersections with lateral county roads, finishing of the adjacent setback levee waterside slope and crown, and installation of drainage features between the existing levee crown and the adjacent levee crown (see Exhibits 2-12 and 2-24). Access to recreational facilities along the Sacramento River, such as boat launches, could be temporarily affected during project construction if construction activities would result in traffic delays and/or lane closures along Garden Highway, which is a primary travel route to marinas along the Sacramento River in the vicinity of the project site. Access to Teal Bend Golf Club on the land side of the levee would need to be rerouted from Garden Highway during the construction of levee improvements in Reach 6B.

The quality of recreational opportunities is also likely to be generally reduced, temporarily, in the project vicinity as a result of noise and visual disturbance from construction activities associated with levee improvement activities (noise and visual impacts are addressed in Sections 3.12 and 3.14, respectively), particularly at Teal Bend Golf Club, Sand Cove Park, Shorebird Park, Natomas Oaks Park, and Discovery Park. The relocation of the Elkhorn Canal and construction of the new GGS/Drainage Canal during 2009–2010 could also directly disturb recreational uses at Teal Bend Golf Club, depending on the alignment of these canals.

Although temporary closure of sections of Garden Highway would be an inconvenience for recreationists, other travel routes would be available and could be used to access recreational facilities during the construction period. For example, Powerline Road can be used as an alternative route to Garden Highway for north-south travel between Sankey Road in the north to below Interstate 5 in the south. Disturbance of recreational uses in any area of the project site would be temporary, and recreationists would be able to use other nearby recreation areas in South Natomas, other parts of Sacramento, or elsewhere in the region that provide similar recreational opportunities during the construction period in the affected area. For these reasons, this impact would be less than significant.

Mitigation Measure: No mitigation is required.

IMPACT 3.13-b **Permanent Encroachment on Parkland along Garden Highway**. *The proposed project would include levee widening that could permanently encroach on land and could affect planned recreational uses. This impact would be* ***significant****.*

Levee widening along Garden Highway in Reaches 4B–19A of the Sacramento River east levee in 2009–2010 could permanently adversely affect recreational opportunities on the land side of the levee at the Costa Park site (see Exhibit 3.13-1). Depending on final design, an adjacent setback levee and seepage berms, with easements for levee maintenance access areas, could permanently occupy the portion of the site that is closest to the existing levee, reducing its potential for development as a city park. This impact would be significant.

Mitigation Measure 3.13-b: Compensate the City of Sacramento for Encroachments that Cause Permanent Loss of the Recreational Use of Affected Recreational Facilities.

Before the start of construction, SAFCA shall compensate the City of Sacramento for any loss of land on the Costa Park site. The negotiated compensation may be in the form of payment, replacement land, or other in-kind compensation for the permanent loss of recreational use at the affected site.

Implementing this mitigation measure would reduce this impact to a **less-than-significant** level.

3.14 VISUAL RESOURCES

This section focuses on visual resources that may be affected by implementation of the proposed project. Effects on recreational facilities are addressed in Section 3.13, "Recreation." Temporary noise effects are evaluated in Section 3.12, "Noise."

3.14.1 REGULATORY SETTING

3.14.1.1 FEDERAL AND STATE

No federal or state plans, policies, regulations, or laws related to aesthetic resources are applicable to the proposed project.

3.14.1.2 LOCAL

Sutter County

There are no Sutter County regulations that pertain specifically to visual resources in the Natomas Basin area. The Visual Resources section of the Land Use Element of the *County of Sutter General Plan 2015 Policy Document* (Sutter County 1996) has as its general goal, "To preserve and protect the visual and scenic resources of the area." Supporting this goal are policies regarding development in industrial and commercial areas, and along State Route [SR] 20 in Sutter County. However, there are no policies regarding nondevelopment-related construction.

Sacramento County

The Conservation Element of the *County of Sacramento General Plan* includes policies concerning flood channels, streamcourses, and waterways. To preserve the natural characteristics of these areas, policies in the Conservation Element call for maintenance of riparian vegetation, buffer zones adjacent to stream corridors that contain riparian vegetation, and unlined watercourses. Policy CO-107 requires that topographic diversity and variation be retained when channels are realigned or modified, including maintaining meandering characteristics, varied berm width, and naturalized side slope. In addition, the Open Space Element contains general policies related to the protection of open space areas. Policy OS-1 calls for the permanent protection, as open space, of areas of natural resource value, including wetland preserves, riparian corridors, woodlands, and floodplains. Policy OS-2 promotes the maintenance of open space and natural areas that are interconnected and of sufficient size to protect biodiversity, accommodate wildlife movement, and sustain ecosystems. (Sacramento County 1993.)

City of Sacramento

The *City of Sacramento General Plan 2006* also contains goals and policies related to flood control. These policies call for the preservation of riparian woodlands and grasslands along waterways in north Sacramento, and the establishment of standards for water-related open space to enhance the visual characteristics of area water resources (City of Sacramento 1988).

3.14.2 ENVIRONMENTAL SETTING

3.14.2.1 CRITERIA USED IN VISUAL RESOURCE ASSESSMENT

The aesthetic quality of an area is determined through the variety and contrasts of the area's visual features, the character of those features, and the scope and scale of the scene. The visual quality of an area depends on the relationships between its features and their importance in the overall view. Both natural and created features in a landscape contribute to its perceived visual quality.

Several sets of criteria have been developed for defining and evaluating visual quality. A commonly used set of criteria includes the concepts of vividness, intactness, and unity. None of these is itself equivalent to visual quality; all three must be high to indicate high quality. These terms are defined as follows (Federal Highway Administration 1983):

- "Vividness" is the visual power or memorability of landscape components as they combine in striking and distinctive visual patterns.

- "Intactness" is the visual integrity of the natural and human-built landscape and its freedom from encroaching elements.

- "Unity" is the visual coherence and compositional harmony of the landscape considered as a whole.

The quality of views of areas that could be affected by the proposed project is characterized based on the relative degree of vividness, intactness, and unity apparent in views and also on viewer sensitivity. Viewer sensitivity is a function of several factors, including the following:

- visibility of the landscape,
- proximity of viewers to the visual resources,
- frequency and duration of views,
- number of viewers,
- types of individuals and groups of viewers, and
- viewers' expectations.

The sensitivity of a view of the landscape is also determined by the extent of the public's concern for a particular view. Areas of high visual sensitivity are highly visible to the general public. Scenic highways, tourist routes, and recreation areas are considered more visually sensitive than more urbanized locations. A viewer's distance from landscape elements plays an important role in the determination of an area's visual quality. Landscape elements are considered higher or lower in visual importance based on their position relative to the viewer. Generally, the closer a resource is to the viewer, the more dominant, and therefore visually important, it is to the viewer.

3.14.2.2 VISUAL QUALITIES OF THE PROJECT AREA

Land uses at the proposed and potential borrow sites and in the vicinity of the Natomas Cross Canal (NCC) south levee, the Sacramento River east levee and adjacent irrigation facilities, and the Pleasant Grove Creek Canal (PGCC) west levee are described in Section 2.2, "Existing Project Facilities and Potential Borrow Sites," in Chapter 2 and are shown in Exhibits 2-8, 2-9, and 2-10.

The areas along the NCC south levee and the PGCC west levee are rural and agricultural. The surrounding lands are almost entirely flat, and there are few trees in the landscape except those along the channels (i.e., on the water side of the levees), in widely spaced woodland areas along the land side of the levee, and near residences. Views of these areas lack vividness, but the visual components of the agricultural landscape are largely uninterrupted by built features. Views of the NCC south levee and PGCC west levee areas are therefore intact and unified. There are no major roadways along these facilities, there are only a few residences from which viewers have near-distance views of the project sites, and these are not areas of recreational use or tourism. Views of these project areas are therefore of low sensitivity, and the quality of the views is low to moderate.

All the potential borrow sites consist of lands under agricultural cultivation or fallowed fields, and all are adjacent to cultivated or fallowed agricultural fields or areas with similar land cover types that are managed for their habitat values. Residences are sparse in the vicinity of these sites, viewers are few, and there are no sensitive viewer groups near them.

Land uses along the Sacramento River east levee vary from rural in the north to urban in the south, as described in detail in Table 3.2-1 in Section 3.2, "Agriculture and Land Use." The landscape of the western basin is almost entirely flat, the only topographic variation consisting of the levees and a few low rises where residences and agricultural buildings are located.

In Reaches 1–15, the area from the landside toe of the Sacramento River east levee to Sacramento International Airport (Airport) is largely rural and agricultural. Houses and agricultural structures are present in scattered locations along the levee system. Rows of mature trees, mainly oaks, cross the landscape in lines along parcel boundaries, and numerous individual mature trees and groves of various sizes are present along the landside levee toe and are scattered throughout the basin landscape. Where very large, mature oaks are present near Garden Highway, they often tower above all surrounding elements of the viewscape and are striking natural features both individually and as parts of overall views.

Airport facilities and arriving and departing aircraft are prominent features in the middle of the basin and in broader views of the overall landscape, and these Airport-related features contrast with the otherwise rural character of the northern and middle portion of the basin (approximately Reaches 1–13). Interstate 5 (I-5), which rises from about 2,000 feet east of the levee to cross the Sacramento River to the west, is also a dominant feature in views of the levee area in Reaches 8–10. In Reaches 13–15, urban and industrial uses form background elements to views of the rural agricultural setting from the vicinity of the levee (see Exhibit 2-10d).

The main viewer groups of the project area in Reaches 1–15 are local residents and travelers on Garden Highway, which is on the crown of the Sacramento River east levee and, therefore, elevated above the basin. Much of the viewscape is typical of local rural areas, consisting mainly of scattered agricultural outbuildings, rural roads, disturbed areas of ruderal vegetation bordering roadways, utility poles and overhead utility lines, and the existing levees. Approximately 25 feet high on average, the existing levee blocks views of the Sacramento River from the east. The existing levee and adjacent berms are an integral part of the visual setting to regular viewers, including area farmers, recreationists, and other travelers on local county roads. The levee is generally not visible from SR 70/99, which runs in a north-south direction approximately 3 miles to the east north of I-5. Trees in the riparian area along the Sacramento River west of the levee are visible above the top of the levee in views from the east. Garden Highway is used by local residents and by recreationists traveling to marinas, Verona Village Resort, and Teal Bend Golf Club, as well as by agricultural traffic. Recreationists are considered a sensitive viewer group; however, overall numbers of recreationists in this area are low. In addition, sweeping views of the basin are afforded to travelers on I-5 and I-80 where they are elevated, but these views are of short duration, and freeway travelers are not considered a sensitive viewer group. Overall views of the basin in these reaches lack vividness and are neither striking nor distinctive. Where Airport facilities are part of the viewshed, the viewscape lacks unity and intactness. However, outside the Airport Operations Area north of I-5, the rural reclamation features of the western basin (levees and berms, irrigation and drainage canals, and well-established agricultural elements) form a cohesive whole, and the area therefore has moderate intactness and unity of visual aesthetic features.

In Reaches 16–18B, rural residences and stands of mature oaks and other trees line the land side of the levee. Broad views of the landscape from Garden Highway are limited. Near views of rural residential properties along the roadway exhibit moderate intactness and unity. However, the I-80 overcrossing of the Sacramento River is prominent in views of Reaches 17–19A. Because of the incongruity of the I-5 and I-80 overcrossings with the otherwise pastoral features of views along Garden Highway, areas where these roadways are visible are of low aesthetic quality, given that they lack intactness and unity of visual features.

In Reaches 19A–20B, the area from the levee to approximately 2,500 feet landward of the levee is filled with a substantial amount of housing development, commercial buildings, and office parks. Because the elements of the landscape are a mixture of commercial, office park, residential, and utility features, the intactness and unity of the views are low. Views in this area are therefore generally of low to moderate aesthetic value. As in the upper reaches, the main viewer groups are residents and travelers on Garden Highway. In these reaches, however, much

of the vehicle traffic is associated with waterside businesses and is therefore short term, and these travelers do not constitute a sensitive viewer group.

From the middle of Reach 2 through Reach 20B, the water side of the Sacramento River east levee is lined with residences, marinas, and (in Reaches 19A through 20B) restaurants and other businesses among remnants of mature riparian woodland, consisting mainly of oaks and cottonwoods, as well as ornamental trees associated with the houses there. Travelers along the length of Garden Highway that is atop the Sacramento River east levee have intermittent views of the Sacramento River through the trees on the water side of the levee.

The water side of the Sacramento River east levee is visible to boaters and other recreationists along the Sacramento River. However, all views of the interior of the basin from the Sacramento River channel are blocked by the levee, waterside structures, and waterside trees. Views of the river corridor itself are distinctive and moderately vivid, with the meandering river channel and dense riparian growth forming striking and harmonious visual elements. However, the riparian growth is interrupted throughout the length of the Natomas Basin by residences and adjacent clearings and by waterside commercial establishments. These features and the east levee limit the extent of the riparian growth and detract from the natural appearance of the corridor, reminding viewers of the presence of nearby urban and agricultural areas. The views have a moderate degree of both intactness and unity. Recreationists are generally considered a sensitive viewer group, but because the number of recreationists in this area is only moderate, the sensitivity of views is moderate. Overall, area views are of moderate aesthetic value.

3.14.3 Environmental Impacts and Mitigation Measures

3.14.3.1 Significance Criteria

The thresholds for determining the significance of impacts for this analysis are based on the environmental checklist in Appendix G of the State CEQA Guidelines. The proposed project was determined to result in a significant effect on visual resources if it would:

- have a substantial adverse effect on a scenic vista;
- substantially damage scenic resources, including but not limited to trees, rock outcrops, and historic buildings, within a state scenic highway;
- substantially degrade the existing visual character or quality of the site and its surroundings; or
- create a new source of substantial light or glare that would adversely affect day or nighttime views in the area.

There are no designated state scenic highways in the project area (California Department of Transportation 2007); therefore, the second significance threshold listed above does not apply and is not discussed further.

3.14.3.2 Impact Analysis

IMPACT 3.14-a Changes in Scenic Vistas, Scenic Resources, and Existing Visual Character of the Project Area. *The temporary presence of construction equipment, materials, and work crews in Natomas Basin viewsheds; permanent modifications to the dimensions of flood control facilities; changes in land cover at borrow areas; and modifications to irrigation and drainage infrastructure in the project area would not substantially affect scenic vistas or substantially degrade the visual character or quality of the project area. However, the removal of mature oak trees from areas along the land side of the Sacramento River east levee to accommodate the adjacent setback levee and seepage berms would substantially degrade the aesthetic qualities of some areas from which the trees are removed. This impact would be* ***significant****.*

The presence and movement of heavy construction equipment and construction-related generation of dust would have the potential to temporarily degrade the existing visual character and/or quality of project sites during construction. However, construction activities would not take place in areas of high aesthetic qualities or viewer sensitivity; would be temporary; would be distant from most residences; and would not be visible for prolonged periods to any recreationists, who would generally be on the water side of the Sacramento River east levee. For these reasons, the presence of construction equipment and crews would not substantially affect scenic vistas or substantially degrade the visual character or quality of the project area.

The proposed levee improvements would include constructing a cutoff wall in Reaches 3–7 of the NCC south levee, which would require degrading the upper third of the levee and, therefore, clearing this portion of the levee of very sparse vegetation on the water side of the levee crown (the land side does not have any large vegetation). The NCC south levee improvements would also include raising the entire levee by approximately 3 feet and flattening the landside levee slope from an approximately 2:1 horizontal-to-vertical (2H:1V) slope to a 3H:1V slope. The Sacramento River east levee improvements would entail constructing an adjacent setback levee with a 3H:1V landside slope along the length of the existing levee, which would widen the levee embankment by approximately 50 feet and flatten its landside slope. The adjacent setback levee would be as much as 3 feet higher than the existing levee in the upper 11 reaches, with a crown elevation tapering down to the elevation of the existing levee by Reach 12. Seepage berms approximately 3–6 feet high would extend out 100 feet from the landside levee toe in several reaches and would extend out 300 feet in Reach 4B and possibly other reaches. The PGCC west levee would be raised, and seepage berms approximately 100 feet wide would be constructed along the land side of the levee.

From the land side of the levees, the changes in levee dimensions and the removal of some vegetation from the water side of the levee crown on the NCC south levee are unlikely to be noticeable to most viewers. The landside levee slopes would appear the same as the existing slopes because they would be maintained with a grass cover, as under existing conditions. Any perceived differences in views of these features would not constitute substantial degradation of the existing visual character or quality of a site or the area because neither the levees nor the general landscape are of high aesthetic value, the levee improvements would not substantially change the overall visual character of the area, and the number of sensitive viewers is low.

The raised and widened Sacramento River east levee would be noticeable to travelers on Garden Highway, but variations in the height and width of flood control features are common throughout the flood control system, and the levees themselves are not distinctive scenic resources. For this reason and the reasons stated with regard to changes in views from the land side of the levees, these changes in the appearance of the flood control system would not be a substantial change in scenic vistas or the character or quality of views.

The proposed borrow operations would lower the elevation of borrow sites by 2–3 feet over very large areas and would result in the replacement of areas of cultivated or fallowed rice fields with managed marsh and managed grasslands. The proposed elevation changes would not be discernible at the scale at which they would be implemented (generally hundreds of acres), and the proposed land cover types would be consistent with adjacent land uses and overall land cover types in the surrounding portions of the Natomas Basin. Long-term effects of these changes on scenic resources would be negligible.

The proposed project would require the removal of numerous large, mature trees in scattered locations along the landside toe of the Sacramento River levee, with an overall, combined canopy area of approximately 25 acres. In some locations, these trees are portions of larger groves, the major part of which would not be affected by the proposed project. In several locations where trees are in areas where seepage berms would be constructed rather than the adjacent setback levee itself, the proposed project design includes interrupting the berms at significant tree groves and installing arrays of relief wells around the trees so that they can be retained for a period of 20–30 years (the assumed useful life of the wells), after which time the wells would be removed, the trees removed, and the seepage berms completed. In other locations, however, entire groves or isolated trees would need to be removed to accommodate the planned improvements. Many of these trees tower above the surrounding features

and are striking, distinctive elements in local settings along the levee system, visible to residents on both sides of the levee and travelers along Garden Highway and other local roadways, I-5, and I-80. As reminders of the oak woodlands that formerly occupied much of the region and sometimes the only remnants of farmsteads that once stood in locations along the levee toe, these trees have a high aesthetic value. The proposed project includes offsetting the removal of the trees with approximately 150 acres of woodland plantings, consisting largely of oaks and faster-growing cottonwoods, spread throughout the western portion of the basin. In time, these new trees would enhance the visual qualities of the landscape; however, it would take many years for the new plantings to reach the size of the existing trees that are proposed to be removed, which in some cases are likely 100 years old or older. The removal of the existing trees from the proposed footprint of the Sacramento River east levee and berms would substantially degrade the quality of scenic resources and the existing visual character and quality of local sites and their surroundings. This impact would be significant in the near term.

Mitigation Measure: No mitigation is available.

The proposed project includes measures to limit the extent of this impact in the near term and to offset the impact over the longer term. No feasible mitigation is available to reduce the impact to a less-than-significant level in the near term. The impact therefore would be **significant and unavoidable**.

IMPACT 3.14-b Changes in Light and Glare. *The proposed project would not introduce any permanent sources of light or glare into the project area. However, it is expected that some NCC south levee improvements would be conducted at night, requiring temporary night lighting while this work is being conducted. Equipment staging areas also would be lit at night for security reasons. Such nighttime lighting would be short term and temporary and would generally be distant from residences or shielded from them by intervening features. Therefore, this impact would be less than significant.*

No new permanent sources of light or glare would be associated with the proposed project. However, equipment staging areas would be temporarily lit for security reasons during construction. It is anticipated that nighttime construction activity would be required for installation of the cutoff wall in the NCC south levee in 2008. Other construction is not generally anticipated to be conducted after 8 p.m.; however, it is possible that occasional construction activities may be required during later hours, in which case additional construction areas may require temporary nighttime lighting. There are no residences on the land side of the levee that are close to the proposed levee improvement sites along all but Reaches 6 and 7 of the NCC south levee, Sacramento River east levee Reaches 1–15, and all but the northern end of the PGCC west levee. Where residences do exist, the landside construction areas would often be screened from direct views of the construction area by trees. Along the Sacramento River east levee from Reach 2 to Reach 19A, where many residences are present on the water side of the levee, the existing levee itself, trees, and other vegetation would shield residences from lighting on the land side of the levee, where the work would be performed.

Security night lighting would be provided at the replacement of RD 1000 Pumping Plant No. 2. It would be situated such that no residences would be affected by this source of night light.

Additionally, construction work would typically move linearly down the levees, and construction activities would generally take place in any one location for no more than a few weeks. Therefore, where nighttime construction lighting (if needed) would be clearly visible from nearby residences, the activity would be short term and temporary and therefore would not constitute a substantial source of light or glare.

For the reasons listed above, nighttime lighting related to project construction would not create a new source of substantial light or glare that would adversely affect day or nighttime views in the area. This impact would be less than significant.

Mitigation Measure: No mitigation is required.

3.15 UTILITIES AND SERVICE SYSTEMS

This section addresses the following public utilities and service systems: water and wastewater, solid waste, electrical and natural gas, telephone and cable, and fire and police protection services. Drainage issues related to the proposed project are addressed in Section 3.4, "Hydrology and Hydraulics." Section 3.10, "Transportation and Circulation," addresses the potential for the proposed project to temporarily affect emergency response times and access during construction.

3.15.1 REGULATORY SETTING

No federal, state, or local plans, policies, regulations, or laws related to utilities and service systems are relevant to this analysis.

3.15.2 ENVIRONMENTAL SETTING

3.15.2.1 WATER SUPPLY

Agricultural irrigation water is provided in the Natomas Basin in Sutter and Sacramento Counties by the Natomas Central Mutual Water Company (NMWC), a private purveyor of irrigation water to farmlands, and through on-site wells. NMWC provides water to more than 33,000 acres of land through pipelines, pumps, and more than 50 miles of canals. NMWC is described further in Section 2.3.4.2, "Management Entities for Project Features." The main irrigation facilities in the project area are described in Section 2.2.1.1 for the Natomas Cross Canal (NCC) vicinity and Section 2.2.1.2 for the Sacramento River east levee vicinity.

The Sacramento County Water Agency provides municipal and industrial water service within Sacramento County, although much of the Natomas Basin receives only agricultural and irrigation water service supplied by NMWC. The City of Sacramento provides domestic water service within the city limits. Domestic water is provided by a combination of surface water and groundwater sources.

3.15.2.2 WASTEWATER

The Sacramento Regional County Sanitation District provides regional sewage services in the unincorporated areas of Sacramento County. The City of Sacramento is responsible for providing and maintaining sewer services in incorporated Sacramento County. There are no sewer lines in the project area; residences and businesses rely on septic systems for wastewater disposal.

3.15.2.3 SOLID WASTE

The nearest landfills in the project region that could be used for waste disposal during project construction activities are listed in Table 3.15-1.

Table 3.15-1
Major Landfills in the Project Region

Facility (County)	Location	Capacity
Kiefer Landfill (Sacramento County)	12701 Kiefer Boulevard Sloughhouse, CA 95683	Maximum permitted capacity: 117,400,000 cubic yards Remaining capacity (as of September 12, 2005): 112,900,000 cubic yards
Union Mine Disposal Site (El Dorado County)	5700 Union Mine Road El Dorado, CA 95623	Maximum permitted capacity: 195,000 cubic yards Remaining capacity (as of November 25, 2001): 140,000 cubic yards
Western Regional Landfill (Placer County)	3195 Athens Road Lincoln, CA 95648	Maximum permitted capacity: 36,350,000 cubic yards Remaining capacity (as of June 30, 2005): 29,093,819 cubic yards

Notes: There are no landfills in Sutter County
Source: California Integrated Waste Management Board 2007

3.15.2.4 Electrical and Natural Gas Service

The Sacramento Municipal Utility District (SMUD) provides electrical service to customers in the city of Sacramento and the Sacramento County portion of the Natomas Basin (Sacramento LAFCo 2007). The Pacific Gas and Electric Company (PG&E) provides electrical and natural gas services in Sutter County. There are no natural gas transmission lines in the NCC area (Sutter County 1996). In Reaches 4B and 8 along the Sacramento River east levee, gas pipelines are present that may be within the footprint of proposed flood control facilities or maintenance access (Dosanjh, pers. comm., 2007). Within the project area, there are standard 12-kilovolt electrical distribution lines supported overhead by wooden poles running roughly parallel to the existing east levee of the Sacramento River. Approximately 500 overhead power poles would need to be relocated along the east levee of the Sacramento River in Reaches 1–20A for the proposed levee improvements (Donanjh, pers. comm., 2007). Additional overhead electrical power distribution lines on wooden poles extend parallel to the landside toe of the NCC south levee in Reach 3, approximately 30 feet away from the levee toe.

3.15.2.5 Telephone and Cable

Telecommunications service in the project area is provided by multiple providers, including AT&T, Sprint, Comcast, SBC Communications, and SureWest.

3.15.2.6 Fire and Police Protection

The Sutter County Fire Department and the Sutter County Sheriff's Department provide fire and police protection, respectively, for Sutter County. The Natomas Fire Protection District of the City of Sacramento provides fire protection services for the portion of the Natomas Basin south of Sutter County by contract between the City and County of Sacramento (Sacramento LAFCo 2007). The unincorporated areas of Sacramento County are under the jurisdiction of the Sacramento County Sheriff's Department, and the City of Sacramento Police Department provides police protection services within the Sacramento city limits.

3.15.3 ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

3.15.3.1 SIGNIFICANCE CRITERIA

The thresholds for determining the significance of impacts for this analysis are based on the environmental checklist in Appendix G of the State CEQA Guidelines. The proposed project was determined to result in a significant effect on utilities and service systems if it would:

- exceed wastewater treatment requirements of the applicable regional water quality control board;
- require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects;
- exceed water supplies available to service the project from existing entitlements and resources, such that new or expanded entitlements would be needed; or
- result in a determination by the wastewater treatment provider that serves or may serve the project that it has inadequate capacity to serve the project's projected demand in addition to the provider's existing commitments;
- generate waste materials that would exceed the permitted capacity of local landfills or fail to comply with federal, state, and local statutes and regulations related to solid waste; or
- result in substantial adverse physical impact associated with the provision of new or altered governmental facilities in order to maintain acceptable service ratios, response times, or other performance objectives for public services such as fire protection, police protection, schools, or parks.

In addition, the proposed project was determined to have a significant effect on utilities and service systems if it would:

- physically interfere with a service provider's ability to continue to provide an existing level of service that meets established standards for the project area.

The proposed project would not involve any changes in land use that would increase short-term or long-term demand for public services, including fire and police protection, schools, parks, and other public facilities, thus necessitating the construction of new or altered government service facilities. Similarly, the proposed project would not result in demand for increased natural gas facilities, electrical transmission lines, communication systems, water infrastructure, sewer lines, or solid-waste services beyond their current capacity. Therefore, increased demand for these services and utilities is not addressed further in this EIR. Effects of the project on drainage systems are addressed in Section 3.4, "Hydrology and Hydraulics."

3.15.3.2 IMPACT ANALYSIS

IMPACT 3.15-a **Potential Temporary Disruption of Irrigation Supply.** *Project construction activity along the NCC south levee in 2008 and the Sacramento River east levee in 2008 and 2009–2010 would require the relocation of irrigation infrastructure. Delivery of irrigation water supply could be substantially disrupted as a result of accidental damage to infrastructure or failure to replace or reconnect needed infrastructure before the time of its required use. This potential impact would be* ***significant****.*

Pipeline penetrations of the existing NCC south levee would be raised in 2008 and pipeline penetrations of the Sacramento River east levee would be raised in 2008 and 2009–2010 to meet current U.S. Army Corps of Engineers regulations. Wells and pumps in the footprint of the proposed flood control facilities along the

Sacramento River east levee would be removed and replaced in locations farther from the project footprint in 2008 and 2009–2010. The Elkhorn and Riverside Canals would be relocated away from the toe of the Sacramento River east levee in 2008 and 2009, and the replacement canals would need to be operable and lateral irrigation canals connected to them before the existing canals are demolished. (See Section 2.3.2, "Levee Raising and Seepage Remediation," and Section 2.3.3, "Major Irrigation and Drainage Infrastructure," in Chapter 2 for descriptions of these improvements.). Additional buried irrigation lines may exist that would need to be removed or reconnected.

Significant temporary interruptions of irrigation supply could occur if irrigation infrastructure is damaged or otherwise rendered inoperable at a time when it is needed (e.g., reconnections to water supply sources are not completed by the time crop irrigation must begin). Given the extent and intensity of proposed project construction activities, it is possible that these activities could impede the repair of damaged infrastructure or cause a delay in the provision of irrigation supply to some areas such that existing levels of service that meet established standards for the project area are not met. Therefore, this potential impact would be significant.

Mitigation Measure 3.15-a: Coordinate with Irrigation Water Supply Users Before and During All Irrigation Infrastructure Modifications and Minimize Interruptions of Supply.

SAFCA and its primary contractors for engineering design and construction shall ensure that the following measures are implemented to minimize the potential for irrigation water supply interruptions during construction activities:

- Coordinate the timing of all modifications to irrigation supply infrastructure with the affected infrastructure owners and water supply users, either directly or through NMWC.
- Include detailed scheduling of the phases of modifications/replacement of existing irrigation infrastructure components in project design and in construction plans and specifications.
- Plan and complete modifications of irrigation infrastructure for the non-irrigation season to the extent feasible.
- Provide for alternative water supply, if necessary, when modification/replacement of irrigation infrastructure must be conducted during a period when it would otherwise be in normal use by an irrigator.
- Ensure either that (1) users of irrigation water supply do not, as a result of physical interference associated with the proposed project, experience a significant interruption in irrigation supply when such supply is needed for normal, planned farming operations (i.e., a decrease in level of service in comparison with the existing level of service), or (2) users of irrigation water supply that experience a significant decrease in an existing level of service that meets the established standards for the project area are compensated in kind for losses associated with the reduction in level of service.

Implementing this mitigation measure would ensure that physical effects on the delivery of irrigation water supply are reduced to a **less-than-significant** level.

IMPACT 3.15-b **Potential Disruption of Utility Service during Construction.** *Project construction activity along the Sacramento River east levee would require the relocation of overhead electrical distribution and/or telephone lines. Natural gas pipelines near the land side of the Sacramento River east levee may require relocation, and other underground utilities may be present in the proposed footprint of the adjacent setback levee, berms, or woodland planting areas. Utility service could be substantially disrupted during relocation or as a result of accidental damage during construction activity. This potential impact would be* ***significant****.*

Approximately 500 power poles carrying electrical distribution lines are present along the landside toe of the Sacramento River east levee, within the proposed footprint of the adjacent setback levee for the 2008 and 2009–2010 construction components. These poles would need to be either relocated to the water side of the existing levee embankment (to the west side of Garden Highway) or placed on special footings within the proposed levee and berm slopes. Natural gas lines also extend underground in some areas on the land side of the levee in the vicinity of the Sacramento River east levee, and other pipelines and underground utilities could be located within areas along the Sacramento River east levee of proposed ground disturbance associated with project construction.

Construction activity could damage identified or unidentified public utility infrastructure, resulting in temporary interruptions of service in the western Natomas Basin area. Relocations of known electrical, gas, and telephone lines could also result in interruptions of service. Significant interruptions of irrigation supply could occur if irrigation infrastructure is damaged or otherwise rendered inoperable at a time when it is needed (e.g., reconnections to water supply sources are not completed by the time crop irrigation must begin). Given the extent and intensity of proposed project construction activities, it is possible that these activities could impede a service provider's ability to repair damage or limit a service interruption in a manner that ensures the provision of existing levels of service that meet established standards for the project area. Therefore, this potential impact would be significant.

Mitigation Measure 3.15-b: Verify Utility Locations, Coordinate with Utility Providers, Prepare a Response Plan, and Conduct Worker Training with Respect to Accidental Utility Damage.

SAFCA and its primary contractors for engineering design and construction shall ensure that the following measures are implemented to avoid and minimize potential damage to utility infrastructure and service disruptions during construction activities:

- Before the start of construction, SAFCA and its primary contractors shall coordinate with applicable utility providers and other relevant agencies to locate existing utilities. The relocation of utilities shall be avoided whenever possible. SAFCA shall coordinate with utility providers to implement orderly relocation of utilities that need to be removed or relocated to accommodate project improvements. Notification of any potential interruptions in service shall be provided to the appropriate agencies.

- Before the start of construction, utility locations shall be verified through field surveys and the use of the Underground Service Alert services. Any buried utility lines shall be clearly marked in the area of construction in advance of any earthmoving activities.

- Before the start of construction, a response plan shall be prepared to address potential accidental damage to a utility line. The plan shall identify chain of command rules for notification of authorities and appropriate actions and responsibilities to ensure the safety of the public and workers. Worker education training in response to such situations shall be conducted by the contractor.

- Utility relocations shall be staged to minimize interruptions in service.

Implementing this mitigation measure would reduce the potential for disruption of utility service to a **less-than-significant** level.

IMPACT 3.15-c **Increases in Solid Waste Generation.** *Project construction would not generate construction waste materials that would exceed the capacity of local landfills or fail to comply with solid waste statutes and regulations. This impact would be* ***less than significant****.*

There would be no long-term generation of solid waste associated with the proposed project. Project construction would generate approximately 110,000 cubic yards of excess spoil material in 2008 and 205,000 cubic yards in 2009–2010. Some residences, agricultural structures, and appurtenances in or near the footprint of the proposed flood control facilities on the land side of the NCC south levee and the Sacramento River east levee would be relocated, if feasible and in accordance with landowner preferences, but others would be demolished as part of both the 2008 and 2009–2010 construction components. Other materials, such as asphalt, concrete, pipes, and gravel, would need to be removed from the footprint of the proposed flood control facilities.

Waste materials would be hauled off-site to a suitable disposal location. Hazardous materials (e.g., building materials containing lead paint or asbestos) encountered during the removal of residences and other structures would be disposed of in accordance with regulatory standards. The location of the landfill used for disposal of spoil material and other construction-related waste would be determined by the construction contractor at the time of construction activity based on capacity, type of waste, and other factors. Only those landfills determined to have the ability to accommodate the construction disposal needs of the proposed project would be used. It is likely that Kiefer Landfill, owned and operated by Sacramento County, would be used for all or a part of the construction waste. Kiefer Landfill is located about 15 miles southeast of the City of Sacramento (approximately 40 miles southeast of the NCC south levee). With a permitted capacity of more than 117 million cubic yards through 2035 and a remaining capacity of nearly 113 million cubic yards as of 2005 (California Integrated Waste Management Board 2007), Kiefer Landfill would be able to accommodate the project's construction disposal needs. Similarly, the Western Regional Landfill in Placer County, approximately 15 miles from the NCC, would be able to accommodate the project disposal requirements, with a maximum permitted capacity of more than 36 million cubic yards and a remaining capacity of more than 29 million cubic yards as of 2005. Because project construction and operation would not cause existing regional landfill capacity to be exceeded, this impact would be less than significant.

Mitigation Measure: No mitigation is required.

3.16 HAZARDS AND HAZARDOUS MATERIALS

This section addresses potential sources of hazards and risks associated with hazardous materials that may be associated with implementation of the proposed project, and the relationship of the proposed project to hazards associated with airport operations. The potential contamination of surface water or groundwater by spills of hazardous construction materials is addressed in Section 3.5, "Water Quality." Section 3.10, "Transportation and Circulation," addresses the potential for construction activities and construction-related traffic to result in traffic hazards.

3.16.1 REGULATORY SETTING

3.16.1.1 HAZARDOUS MATERIALS HANDLING AND TRANSPORT

Federal

At the federal level, the principal agency regulating the generation, transport, and disposal of hazardous substances is the U.S. Environmental Protection Agency (EPA), under the authority of the Resource Conservation and Recovery Act (RCRA). RCRA established an all-encompassing federal regulatory program for hazardous substances that is administered in California by the Department of Toxic Substances Control (DTSC). Under RCRA, DTSC regulates the generation, transportation, treatment, storage, and disposal of hazardous substances. RCRA was amended in 1984 by the Hazardous and Solid Waste Amendments of 1984, which specifically prohibits the use of certain techniques for the disposal of various hazardous substances. The Federal Emergency Planning and Community Right-to-Know Act of 1986 imposes hazardous materials planning requirements to help protect local communities in the event of accidental release.

State

Several state agencies regulate the transportation and use of hazardous materials to minimize potential risks to public health and safety. The California Environmental Protection Agency (Cal/EPA) and the Governor's Office of Emergency Services (OES) establish rules governing the use of hazardous substances in California. Within Cal/EPA, DTSC has primary responsibility, with delegation of enforcement to local jurisdictions, for regulating the generation, transport, and disposal of hazardous substances under the authority of the Hazardous Waste Control Law. Regulations implementing this law list hazardous chemicals and common substances that may be hazardous; establish criteria for identifying, packaging, and labeling hazardous substances; prescribe management of hazardous substances; establish permit requirements for treatment, storage, disposal, and transportation of hazardous substances; and identify hazardous substances prohibited from landfills.

DTSC's Hazardous Waste and Substances Site List, also known as the Cortese List, provides a listing of the location of hazardous materials release sites. DTSC's HAZNET list is a facility and hazardous waste manifest database. The data are extracted from the copies of hazardous waste manifests received each year by DTSC. Data elements include generator ID, waste category, and disposal method (Environmental Data Resources 2007). Additionally, the California Spills, Leaks, Investigations, and Cleanup (SLIC) list is a State Water Resources Control Board (SWRCB) program designed to protect and restore water quality (Environmental Data Resources 2007).

State agencies with primary responsibility for enforcing federal and state regulations regarding the transport of hazardous substances and responding to hazardous materials transportation emergencies are the California Highway Patrol and the California Department of Transportation (Caltrans). Together, these agencies determine container types used and license hazardous waste haulers for hazardous waste transportation on public roads.

Local

The Sutter County Environmental Health Services Department (EHS) regulates the use, storage, and disposal of hazardous substances in Sutter County by issuing permits, monitoring regulatory compliance, and conducting other enforcement activities. EHS reviews technical aspects of hazardous substance site cleanups, oversees remediation of certain contaminated sites resulting from leaking underground storage tanks (USTs), and is responsible for providing technical assistance to public and private entities that seek to minimize the generation of hazardous substances.

The Sacramento County Environmental Management Department (EMD) Hazardous Materials Division regulates the storage, use, and disposal of hazardous materials in Sacramento County and the incorporated cities in Sacramento County by issuing permits, monitoring regulatory compliance, and investigating complaints. EMD oversees remediation of certain contaminated sites resulting from leaking USTs, reviews technical aspects of hazardous substance site cleanups, and provides assistance to public and private operations seeking to minimize the generation of hazardous substances.

The City of Sacramento has established a Toxic Substances Commission whose task it is to develop long-range plans for issues related to toxic substances (hazardous materials) within the Sacramento city limits. The *Sacramento County Hazardous Waste Management Plan* is considered a part of the *City of Sacramento General Plan* (City of Sacramento 1988) to ensure that suitable locations are available for needed hazardous waste facilities and that land uses near the facilities, or proposed sites for facilities, are compatible with their operation.

3.16.1.2 Emergency and Hazardous Materials Response

Sutter County

Sutter County's Emergency Services Program is responsible for planning, response, and recovery activities associated with natural and human-caused emergencies and disasters throughout Sutter County and coordination of those activities with local agencies, OES, and the Federal Emergency Management Agency. Sutter County has an adopted evacuation plan. The plan specifies that the county's major evacuation routes include State Route (SR) 99, SR 113, and SR 20 (DeBeaux, pers. comm., 2007).

Sacramento County

The *Area Plan for Emergency Response to Hazardous Materials Incidents in Sacramento County* (EMD 2007) details the duties and responsibilities of governmental and other responsible agencies in a hazardous materials incident. In 1983, Sacramento County adopted the Hazardous Materials Disclosure Ordinance. This ordinance requires firms using or handling significant amounts of hazardous materials to disclose to Sacramento County the nature, quantity, and location of those chemicals. This information is provided to fire crews responding to emergencies.

County and City of Sacramento

The City of Sacramento Fire Department has two hazardous materials response teams (HMRTs) and two decontamination teams, each staffed with four specialists. These teams respond to hazardous materials incidents in addition to other calls. Through contractual agreements, the HMRTs and decontamination team provide 24-hour emergency response to incidents within the city of Sacramento and unincorporated Sacramento County, incorporated cities within Sacramento County, and the city of West Sacramento. The HMRT and decontamination teams are located at Fire Stations 7 and 30 (City of Sacramento 2007a).

The Office of Emergency Management, a division of the City of Sacramento Fire Department, is responsible for disaster planning. It provides intra- and interagency coordination for disaster planning and presentations on disaster preparedness to public service organizations. State OES planning efforts also extend to the threat of

terrorism and weapons of mass destruction, and a Sacramento City/County task force has been formed to address these issues as they affect both agencies. A task force of local emergency planners, OES, and the Federal Bureau of Investigation (FBI) has been formed to address coordination issues related to terrorism (City of Sacramento 2007b).

3.16.1.3 WORKER SAFETY

The U.S. Department of Labor, Occupational Safety and Health Administration (OSHA) is responsible at the federal level for ensuring worker safety. OSHA sets federal standards for implementation of workplace training, exposure limits, and safety procedures for the handling of hazardous substances (as well as other hazards). OSHA also establishes criteria by which each state can implement its own health and safety program.

The California Occupational Safety and Health Administration (Cal/OSHA) assumes primary responsibility for developing and enforcing workplace safety regulations within California. Cal/OSHA regulations pertaining to the use of hazardous materials at workplaces, as detailed in Title 8 of the California Code of Regulations, include requirements for safety training, availability of safety equipment, accident and illness prevention programs, hazardous substance exposure warnings, and preparation of emergency action and fire prevention plans. Cal/OSHA enforces hazard communication program regulations that contain training and information requirements. These requirements specify procedures for identifying and labeling hazardous substances, communicating hazard information related to hazardous substances and their handling, and preparing health and safety plans to protect workers and employees at hazardous waste sites. The hazard communication program requires that Material Safety Data Sheets be available to employees and that employee information and training programs be documented.

3.16.1.4 WILDFIRES

Wildfires pose a hazard to both persons and property in many areas of California. Wildland fires are a particularly dangerous threat to development located in forest and shrub areas. The severity of wildland fires is influenced by four primary factors: vegetation, climate, slope, and people. The California Department of Forestry and Fire Protection (CDF) has developed a fire hazard severity scale that considers vegetation, climate, and slope to evaluate the level of wildfire hazard in all State Responsibility Area lands. A State Responsibility Area is defined as part of the state where CDF is primarily responsible for providing basic wildland fire protection assistance. CDF designates three levels of Fire Hazard Severity Zones (Moderate, High, and Very High) to indicate the severity of fire hazard in a particular geographical area (CDF 2001).

According to CDF's Fire Resource Assessment Program, the majority of the land in Sacramento and Sutter Counties is located in either a "nonflammable" or "moderate" zone for wildland fires (CDF 2007a). No Very High Fire Hazard Severity Zones are located in the project area within either Sacramento County or Sutter County (CDF 2007b). In addition, Sutter and Sacramento Counties are not located in a State Responsibility Area (CDF 2007c, 2007d).

3.16.2 AIRSPACE SAFETY

3.16.2.1 FEDERAL

Obstructions and Airport Land Use Compatibility

Part 77 of the Federal Aviation Regulations (FAR), "Objects Affecting Navigable Airspace," has been adopted as a means of monitoring and protecting the airspace required for safe operation of aircraft and airports. Objects that exceed certain specified height limits constitute airspace obstructions. FAR Section 77.13 requires that the Federal Aviation Administration (FAA) be notified of proposed construction or alteration of certain objects within a specified vicinity of an airport, among them the following:

(1) Any construction or alteration of more than 200 feet in height above the ground level at its site.

(2) Any construction or alteration of greater height than an imaginary surface extending outward and upward at [a slope of] 100 to 1 for horizontal distance of 20,000 feet from the nearest point of the nearest runway of each [public-use airport, public-use airport under construction, or military airport] with at least one runway more than 3,200 feet in actual length, excluding heliports.

Regulations Addressing Hazardous Wildlife in the Vicinity of Airports

Collisions between aircraft and wildlife compromise the safety of passengers and flight crews. Damage to an aircraft resulting from a wildlife collision can range from a small dent in the wing to catastrophic engine failure and destruction of the aircraft, along with potential loss of life. At least 122 civil aircraft have been destroyed and more than 225 civilian lives have been lost worldwide as a result of wildlife strikes from 1960 to 2004 (SCAS 2007).

Federal requirements pertaining to wildlife hazard management at airports are described under Title 14 Code of Federal Regulations (CFR) Part 139.337. Commercial service airports that experience a significant number of collisions between aircraft and wildlife (wildlife strikes) are required to develop a program to limit the number of hazardous wildlife incursions, deploy sufficient resources to implement such programs, and correct conditions that attract hazardous wildlife. Commercial airports that experience multiple wildlife strikes must prepare a wildlife hazard management plan (WHMP). The WHMP, which is submitted to and approved by the FAA, must provide "…measures to alleviate or eliminate wildlife hazards to air carrier operations" by outlining necessary habitat modifications and wildlife control procedures and identifying those responsible for implementing the plan (CFR Part 139.337[f][1]). FAA conducts annual airport certification and safety inspections, which include an evaluation of the effectiveness of the airport's wildlife control program. Deficiencies discovered during such inspections typically result in a directive for the airport to implement corrective measures.

The FAA also addresses control of hazardous wildlife in Advisory Circulars (ACs). In AC 150/5200-33A, the FAA provides direction on where public-use airports should restrict land uses that have the potential to attract hazardous wildlife. FAA recommends a distance of 10,000 feet separating wildlife attractants and aircraft movement areas. The area within a 10,000-foot radius of the Airport Operations Area is designated as the Critical Zone. The FAA definition of wildlife attractants in AC 150/5200-33A includes human-made or natural areas, such as poorly drained areas, retention ponds, agricultural activities, and wetlands. AC 150/5200-33A recommends against the use of airport property for agricultural production within a 5-mile radius of the Airport Operations Area unless the income from the agricultural crops is necessary for the economic viability of the airport.

3.16.2.2 STATE

The state regulates airports under the authority of the Airport Land Use Commission Law, Section 21670 et seq. of the California Public Utilities Code. The *California Airport Land Use Planning Handbook* published by the Caltrans Division of Aeronautics (Caltrans 2002) supports this law by providing compatibility planning guidance to airport land use commissions (ALUCs), counties and cities that have jurisdiction over airport area land uses, and airport proprietors.

The Airport Land Use Commission Law is implemented through ALUCs, which are required in every county with a public-use airport or with an airport served by a scheduled airline. Under the provisions of the law, the ALUC has certain responsibilities conferred upon it and specific duties to perform. Among these are preparing airport land use plans for each of the airports within its jurisdiction (California Public Utilities Code Sections 21674[c] and 21675[a]). The Sacramento Area Council of Governments (SACOG) has been designated the ALUC for Sacramento County (see discussion of local regulations below).

3.16.2.3 LOCAL

The *Sacramento International Airport Comprehensive Land Use Plan* (CLUP) (Airport Land Use Commission 1994) establishes planning boundaries for the airport and defines compatible types and patterns of future land use. The purpose of the CLUP is to provide the Airport land area with compatibility guidelines for height, noise, and safety. The current CLUP is more than 13 years old; in the time since publication of the CLUP, the level of growth in North Natomas and expansion of operations at the airport has indicated the need for an update to the plan. An updated version of the CLUP had not been developed as of the writing of this EIR (Chew, pers. comm., 2007).

The CLUP outlines airport-area height restrictions necessary to ensure that objects will not impair flight safety or decrease the airport's operational capability. SACOG, the ALUC for Sacramento County, has adopted FAR Part 77 imaginary surfaces (see the description of federal airspace safety regulations above) to determine height restrictions for natural and artificial objects. Penetration of these imaginary surfaces by permanent structures would endanger pilots and passengers of aircraft operating at the airport and would pose a hazard to persons occupying those structures.

Additionally, the CLUP designates airport safety zones to the land surrounding the airport to minimize the number of people exposed to aircraft crash hazards. This is accomplished by enforcing land use restrictions in the safety zones. The CLUP designates three safety zones:

- the clear zone, which is near the runway and is the most restrictive;
- the approach/departure zone, which is located under the takeoff and landing slopes and is less restrictive; and
- the overflight zone, which is the area overflown by aircraft during the normal traffic pattern and is the least restrictive.

3.16.3 ENVIRONMENTAL SETTING

3.16.3.1 DEFINITIONS OF TERMS

For purposes of this section, the term "hazardous materials" refers to both hazardous substances and hazardous wastes. A "hazardous material" is defined in the Code of Federal Regulations as "a substance or material that…is capable of posing an unreasonable risk to health, safety, and property when transported in commerce" (49 CFR 171.8). California Health and Safety Code Section 25501 defines a hazardous material as follows:

> "Hazardous material" means any material that, because of its quantity, concentration, or physical, or chemical characteristics, poses a significant present or potential hazard to human health and safety or to the environment if released into the workplace or the environment. "Hazardous materials" include, but are not limited to, hazardous substances, hazardous waste, and any material which a handler or the administering agency has a reasonable basis for believing that it would be injurious to the health and safety of persons or harmful to the environment if released into the workplace or the environment.

"Hazardous wastes" are defined in California Health and Safety Code Section 25141(b) as wastes that:

> … because of their quantity, concentration, or physical, chemical, or infectious characteristics, [may either] cause, or significantly contribute to an increase in mortality or an increase in serious illness[, or] pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

3.16.3.2 POTENTIAL SOURCES OF HAZARDOUS MATERIALS

The sites of proposed construction activity are located in rural, suburban, and urban areas. Potential sources of hazardous materials and waste may exist in both the agricultural and urbanized portions of the project area. Hazardous materials may have been used in the past at the proposed construction or borrow sites that could have resulted in soil contamination. Sites where borrow material would be excavated are of particular interest. All of the potential borrow sites have been or currently are in agricultural use.

Hazardous materials may be present at project sites in a variety of common contexts, including the following:

- petroleum hydrocarbons;
- pesticides, herbicides, and fertilizers;
- contaminated debris;
- lead;
- wastewater;
- pits, ponds, or lagoons;
- fill, dirt, depressions, and mounds;
- underground storage tanks;
- stormwater runoff structures; and
- transformers that may contain polychlorinated biphenyls (PCBs).

Records Search for the Proposed Soil Borrow Sites

Environmental Data Resources, Inc. (EDR) conducted an independent computer-generated database search to identify any existing hazardous materials within and near the proposed borrow sites (excluding the Fisherman's Lake area, where particular sites have not been identified) and the proposed canal alignments shown in Exhibit 2-8. The purpose of the search was to identify documented recognized environmental conditions at and near the proposed borrow sites and canal alignments related to current and historical uses of the area, and to evaluate the potential for a release of hazardous materials from on- or off-site sources that could significantly affect environmental conditions in the project area.

The databases are based on records kept by federal, state, and local agencies that are responsible for recording incidents of contamination and permitting transfer, storage, or disposal facilities that handle hazardous materials. EDR searched a variety of federal and state databases, including the National Priorities List; RCRA information; and the Cortese List. The database search revealed no known hazardous materials at the proposed borrow sites or canal alignments (Environmental Data Resources 2007). Three leaking USTs were listed on properties approximately 1/4 mile from the bufferlands south of the Airport that are a potential source of borrow material for 2009–2010 construction; however, they are downgradient from the potential borrow site and, therefore, are unlikely to pose soil contamination problems.

3.16.3.3 HAZARDS ASSOCIATED WITH LAND USES AROUND THE AIRPORT

The Airport is approximately 1.5 miles east of the Sacramento River east levee and 12 miles north of downtown Sacramento. The Airport includes the Airport Operations Area and adjacent terminals, parking lots, and landscaped areas. There are two 8,600-foot parallel runways, oriented roughly north-south, and three airline terminals, as well as additional buildings associated with various airport operations. Approximately half of the 5,900 acres of Sacramento County–owned land at the Airport is located due south and due north of the Airport Operations Area. Sacramento County–owned property outside of the Airport Operations Area functions as aviation "bufferlands" for the purposes of operational land use compatibility (i.e., to prevent encroachment by land uses, such as residential development, that are incompatible with aircraft operations). The vast majority of these bufferlands have been historically leased to tenant farmers as an alternative to active management by Sacramento County maintenance staff. Agricultural activity on these parcels has been strictly incidental to the property's primary purpose of providing airspace protection.

The Airport has the highest number of reported wildlife strikes of all California airports (SCAS 2007). According to the FAA Bird Strike Database (FAA 2005), a total of 964 wildlife strikes were recorded at the Airport between 1990 and 2004. Birds with flocking tendencies, and birds of relatively large size, such as waterfowl, gulls, herons, egrets, pigeons, blackbirds, and raptors present the greatest threat to aviation at the Airport (SCAS 2007).

The frequency of wildlife strikes at the Airport is directly related to the airport's location. The Airport is situated in the western portion of the Natomas Basin, which is a relatively flat, low-lying area that was historically part of the Sacramento/American River floodplain. Historically, wetlands in the Natomas Basin attracted tremendous numbers of migratory waterfowl. Land reclamation and the extensive construction of canals, levees, and pumping stations have allowed more than 80% of the Natomas Basin to be converted to agricultural production (City of Sacramento, Sutter County, and The Natomas Basin Conservancy 2003). Agricultural crops and open water are the primary wildlife attractants with the Airport's Critical Zone. Rice, wheat, safflower, corn, and alfalfa are all grown in the Critical Zone. However, the Sacramento County Airport System (SCAS) considers rice cultivation, along with flooding of the rice fields in winter and summer, as the most incompatible current land use in the Critical Zone (SCAS 2007).

Since 1996, the FAA has required SCAS to maintain and implement a WHMP because of the significant number of wildlife strikes that occur at the Airport. The plan emphasizes the identification and abatement of wildlife hazards and outlines steps for monitoring, documenting, and reporting potential wildlife hazards and birds strikes. Implementation of the WHMP involves an integrated approach that relies on a combination of wildlife control and land management strategies (SCAS 2007). The following land management objectives in the WHMP are relevant to the proposed project:

- Maintain grasslands in the Airport Operations Area to discourage use by hazardous wildlife.
- Reduce aquatic habitat for hazardous wildlife.
- Reduce hazardous wildlife use of ditches in the Airport Operations Area.
- Reduce hazardous wildlife on Sacramento County–owned agricultural land in the 10,000-foot Critical Zone.

3.16.4 Environmental Impacts and Mitigation Measures

3.16.4.1 Significance Criteria

The thresholds for determining the significance of impacts for this analysis are based on the environmental checklist in Appendix G of the State CEQA Guidelines. The proposed project was determined to result in a significant effect related to hazards if it would:

- create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials or through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment;
- emit hazardous emissions or involve the handling of hazardous or acutely hazardous materials, substances, or waste within ¼ mile of an existing or proposed school;
- be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, create a significant hazard to the public or the environment;
- result in a safety hazard for people residing or working in a project area that is located within 2 miles of a public airport or public-use airport;
- impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan; or
- expose people or structures to a significant risk of loss, injury, or death from wildland fires.

There are no existing or proposed schools located within ¼ mile of the project sites. Therefore, the handling of hazardous materials or waste within ¼ mile of a school is not discussed.

3.16.4.2 IMPACT ANALYSIS

IMPACT 3.16-a **Spills of Hazardous Materials during Construction.** *Construction of the proposed improvements would involve the storage, use, and transport of hazardous materials during construction activities in all construction seasons (2008–2010). Compliance with federal, state, and local hazardous materials regulations would ensure that no significant hazards to the public would result. This impact would be* ***less than significant.***

The proposed project would not cause any significant hazards associated with the transport and handling of hazardous materials. Construction and maintenance activities in all construction seasons (2008–2010) would involve the use of potentially hazardous materials, such as fuels (gasoline and diesel), oils and lubricants, and cleaners (which could include solvents and corrosives in addition to soaps and detergents), that are commonly used in construction projects. Bentonite would be used where slurry cutoff walls are being constructed to remediate levee seepage conditions. Construction contractors would be required to use, store, and transport hazardous materials in compliance with federal, state, and local regulations during project construction. Risks to water quality associated with incidental releases of these materials on project sites are addressed in Section 3.5, "Water Quality."

Compliance with the applicable regulations would reduce the potential for accidental release of hazardous materials during their transport and during project construction activities. Consequently, the risk of significant hazards associated with the transport, use, and disposal of these materials is low. This impact would be less than significant.

Mitigation Measure: No mitigation is required.

IMPACT 3.16-b **Exposure to Hazardous Materials Encountered at Project Sites.** *Hazardous materials could potentially be present at project sites in any of the construction seasons (2008–2010). Excavation and construction activities at or near areas of previously unrecorded soil and/or groundwater contamination could result in the exposure of workers, the public, and the environment to hazardous materials. This potential impact would be* ***significant.***

DTSC's Cortese List does not list any hazardous materials sites within the specific sites proposed for project-related excavation for any of the construction seasons (2008–2010). However, the EDR government records database search (Environmental Data Resources 2007) listed one site along the Sacramento River east levee with possible contamination issues: Yuki Farms located at 7800 Garden Highway, in Reaches 5B and 6A. The site was listed on the State Water Resources Control Board's SLIC list (Central Valley RWQCB 2007) and on DTSC's HAZNET list.

Central Valley Regional Water Quality Control Board records (Vogelsang, pers. comm., 2007) indicate that approximately 2,000 gallons of gasoline were discharged into the soil on this property in October 1997 and that soil sampling conducted in January 1998 showed "detectable concentrations of petroleum hydrocarbons" in two samples and "significant concentrations of the oxygenates MtBE and TAME" in another sample. Water samples from a previously used supply well and excavation showed significant impacts. To date, contaminant remediation has not been conducted on the site (Rowe, pers. comm., 2007). The entry in the HAZNET list, which tracks waste generation information, waste categorization, and disposal method, relates to photochemicals. However, the HAZNET records contain no indication of any contamination issue with regard to photochemical waste.

The proposed project would include construction of the adjacent setback levee and possibly a 300-foot seepage berm through this reach. The relocated Elkhorn Canal and the new GGS/Drainage Canal also would be constructed through this property. Construction activity conducted at or near the site of previous contamination from the gasoline spill could disturb contaminated soils and expose workers and the public to unacceptable levels of hazardous substances. Construction of either canal through or near the contaminated site could lead to the

introduction of hazardous materials into irrigation water supply or drainage and could expose the public, irrigated crops, or wildlife to unacceptable levels of these materials.

Additionally, although the database searches did not list any other hazardous material release sites, previously unknown or undocumented hazardous materials could be present in project construction areas, including the identified potential borrow sites or properties in the Fisherman's Lake area that have not yet been specifically identified for use as borrow sources for 2009–2010 construction. Excavation at or near areas of currently unrecorded soil and/or groundwater contamination could result in the exposure of construction workers, the general public, and the environment to hazardous materials such as petroleum hydrocarbons, pesticides, herbicides, fertilizers, contaminated debris, or elevated levels of other chemicals that could be hazardous. Because the potential exists for exposure to previously unknown hazardous materials during construction activities, this potential impact would be significant.

Mitigation Measure 3.16-b(1): Ensure that Contaminants Are Not Present at Unacceptable Levels on the Yuki Farms Site Near the Location of Project Construction Activities.

Before the start of any construction activities on the Sacramento County–owned property known as "Yuki Farms," SAFCA shall ensure that (1) any issues of documented soil or groundwater contamination on the property have been resolved by Sacramento County in accordance with federal, state, and local requirements; or (2) a qualified hazardous materials specialist, through soil and groundwater testing, has determined that any previously documented contamination site on the property is sufficiently distant from areas of project-related disturbance to ensure that hazardous materials at the site will not be encountered during construction activity and would not migrate into water carried in the new canals and pose a threat to the safety of construction workers, the general public, or the environment.

Implementation of this measure would reduce the impact to a **less-than-significant** level.

Mitigation Measure 3.16-b(2): Prepare a Worker Health and Safety Plan, and Implement Appropriate Measures to Minimize Potential Exposure to Unknown Hazardous Materials.

SAFCA and its primary contractors for engineering design and construction shall ensure that the following measures are implemented to minimize the potential for exposure to hazardous materials during construction.

If, during site preparation and construction activities, previous undiscovered or unknown evidence of hazardous materials contamination is observed or suspected through either obvious or implied site characteristics (e.g., stained or odorous soil), construction activities shall immediately cease in the area of the find. A qualified hazardous materials specialist shall assess the construction site and shall collect and analyze soil samples, if needed, from the site. If contaminants at unacceptable levels are identified in the samples, SAFCA or its primary construction contractor shall implement measures in accordance with federal and state regulations before beginning construction activities.

SAFCA shall require all contractors to prepare a worker health and safety plan before the start of construction activities. This plan shall identify, at a minimum, all contaminants that could be encountered during construction activity; all appropriate worker, public health, and environmental protection equipment and procedures to be used during project activities; emergency response procedures; the most direct route to the nearest hospitals; and a site safety officer. The plan shall describe actions to be taken should hazardous materials be encountered on-site, including protocols for handling hazardous materials and preventing their spread and emergency procedures to be taken.

Implementation of this mitigation measure would reduce the impact to a **less-than-significant** level.

IMPACT 3.16-c **Temporary Aircraft Safety Hazards Resulting from Project Construction Activities within or near the Airport Critical Zone.** *The proposed project would include construction activities within or near the Airport Critical Zone and the runway approaches. Lighting of construction sites at night could interfere with aircraft landing operations and pose a safety hazard. This potential impact would be* ***significant****.*

Parts of the 2008 and 2009–2010 project areas along the Sacramento River east levee and Airport borrow sources north of the Airport Operations Area are within the Airport Critical Zone (Exhibit 2-8). Other construction areas and borrow sites are near the aircraft landing approaches for, or are directly north or south of, the Airport runways. Extensive night lighting of construction work and security lighting of construction staging areas at night within these areas could interfere with nighttime aircraft landing operations and create a safety hazard related to aircraft landings. This potential impact would be significant.

Mitigation Measure 3.16-c: Coordinate Work in the Critical Zone with Airport Operations and Restrict Night Lighting within and near the Runway Approaches.

SAFCA and its primary construction contractors shall ensure that the following mitigation is implemented to avoid interference of construction activities with Airport operations.

- No borrow activities shall be conducted within the Airport Critical Zone during nighttime hours.
- All project-related nighttime lighting that is in, or is aligned with, the Airport runway approach zones (Natomas Cross Canal [NCC] south levee Reaches 1–4 and Sacramento River east levee Reaches 1–11B) shall be directed downward to avoid potential interference with nighttime aircraft operations.
- SAFCA shall ensure that SCAS is informed in advance of the timing and nature of all construction activities within the Airport Critical Zone, and shall coordinate with SCAS during final project design to ensure that all appropriate safety precautions within the Critical Zone are incorporated into the construction plans.

Implementation of this mitigation measure would reduce the potential for hazards related to construction interference with Airport operations to a **less-than-significant** level.

IMPACT 3.16-d **Potential to Result in Higher Frequency of Collisions between Aircraft and Wildlife at Sacramento International Airport.** *The proposed project design would require extensive borrow of soil material; dewatering, filling, and replacement of canals; and removal and replacement of trees with 10,000 feet of the Airport's Airport Operations Area. In addition, the proposed project includes creating new managed habitat and enhancing existing habitats for giant garter snake and Swainson's hawk. These project elements have the potential to increase the abundance of wildlife considered hazardous to aircraft and passenger safety by the FAA and SCAS. Implementation of the proposed project could also result in an increase in the frequency of collisions between aircraft and wildlife at the Airport. This potential impact would be* ***significant****.*

The Airport has the highest number of reported wildlife strikes with aircraft in California. Collisions between aircraft and wildlife compromise the safety of aircraft passengers and flight crews. In an attempt to reduce wildlife collisions with aircraft, SCAS has maintained and implemented a WHMP for more than 10 years at the Airport. The plan identifies routine maintenance, hazardous wildlife habitat manipulation, and other land management activities as the most effective long-term preemptive measures for reducing wildlife hazards.

SCAS and the FAA are most concerned about hazardous wildlife attractants within 10,000 feet of the Airport Operations Area. The FAA identifies this area as the Critical Zone. Wildlife attractants near the runways are of greatest concern because, nationally, 74% of bird-aircraft strikes occurred at or below 500 feet above ground level (Cleary, Dolbeer, and Wright 2004). The area within a 10,000-foot radius of the Airport Operations Area is where arriving and departing aircraft are typically operating at or below 2,000 feet, an altitude that also corresponds with most bird activity (SCAS 2007).

Implementation of the proposed project would require the creation of hazardous wildlife attractants within 10,000 feet of the Airport Operations Area. The proposed project entails relocating, creating, or redesigning a substantial length of canals. It also includes creating new managed habitat and enhancing existing habitats for giant garter snake and Swainson's hawk. This additional habitat would include 250 acres of managed marsh and 100–130 acres preserved in rice cultivation on lands that would connect existing managed habitat lands. The new GGS/Drainage Canal, which would be located between the Sacramento River and the Airport's perimeter fence, would be designed as giant garter snake habitat. The proposed project also would establish additional woodland (150 additional acres have been proposed) and more than 1,000 acres of managed grassland, which would replace existing cropland, woodland, and rice to accommodate project features and borrow areas. Most of these project elements, which would attract hazardous wildlife, would be constructed within the Critical Zone.

Although creation of hazardous wildlife attractants within the Critical Zone is a necessary component of the proposed project, the project could result in a reduction of potential for wildlife collisions with aircraft at the Airport because it has been designed to replace existing hazardous wildlife attractants with land uses considered more compatible by the FAA and SCAS.

Construction of the GGS/Drainage Canal would allow approximately 6.5 acres of the Airport's West Ditch to be dewatered during summer. A significant portion of the West Ditch, which parallels the Airport's west runway, is located within the Airport Operations Area. The aquatic habitat associated with the West Ditch has been identified by SCAS and the FAA as a hazardous wildlife attractant. Removing irrigation water and most drainage from the West Ditch and grading the ditch into a swale would help SCAS to achieve two objectives specified in the Airport's WHMP: reducing aquatic habitat for hazardous wildlife and reducing hazardous wildlife use of ditches in the Airport Operations Area (SCAS 2007).

SAFCA would implement landscape changes on Airport bufferlands used as borrow sources, through subsequent land reclamation, that would result in a reduction in the attractiveness of those parcels to hazardous wildlife. Most importantly, land currently or recently in rice cultivation north of the Airport Operations Area would be converted through SAFCA's borrow and reclamation activities to managed grasslands nearer to the Airport Operations Area and managed marsh farther north of the operations area.

Managed grassland would attract substantially less hazardous wildlife than the current land uses because they do not provide waste grain, in the case of cereal crops, or standing water, in the case of rice. Grassland management activities would also attract less hazardous wildlife than agricultural crops that require disking or irrigation. North of Elverta Road, some borrow sites on Airport bufferlands historically cultivated as rice could be converted to managed marsh designed to provide maximum habitat value to giant garter snake while reducing the overall attractiveness to hazardous wildlife. These landscape changes could contribute to a reduction in wildlife collisions with wildlife by replacing land uses in the Critical Zone considered highly attractive to hazardous wildlife species with uses designed and managed to reduce use by these species. In addition, these landscape changes would likely result in an overall reduction of hazardous wildlife on Sacramento County–owned agricultural land within the 10,000-foot Critical Zone, which is a specific objective of the Airport's WHMP (SCAS 2007).

Additionally, SAFCA's excavation and grading activities could serve to improve existing irrigation and drainage infrastructure on Airport land beyond the dewatering of the West Ditch. These improvements could address floodplain storage issues that could arise in connection with the Airport's planned parking lot construction activities south of Interstate 5. SAFCA would include the physical alteration of the land as part of its flood control program, obtaining all necessary permits and environmental clearances, thus giving the Airport more flexibility than it currently has to reduce the wildlife hazards associated with this land.

Although woodlands are known to support hazardous wildlife species, tree plantings that would result, eventually, in an increase in the acreage of woodlands within the Critical Zone could actually result in a net reduction in hazardous wildlife attractiveness of these areas because the woodlands would replace cropland. Agricultural crops, along with open water, are the primary wildlife attractants within the Airport's Critical Zone (SCAS 2007).

Most species of birds dependent on woodland habitats forage and nest within these habitats. This behavior trait is likely to put many woodland species at less risk of collisions with aircraft compared to birds that often fly long distances to forage in agricultural croplands (e.g., blackbirds, crows, pigeons). The potential for tree planting to result in a significant contribution to an increase in the frequency of wildlife collisions with aircraft is also reduced by the selection of proposed planting locations; no tree plantings are proposed in the vicinity of the north and south runway approaches, and most plantings would occur outside the Critical Zone.

In combination, the proposed project elements are expected to reduce the overall attractiveness of the project area to hazardous wildlife. As a result, wildlife collisions with aircraft arriving and departing from the Airport are not expected to increase, and could decrease. In addition, SAFCA would be responsible for securing all necessary permits and environmental clearances, which would provide SCAS with more flexibility than it currently has to reduce the wildlife hazards on its bufferlands. However, because the project design elements described in this document have yet to be finalized and land management practices have yet to be approved, this potential impact would be significant.

Mitigation Measure 3.16-d: Implement Measures to Avoid Substantial Increases in Hazardous Wildlife within the Critical Zone or Wildlife Collisions with Aircraft.

SAFCA and its primary contractors for engineering, design, and construction shall ensure that the following measure is implemented to ensure that the proposed project would not result in a substantial increase in hazardous wildlife within the Critical Zone, or a substantial increase in wildlife collisions with aircraft.

A qualified biologist, retained by SAFCA, shall conduct a wildlife-aircraft strike analysis to determine to what extent the proposed project could increase the potential for wildlife collisions with aircraft, and how the project could be modified to reduce any potential increase in wildlife collisions. The analysis, which shall be completed as part of project design of Airport borrow sites and of woodland plantings within the Critical Zone (2009–2010 construction), shall include the following:

- A summary of existing information on wildlife-aircraft strikes at the Airport, relevant research conducted at the Airport and other airports in the United States, and a description of the sources of uncertainty resulting from insufficient data.

- A comparison of current land use and habitat types in the Natomas Basin with anticipated land use changes over the next 20 years (i.e., the period covered by the Airport's master plan). The purpose of this analysis will be to predict how anticipated land use changes will influence the diversity, abundance, and distribution of hazardous wildlife in the vicinity of the Airport. Particular attention will be given to analyzing potential effects of implementing the proposed project on hazardous wildlife populations.

- An analysis of the anticipated effects of project implementation on the frequency and patterns of wildlife-aircraft strikes at the Airport

- Mitigation options, including alternative designs for habitat compensation sites, on-site versus off-site mitigation opportunities, and monitoring and adaptive management options that could be implemented if it is determined that the overall project could result in a no net increase of risk to aircraft.

If the wildlife-aircraft strike analysis concludes that implementation of project elements proposed for construction in 2009–2010 would not result in an increase the potential for wildlife collisions with aircraft, no further mitigation is necessary

If the wildlife-aircraft strike analysis concludes that project elements proposed for construction in 2009–2010 could increase the potential for wildlife collisions with aircraft, SAFCA shall implement the following mitigation:

- SAFCA, in consultation with SCAS and the FAA, shall design and implement mitigation and/or modify the proposed project as needed until it is determined by SCAS and the FAA that the proposed project would not substantially increase the risk of wildlife collisions with aircraft

Implementation of this mitigation measure would reduce this impact to a **less-than-significant** level.

IMPACT 3.16-e Interference with an Adopted Emergency Evacuation Plan. *Construction activities could result in interference with the use of SR 99/70 as an emergency evacuation route. This potential impact would be significant.*

Construction of a cutoff wall along the NCC south levee at the SR 99/70 levee crossing would require shutting down portions of SR 99/70 temporarily and constructing temporary detours in two stages, one for northbound traffic and one for southbound traffic, as described under "Traffic Control for Improvements to the Natomas Cross Canal South Levee" in Section 2.3.2.2. Temporary closure of the main roadway and the use of detours through the construction zone could cause traffic delays that would interfere with the use of SR 99/70 in this area as an emergency evacuation route should such use be required. This potential impact would be significant.

Mitigation Measure 3.16-e: Notify State and Local Emergency Management Agencies about Project Construction and Coordinate SR 99 Detours with These Agencies to Ensure That Any Need for Emergency Use Is Not Significantly Impaired.

SAFCA and its primary contractors for engineering design and construction shall ensure that the following measures are implemented to avoid impairment of the use of SR 99/70 as an emergency evacuation route.

(a) SAFCA shall implement Mitigation Measures 3.10-a, 3.10-b, and 3.10-c.

(b) During project design, SAFCA shall coordinate with Caltrans to plan detours through the NCC south levee construction area at SR 99/70 that will ensure an acceptable flow of traffic through this area.

(c) Before the beginning of construction, SAFCA shall notify the California Highway Patrol and the Sutter County, Sacramento County, and City of Sacramento emergency management agencies of the timing and nature of detours and traffic controls required on SR 99/70 during project construction. SAFCA shall coordinate with these agencies and Caltrans to ensure that information on potential traffic delays and impairment of the use of this highway as an emergency evacuation route are appropriately publicized, as determined necessary by these agencies.

Implementation of this mitigation measure would reduce the potential impact to a **less-than-significant** level.

IMPACT 3.16-f Exposure to Wildland Fires. *Construction activities could result in the ignition and spread of wildland fires. This potential impact would be significant.*

Although no Very High Fire Hazard Severity Zones are located in the project area, and the majority of Sutter and Sacramento Counties is located in either a "nonflammable" or "moderate" zone for wildland fires, the proposed project components would take place in locations where physical and weather conditions may combine to lead to a high risk of fire hazard. Construction equipment or construction practices could ignite fires that may result in wildland fires and expose people or structures to a significant risk of loss, injury, or death under some circumstances. This potential impact would be significant.

Mitigation Measure 3.16-f: Prepare and Implement a Fire Management Plan to Minimize Potential for Wildland Fires.

SAFCA and its primary contractors for engineering design and construction shall prepare and implement a fire management plan in coordination with the appropriate emergency service and/or fire-suppression agencies of the applicable local jurisdictions before beginning project construction. The plan shall describe fire prevention and response methods, including fire precaution, fire presuppression, and suppression measures that are consistent with the policies and standards of the affected jurisdictions. All materials and equipment required for implementation of the plan shall be maintained on-site. All construction personnel shall be made familiar with the contents of the plan before construction activities begin.

Implementation of this mitigation measure would reduce the impact to a **less-than-significant** level.

4 CUMULATIVE IMPACTS

4.1 APPROACH

4.1.1 CEQA REQUIREMENTS

Section 21083 of the Public Resources Code requires that an EIR discuss impacts of a project when the project's incremental effect is "cumulatively considerable." According to Section 21083, "'cumulatively considerable' means that the incremental effects of an individual project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects" (see also State CEQA Guidelines Sections 15130[a]–[3]). Sections 15355 and 15130 of the State CEQA Guidelines indicate that cumulative impacts are to be analyzed in the context of "closely related" projects and projects "causing related impacts."

Pursuant to Section 15130(b) of the State CEQA Guidelines,

> [t]he discussion of cumulative impacts shall reflect the severity of the impacts and their likelihood of occurrence, but the discussion need not provide as great detail as is provided for the effects attributable to the project alone. The discussion should be guided by standards of practicality and reasonableness, and should focus on the cumulative impact to which the identified other projects contribute rather than the attributes of other projects which do not contribute to the cumulative impact.

If an incremental effect is not considered cumulatively considerable, the EIR must briefly describe the basis for the conclusion that the incremental effect is not cumulatively considerable.

4.1.2 APPROACH TO ANALYSIS

State CEQA Guidelines Section 15130(b)(1) identifies two basic methods for establishing the cumulative environment in which the project is to be considered: the use of a list of past, present, and probable future projects and the use of projections contained in relevant planning documents.

The analysis in this EIR is tiered from the analysis in Chapter 5 of the *Environmental Impact Report on Local Funding Mechanisms for Comprehensive Flood Control Improvements for the Sacramento Area* (Local Funding EIR), which is included as an attachment to this EIR. The cumulative impact analysis in the Local Funding EIR was based on a summary of projections contained in relevant planning documents. That EIR identified the following significant cumulative impacts to which SAFCA's overall program of flood control improvements could make a cumulatively considerable contribution, despite the implementation of mitigation, and that are relevant to the current analysis (see Local Funding EIR Section 5.3.4):

- conversion of Important Farmland to nonagricultural uses,
- potential losses of archaeological resources,
- construction-related air quality effects,
- changes to the visual character and scenic resources of the Natomas Basin.

The following impacts were determined to be less than significant at a cumulative level, with the implementation of mitigation:

- removal of shaded riverine aquatic (SRA) habitat,
- effects on terrestrial species and habitats,

- temporary increases in traffic levels during construction, and
- toxic air emissions.

No substantial changes in the proposed project, no substantial changes with respect to the circumstances under which the project would be undertaken, and no new information of substantial importance implicate new significant cumulative effects on the environment or a substantial increase in the severity of significant cumulative effects previously identified in the Local Funding EIR. The analysis of significant cumulative effects has been updated in this chapter, however, to incorporate project-specific information. Additionally, comments on the notice of preparation (NOP) of this EIR included a list of current and future projects that it was suggested may be relevant to the cumulative impact analysis for the proposed project, and the analysis has been updated to reflect consideration of those projects as well.

For this EIR, therefore, the plan approach used in the Local Funding EIR has been combined with a list approach. The planning context is described in detail in Section 5.3.3, "Development Trends and Projections," in the Local Funding EIR. Specific projects that are potentially relevant to the evaluation of cumulative impacts, including those listed in the comment on the NOP, are described in Section 4.2.3 below.

4.2 CUMULATIVE IMPACT ANALYSIS

This section is organized as follows:

- Section 4.2.1 describes the geographic area associated with effects for each resource topic.
- Section 4.2.2 discusses resource topics for which effects would not be considered cumulatively considerable for the following reasons, as described in the Local Funding EIR:
    - cumulative effects would be beneficial, or
    - the effect of the proposed project would not be added to the effect of other projects (i.e., no cumulative impact would occur) or would be too minor or localized to be cumulatively considerable.
- Section 4.2.3 lists the remaining resource topics addressed in more detail in this chapter.
- Section 4.2.4 describes the land use planning context for the Natomas Basin and past, present, and future projects that may produce cumulative effects to which the proposed project may make a cumulatively considerable contribution.
- Section 4.2.5 describes potential cumulative impacts associated with the resource topics listed in Section 4.2.3. The descriptions summarize the previous analysis contained in the Local Funding EIR and update it with project-specific information.

4.2.1 GEOGRAPHIC SCOPE OF EFFECTS OF THE PROPOSED PROJECT

The State CEQA Guidelines state that lead agencies "should define the geographic scope of the area affected by the cumulative effect" (Section 15130[b][3]). The geographic scope of the area affected by the proposed project for each of the resource topics addressed in this EIR is identified in Table 4-1.

Table 4-1
Geographic Areas that Would Be Affected by the Proposed Project

Resource Area	Geographic Area
Agriculture	Natomas Basin, with regional implications
Land use	NA, because the only potential direct and indirect land use impacts of the proposed project relate to possible inconsistency with land use plans and policies, and the proposed project would be consistent with applicable land use plans and policies. Therefore, land use is not addressed further in this cumulative impact analysis.
Geology and soils	Individual construction sites and other ground disturbance sites
Hydrology	Local drainage system and individual grading sites
Hydraulics	Sacramento River system
Water quality	Local ditches and canals, with implications for the Sacramento River system
Fisheries and aquatic resources	Local (habitat at individual waterside improvement sites)
Terrestrial biological resources	Natomas Basin, with regional implications
Cultural resources	Individual ground disturbance sites, with regional implications
Paleontological resources	Individual ground disturbance sites
Transportation and circulation	Local roadway network in the Natomas Basin
Air quality	Regional (FRAQMD and SMAQMD); global for greenhouse gas emissions
Noise	Immediate vicinity of the individual sites of construction activity
Recreation	Local (facilities near construction sites)
Visual resources	Local (individual levee improvement sites) and landscape level
Utilities and service systems	Local service areas
Hazards and hazardous materials	Local construction sites and other ground disturbance sites for hazardous materials, Airport for aircraft strike hazards

Notes: Airport = Sacramento International Airport; FRAQMD = Feather River Air Quality Management District; NA = not applicable; SMAQMD = Sacramento Metropolitan Air Quality Management District

4.2.2 RESOURCE TOPICS FOR WHICH EFFECTS OF THE PROPOSED PROJECT WOULD NOT BE CUMULATIVELY CONSIDERABLE

In several resource topics, effects of the proposed project would not be cumulatively considerable either because cumulative effects would be beneficial, or because the effect of the proposed project would not be added to the effect of other projects (i.e., no cumulative impact would occur) or would be too minor or localized to be cumulatively considerable.

4.2.2.1 BENEFICIAL CUMULATIVE HYDRAULIC EFFECT

The hydraulic impact analysis presented in Appendix C of the Local Funding EIR and summarized in Section 4.4 of that EIR evaluated the combined effects of all components of SAFCA's program of flood control improvements, including the proposed project evaluated in this EIR, on hydraulic conditions in the Sacramento and American River systems. The analysis found that the contribution of SAFCA's program of flood control improvements, including the proposed project, to cumulative hydraulic impacts would be beneficial. This conclusion remains valid. No substantial changes in the proposed project, no substantial changes with respect to

the circumstances under which the project would be undertaken, and no new information of substantial importance implicate new significant cumulative effects on hydraulics.

4.2.2.2 PROJECT IMPACTS THAT WOULD NOT BE CUMULATIVELY CONSIDERABLE

For the following resource areas, the proposed project is not expected to make a cumulatively considerable contribution to an impact because it is expected that the effects of the proposed project would not be added to the effects of other projects (i.e., no cumulative impact is expected to occur), or because the contribution of the proposed project to any potential cumulative impact would be very minor, as described in the Local Funding EIR.

- *Geology and soils:* Grading and other earthmoving activities could result in temporary, localized soil erosion and topsoil loss. These effects would be site specific, particularly with implementation of construction best management practices (BMPs) (Mitigation Measure 3.3-a), and any residual effects are not expected to be additive with the effects of any other activities. Therefore, no cumulative impact would occur.

- *Local drainage:* The widening of levees and construction of landside seepage berms along the Sacramento River east levee, associated modification of irrigation and drainage infrastructure, and borrow activities on large parcels could interfere with the functioning of drainage systems and alter surface drainage. Project design would incorporate measures to prevent a significant drainage disruption or alteration in runoff patterns (Mitigation Measure 3.4-b), and any temporary effects would be limited to the vicinity of the individual disturbance sites. Therefore, no cumulative impact would occur.

- *Paleontological resources:* Earthmoving activities could damage unknown unique paleontological resources, but potential damage would be limited by implementation of Mitigation Measure 3.9-a, and would be limited to individual resources in discrete locations. Therefore, there would be no cumulative impact.

- *Recreation:* Effects of the proposed project on recreational uses would be limited to potential disturbance of access to facilities in the western part of the Natomas Basin during construction, potential temporary degradation in the quality of recreational experiences as a result of construction activity and noise, and potential removal of land at the City of Sacramento's undeveloped Costa Park site from future recreational use. Because of the temporary nature of the construction effects and the likelihood that any access restrictions or degradation of the quality of recreational experiences would last for less than one construction season in any location, these effects are not considered substantial enough to make a cumulatively considerable contribution to a cumulative impact. The potential encroachment on the Costa Park site would be a localized effect that would likely be minor and that would be offset through compensation in the form of payment or land (Mitigation Measure 3.13-b). Therefore, there would be no cumulative impact on recreation.

- *Utilities and service systems:* Construction may damage irrigation systems and public utility infrastructure, resulting in temporary disruptions to service. Coordination with irrigation system users and consultation with service providers and implementation of appropriate protection measures (Mitigation Measures 3.15-a and 3.15-b) would minimize the possibility that any significant effect would occur. Furthermore, any such incidents would be isolated and would not contribute to a cumulative impact.

- *Hazardous materials:* Mitigation would be implemented to minimize the potential for exposure of people or the environment to hazardous materials encountered during construction activity or to fire hazards (Mitigation Measures 3.16-a and 3.16-b). If hazardous materials are encountered or a fire outbreak occurs, the effects would be localized and would not be expected to be additive with the effects of other actions. Therefore, there would be no cumulative impact related to hazardous materials.

- *Hazards related to Airport operations:* The potential for night lighting of project areas to affect aircraft operations is a function of the location of construction areas in relation to the Airport Critical Zone and the runway approaches. Potential effects would be reduced through lighting restrictions and coordination with the

Sacramento County Airport System (Mitigation Measure 3.16-c). The potential of the project to increase the possibility of collisions between aircraft and wildlife is a result of the project including broad changes to managed land cover types in or near the Airport Critical Zone. There are no other known projects that would affect lands within the Airport Critical Zone. Therefore, no cumulative impact related to hazards in the Airport vicinity would occur.

4.2.3 Resource Topics for Which Effects of the Proposed Project May Be Cumulatively Considerable

The remainder of this chapter focuses on analysis of the potential contributions of the proposed project to cumulative impacts with regard to the following resource topics that were not addressed in Section 4.2.2:

- Agricultural resources
- Water quality/fisheries and aquatic resources
- Terrestrial biological resources
- Cultural resources
- Transportation and circulation
- Air quality
- Noise
- Visual resources

4.2.4 Planning Context and Projects Considered in the Cumulative Impact Analysis

4.2.4.1 Relevant Land Use Plans and Projections

See Section 5.3.3 of the Local Funding EIR for a description of Sacramento area population trends, a summary of trends in regional agricultural land conversion, and detailed descriptions of the following land use plans that provided the context for the analysis of cumulative impacts in the Natomas Basin that was presented in the Local Funding EIR.

- *North Natomas Community Plan*: The approximately 9,038-acre *North Natomas Community Plan* (NNCP) area is designated in the City of Sacramento's general plan as the city's major growth area for new housing and employment opportunities. The NNCP area is bounded by Elkhorn Boulevard to the north, Interstate 80 (I-80) to the south, the Natomas East Main Drainage Canal (NEMDC)/Steelhead Creek to the east, and the Natomas West Drainage Canal and SR 99/70 to the west. Development within the NNCP area started in 1999. At buildout (year 2016), the NNCP estimates a population of 66,495 in the NNCP area occupying approximately 9,038 acres (City of Sacramento 1996). The environmental consequences of buildout of the NNCP were addressed in the 1986 NNCP EIR (certified by the Sacramento City Council in May 1986) and the 1993 Supplement to the 1986 NNCP EIR, which identified significant and unavoidable impacts related to agriculture; traffic; air quality; species habitat, including Swainson's hawk foraging habitat; noise; drainage, groundwater, and water quality; and flooding potential (City of Sacramento 1994).

- *Natomas Joint Vision Plan*: The *North Natomas Joint Vision Plan* (Joint Vision) (City of Sacramento 2006) is a long-term agreement between the City and County of Sacramento to collaboratively manage growth and preservation of open space and habitat in the 10,000-acre portion of unincorporated Natomas in Sacramento County. The area is north of the Sacramento city limits and generally bounded by Sutter County on the north, the Sacramento River on the west, and the NEMDC/Steelhead Creek on the east. Approximately 28% of this area is developed, and the Joint Vision anticipates that a substantial portion of the Natomas Basin will become urbanized. A specific land use plan has not been developed, but general concepts have been considered. In general, the preferred land use scenario for the Joint Vision area consists of a mixture of residential densities,

an industrial park adjacent to the eastern edge of the Airport, and open spaces in the northern extent separating development from the Sutter County boundary. The Greenbriar project site (see below) is within the Joint Vision area.

- *Sacramento Area Council of Governments (SACOG) Sacramento Region Blueprint*: The "Blueprint" is a preferred scenario for regional growth in the Counties of El Dorado, Placer, Sacramento, Sutter, Yolo, and Yuba. The Blueprint is intended to serve as a framework to guide local government planning for orderly growth of population and transportation systems and integrates smart growth concepts such as higher-density developments. The Blueprint assumes extensive development in the Natomas Basin.

- *South Sutter County Specific Plan and Measure M*: In 1996, the Sutter County Board of Supervisors identified a 10,500-acre South Sutter County Industrial/Commercial (SSCI/C) Reserve in the *Sutter County General Plan.* The SSCI/C Reserve is in Sutter County adjacent to the Sacramento County boundary. Sutter County began development in 2004 of a 3,500-acre specific plan area within the SSCI/C Reserve. In 2004, Sutter County voters also passed Measure M, an advisory measure providing guidance on the type of development preferred for a 7,500-acre portion of the SSCI/C Reserve area: at least 3,600 acres for commercial/industrial uses, at least 1,000 acres for public and retail uses, and no more than 2,900 acres for residential development. The *Sutter Pointe Specific Plan* area (see below) is within the SSCI/C Reserve.

- *Natomas Basin Habitat Conservation Plan (NBHCP)*: The NBHCP (City of Sacramento, Sutter County, and The Natomas Basin Conservancy 2003) was developed to promote biological conservation in conjunction with expected economic and urban development in the Natomas Basin. The NBHCP establishes a multispecies conservation program to minimize and mitigate the expected loss of habitat values and incidental take of "covered species" that could result from urban development and operation and maintenance of irrigation and drainage systems in the basin. The NBHCP currently authorizes take associated with 17,500 acres of urban development in southern Sutter County and within the City and County of Sacramento, with effects on habitat to be offset by the protection of 8,750 acres of habitat preserve land. As development is approved within the development areas covered under the NBHCP, developers pay mitigation fees to The Natomas Basin Conservancy (TNBC), the nonprofit "plan operator" of the NBHCP. TNBC uses the funds to acquire, establish, enhance, monitor, and manage mitigation lands in perpetuity. As of January 2006, nearly 4,000 acres of mitigation property had been acquired in the Natomas Basin (TNBC 2006).

4.2.4.2 RELATED PROJECTS IN THE NATOMAS BASIN

The major past projects in the proposed project area (generally the northern and western boundaries of the Natomas Basin) are development of the Airport and Teal Bend Golf Club; residential development along Garden Highway and county roads; and numerous projects within the Sacramento city limits that make up the urbanized portion of the Natomas Basin south of Elkhorn Boulevard and west of Powerline Road. Other relevant completed projects are components of the plans described in the previous section (e.g., development within the NNCP area). These past projects have reduced the acreage of agricultural land and natural habitats in the basin.

Present and future projects are those projects that are currently under construction or are in various stages of planning but that have yet to break ground. Some of these projects are planned to be under construction during the period in which SAFCA's proposed project would be under construction (2008–2010), while others are expected to be developed after 2010. The following projects are organized into five categories:

- SAFCA Natomas Levee Improvement Program (NLIP) elements,
- other flood control system improvements,
- *Sacramento International Airport Master Plan* elements,
- development projects, and
- utility infrastructure projects.

SAFCA Natomas Levee Improvement Program (NLIP)

NLIP Natomas Cross Canal South Levee Phase 1 Improvements

SAFCA is currently constructing the first phase of the NLIP, consisting of improvements to correct seepage potential in the western portion of the Natomas Cross Canal (NCC) south levee and northernmost 500 feet of the Sacramento River east levee. The improvements, which will be completed by the end of September 2007, consist of the construction of a seepage cutoff wall through the levee, which requires degradation of the upper third of the levee, installation of the cutoff wall, and reconstruction of the levee.

This work does not require the conversion of any agricultural land or habitat loss. Because of the movement of a large quantity of soil material and operation of heavy equipment, it does entail significant temporary air pollutant emissions in 2007 and significant temporary noise impacts on the few nearby residences.

NLIP Bank Protection Project

SAFCA is proposing improvements to nine erosion sites on the east (left) bank of the Sacramento River between River Mile (RM) 69 (upstream of the confluence with the American River) and RM 79 (the confluence with the NCC). The sites are generally depicted in Exhibit 2-6. Construction would take place between April 1 and October 15 during one or all of the 2008, 2009, and 2010 construction seasons. The improvements would stabilize the banks to ensure that the levees are not eroded during a large flood event. Toe stabilization would arrest retreat of the emergent upper bank and stop the reduction in berm width, thereby preventing loss of extensive mature riparian vegetation, destabilization of the levee foundation, and shortening of seepage pathways under the Sacramento River east levee.

The environmental effects of this project are analyzed in the *Environmental Impact Report on Natomas Levee Improvement Program Bank Protection Project*, prepared by SAFCA concurrently with this EIR. If trucks, rather than barges, are used to deliver construction materials to the bank protection sites, the bank protection project could result in a moderate level of increased truck traffic on some of the local roadways also being used for hauling of materials for the proposed project (landside levee improvements). Residents of waterside homes near bank protection construction sites would be exposed to audible noise from construction, which in some circumstances could be conducted near sites where the proposed landside improvements are being conducted, also generating equipment noise. Construction of the bank protection improvements also would temporarily increase air pollutant emissions from construction equipment in the same timeframe (2008–2010 construction seasons) as the proposed project.

Removal of Relief Wells and Completion of Seepage Berms along the Sacramento River East Levee

As described elsewhere in this EIR, under the proposed project evaluated in this EIR, seepage berms would be interrupted at the locations of some residences and tree groves along the Sacramento River east levee, and relief wells would be installed around the structures and trees so they could be retained during the 20–30 years of the effective functioning of the wells. After this time, however, the wells would need to be removed and the berms completed, requiring the removal of the structures and trees from these locations (see "Use of Relief Wells to Avoid Removal of Structures and Trees along Sacramento River East Levee Reaches 4B–20A" in Section 2.3.2.4 in Chapter 2).

Structures would be removed from the locations and landowners and tenants relocated as described in this EIR. The tree removals would add to the significant biological and visual resource impacts identified in the near term for the proposed project. Woodland plantings included in the current proposed project are intended to help offset the losses of these trees, in addition to the losses that would be incurred in the near term.

Post-2010 NLIP Seepage Remediation Projects

Completion of the "200-year" level of protection for the Natomas Basin flood control system will require constructing seepage mitigation along the Sacramento River east levee and the American River north levee that is in addition to the seepage mitigation included in the current proposed project. SAFCA would undertake this work after completing the improvements necessary to achieve the 100-year level of protection in 2010. The work is not currently proposed or designed but is a necessary part of SAFCA's overall program to provide a "200-year" level of protection to the Sacramento area. SAFCA anticipates that along the Sacramento River east levee, 100-foot seepage berms will be required in Reaches 5B, 11A, and 11B and a 65-foot-deep cutoff wall will be required in Reach 19B. Along the American River north levee, the anticipated through-seepage remediation is an internal layer of drain rock that would be built in the landside slope of the existing levee. This would require the excavation of the levee slope, followed by the installation of the drainage layer and the reconstruction of the levee. The American River north levee improvements would include a combination of internal drains and slope flattening along a total of 11,850 feet of levee.

Construction activities would be similar to those described for the proposed project but would be on a much smaller scale. Because additional seepage berms are anticipated, these improvements would add to the conversion of agricultural land, most likely Important Farmland, to nonagricultural uses. As in the case of the proposed project, it is expected that these future berms would be vegetated with grasses that would be managed to provide foraging habitat for Swainson's hawks and that borrow sites would be restored as managed habitat conducive to supporting special-status species.

Other Flood Control System Improvements

SAFCA Levee Integrity Program

As part of its long-term program to improve the Natomas Basin levee system, SAFCA expects to continue waterside and landside levee strengthening efforts, including increasing bank protection, levee armoring, levee toe stabilization, and flattening of landside levee slopes to a 5:1 horizontal-to-vertical (5H:1V) profile. These activities are part of the improvements evaluated at a conceptual, program level in the Local Funding EIR and would be funded in part by the development fee component of the local funding mechanisms being developed by SAFCA. The intention is to adapt the future flood control system as needed to changing hydrologic and floodplain conditions (e.g., changes in hydrology resulting from global climate change, increases in the amount of damageable property protected by the levee system).

Construction activities would be similar to those evaluated in this EIR for the proposed project and in the EIR for bank protection improvements prepared by SAFCA concurrent with this EIR. However, specific construction activities are not yet planned, designed, or funded, and their timing is not known. The potential landside slope modifications would be within the boundaries of the maintenance access area that is included in the current proposed project. Where this land is currently in agricultural use, it would be converted to grassland in the near term as part of the proposed project, and building out the 5H:1V landside slope would not change the land cover type. However, where the 5:1 landside slope would overlap areas that contain woodland groves, the trees would be removed. As described above under "Removal of Relief Wells and Completion of Seepage Berms along the Sacramento River East Levee," this effect would be additive to the significant biological and visual resource impacts identified for the proposed project but would be offset in part by the establishment of new woodland plantings under the proposed project.

California Department of Water Resources/U.S. Army Corps of Engineers Repairs to Critical Erosion Sites

On February 24, 2006, Governor Arnold Schwarzenegger declared a state of emergency for California's levee system. Soon after, he signed Executive Order S-01-06, directing the California Department of Water Resources to identify and repair eroded levee sites on the state/federal levee system to prevent catastrophic flooding and loss

of life. By the end of summer 2006, 33 critical erosion sites on the levee system had been identified as being in urgent need of repair. Two of these sites are along the bank of the Sacramento River east levee between the NCC and the American River. Rock toe protection has been installed at these sites.

These improvements do not overlap temporally with proposed project construction, and the sites are separated from the proposed project area by the levee itself.

Sacramento International Airport Master Plan

The *Sacramento International Airport Master Plan* (SMF Master Plan) covers planned Airport improvements through 2020. The EIR for the SMF Master Plan was certified and the project approved in August 2007. The master plan includes three phases, as described below. The new facilities are planned to be constructed within the boundaries of existing Airport property, which totals approximately 5,670 acres, 2,300 acres of which are currently developed.

Development of many of the planned facilities will be on land historically in agricultural production. Most lands outside the current Airport Operations Area provide foraging habitat of varying quality for a variety of wildlife species and that the facility expansion would reduce the overall availability of such habitat in the western portion of the Natomas Basin. The SMF Master Plan EIR estimates that 190 acres of Swainson's hawk foraging habitat would be converted to developed uses in Phases 1 and 2 of master plan buildout. Construction of some of the planned facilities is likely to coincide with construction of SAFCA's proposed project in 2008–2010; as a result, some temporary construction-related effects (particularly construction traffic and air quality effects) could combine with those of the proposed project.

SMF Master Plan Phase 1 (2007–2013)

Phase 1 of the SMF Master Plan includes the following features:

- New landside passenger terminal (Terminal B)
- New airside concourse (Concourse B, accommodating a total of 23 aircraft gates) and aircraft apron
- Hotel/parking garage
- New parallel Taxiway Y
- New full-length parallel Taxiway A, hold pads, and high-speed taxiway exits for Runway 16R/34L (west runway)
- New airport traffic control tower north and west of Cy Homer Road and airport, airfield, and equipment maintenance buildings
- General aviation area including corporate hangars, fixed base operator facility, and apron
- Expanded surface rental car parking lot between Airport Boulevard and Earhart Drive
- Expanded rental car terminal facility east of Airport Boulevard and McNair Circle
- Extension of Elkhorn Boulevard from Metro Air Park to Airport Boulevard
- Surface employee parking lot north of Interstate 5 (I-5) and west of Airport Boulevard to accommodate 1,500 automobile parking spaces

- New remote economy parking and rental car overflow facility south of I-5 to accommodate 13,800 automobile parking spaces
- Extension of Airport Boulevard to the new parking facility
- New ground-service equipment maintenance building east of Aviation Drive
- New community fire station at the northwest corner of Lindbergh Drive and Crossfield Drive
- Acquisition of two areas (48 acres and 313 acres) north of I-5 for buffers

SMF Master Plan Phase 2 (2014–2020)

Phase 2 of the SMF Master Plan includes the following features:

- Expansion of landside Terminal B to create a centralized landside terminal, with addition of four gates along Concourse B and a new Terminal B parking garage
- Extension of Terminal A concourse piers to accommodate four additional aircraft gates, and a 2,400-foot extension of Runway 16L/34R (east runway) to provide a total runway length of 11,000 feet
- Addition of a localizer, instrument landing system glide slope, and high-intensity approach lighting system with sequenced flashing lights for new instrument landing system approach to Runway 16L/34R perpendicular taxiway exits for parallel Taxiway A
- Addition of a full-length parallel Taxiway E, hold pads, and high-speed taxiway exits for Runway 16L/34R, new north crossfield Taxiway Z (north of Taxiway Y), terminal apron near Terminal A, air cargo building and air cargo apron with a taxiway connector to the end of Runway 16L/34R, Aircraft Rescue & Fire Fighting building north of Cy Homer Road and west of Earhart Drive
- Extension of Cy Homer Road to both existing runways
- Relocation of Elverta Road to avoid the Runway 16L/34R Runway Protection Zone
- Commercial development on approximately 79 acres south of I-5
- Placement of ditches within culverts and pipes in the Runway Protection Zone and road areas
- New 8,600-foot runway parallel to and 1,200 feet west of existing Runway 16R/34L
- New concourse to serve the third runway
- Light rail and/or bus rapid transit service to passenger terminals
- Commercial development on approximately 77 acres north of I-5 and east of Airport Boulevard, and approximately 135 acres north of existing Elverta Road

SMF Master Plan Phase 3 (After 2020)

Phase 3 of the SMF Master Plan includes the following conceptual features:

- A new 8,600-foot-long runway parallel to and 1,200 feet west of the existing west runway (Runway 16R/34L)
- A new passenger concourse to support this new runway
- Commercial development on approximately 137 acres north of the existing alignment of Elverta Road between the existing parallel runways and on about 77 acres north of I-5 and east of Airport Boulevard
- Construction of a light rail line into the airport terminal complex

Development Projects

Camino Norte Project

The Camino Norte/Leona Circle project area—generally located east of El Centro Road south of Arena Boulevard—has been proposed by the City of Sacramento as Phase 1 of the more extensive Sphere of Influence amendment for the Natomas Joint Vision area. There is no development application for this project for this project. The concept is to develop the approximately 400-acre area for residential and commercial uses. Preparation of an EIR for the Camino Norte Sphere of Influence Amendment began in 2007 (Mende, pers. comm., 2007).

If developed, this project would convert land historically in row crops to nonagricultural uses.

Greenbriar

Greenbriar is a proposed 577-acre, mixed-use project proposed for the northwest corner of the intersection of I-5 and SR 99/70. The Greenbriar project site lies 1 mile east of the Airport and is bounded on the north by Elkhorn Boulevard and on the west by the Lone Tree Canal. The site, which is included in the Natomas Joint Vision area, is zoned agricultural and is located outside the Sacramento city limits and Sacramento County's Urban Services Boundary. The development would include nearly 3,500 residential units, about 50 acres of commercial development, a 10-acre elementary school, about 50 acres of neighborhood parks, and a 40-acre lake for stormwater retention. The project would include two connections with SR 99/70—the existing Elkhorn Boulevard and a new east/west thoroughfare, Meister Way, which would require creation of a new interchange just north of the I-5 exit. The final EIR for the Greenbriar project was issued in August 2007.

Implementation of the project would result in the conversion of 577 acres of Important Farmland historically rotated between rice, alfalfa, wheat, and row crops to nonagricultural uses. A project-specific habitat conservation plan (HCP) is being developed to address the mitigation requirements for effects of the project on special-status species and habitats, particularly Swainson's hawk foraging habitat and giant garter snake habitat (City of Sacramento and Sacramento Area Local Agency Formation Commission 2007).

Sutter Pointe Specific Plan

The *Sutter Pointe Specific Plan* area encompasses approximately 7,500 acres in southeastern Sutter County within the SSCI/C Reserve described above. The site is generally bounded by Natomas Road on the east, the Sacramento/Sutter County line on the south, and, at its westernmost point, Powerline Road; the northern boundary is approximately 4 miles north of the Sacramento-Sutter County line. SR 99/70 divides the southern portion of the specific plan area and serves as the western boundary of its northern portion. The *Sutter Pointe Specific Plan* is a mixed-use project that combines industry, commerce, housing, open space, and civic and associated uses.

Buildout of the proposed project would be split into five residential/mixed-use development phases and five employment center development phases and is anticipated to occur over approximately 30 years.

Development of this specific plan area would convert land historically in a mixture of agricultural row crops to nonagricultural uses. An EIR for the *Sutter Pointe Specific Plan* is in preparation.

Metro Air Park Specific Plan

The *Metro Air Park Specific Plan* area encompasses 1,887 acres just east of the Airport on the north side of I-5. The specific plan area is bordered by Elverta Road to the north, Lone Tree Road to the east, Bayou Way to the south, and Powerline Road to the west. The following land uses are proposed for Metro Air Park: light manufacturing (551 acres), airport related (277 acres), office (682 acres), and recreation/open space (275 acres). However, no development plans had been submitted at the time of preparation of this EIR. Metro Air Park cannot be redesignated for residential use because of its proximity to the Airport, and the habitat conservation plan for Metro Air Park requires that the land be used in agriculture until developed.

Utility Infrastructure Projects

American Basin Fish Screen Habitat Improvement Project

This project involves the consolidation of diversions and the addition of state-of-the-art fish screens to Natomas Central Mutual Water Company's (NMWC's) diversions on the Sacramento River between Verona and the American River, and on the NCC. The specific objectives of the project are to remove migration barriers; prevent straying and entrainment of winter-run chinook salmon, spring-run chinook salmon, fall-run chinook salmon, late fall–run chinook salmon, steelhead trout, splittail, green sturgeon, and other high-risk species; and to improve aquatic, riverine, and riparian habitat. As part of this project, NMWC would construct the Sankey diversion, a screened intake and pumping plant in Reach 1 of the Sacramento River east levee at the proposed realignment of the Sankey Road intersection with Garden Highway. Construction would take place on both sides of the levee.

The timing of the Sankey diversion project has not yet been established. The land use conversion that would be required at the intake site is already assumed in the proposed project evaluated in this EIR as part of the land acquisition for the Sankey Road realignment, as shown in Exhibit 2-23a.

Western Area Power Administration Transmission Line/Sacramento Area Voltage Support Project

The Western Area Power Administration of the U.S. Department of Energy, the Sacramento Municipal Utility District (SMUD), and the City of Roseville are proposing to construct and operate approximately 38 miles of 230-kilovolt (kV), new double-circuit transmission line in the Sacramento area. A joint supplemental environmental impact statement (SEIS) and EIR were prepared for this project in 2003. Segments of the line would run along established roadways in the Natomas Basin; alternative alignments have been identified for these segments.

The draft SEIS/EIR estimated that in the Natomas Basin, the project would permanently affect up to 17 acres of Prime and Unique Farmland, approximately 19 acres of rice, 1.4 acres of riverine/riparian habitat, up to 0.3 acre of riverine/riparian habitat, 1 acre of vernal pools, and up to 1.4 acres of emergent wetlands (WAPA 2007).

Placer Parkway Corridor Preservation Project

The Placer Parkway Corridor Preservation Project is a proposal to identify and preserve an approximate 15-mile-long, 500- to 1,000-foot-wide corridor between SR 65 and SR 99/70 for future development of a roadway that would connect State Route (SR) 65 in the Lincoln/Roseville/Rocklin area to SR 99/70 in Sutter County and the Airport (Placer Parkway Corridor Preservation 2007). The draft EIS/EIR for the Tier 1 corridor assessment is

expected to be released in 2007. Design and construction have not been funded. Implementation is anticipated by 2020. (Placer Parkway Corridor Preservation 2007.)

The proposed corridor would occupy 90–180 acres, approximately ¼ of which (22–45 acres) would be in the Natomas Basin, on land currently in agricultural use.

Downtown Natomas Airport Light Rail Transportation Project

A 13-mile, 13-station light rail transit corridor would extend from downtown to the Airport, serving the future Railyards development and Regional Intermodal Facility, the Richards Boulevard Redevelopment Area, and the communities of South and North Natomas (Sacramento RT 2006). Extension of the light rail into Natomas is not anticipated to occur until after 2012.

Sacramento Municipal Utility District Power Line–Elkhorn Substation Capacity Expansion Project

SMUD plans to expand an existing distribution substation located on Powerline Road (approximately 1.25 miles north of I-5) along the east side of the Airport in northern Sacramento County. The proposed Power Line–Elkhorn Substation Capacity Expansion Project would increase the capacity of the substation from 16.25 MVA to 50 MVA, mainly to serve the Airport's terminal modernization and demand from Metro Air Park development (SMUD 2007).

The project would increase the footprint of the substation by approximately 0.5 acre.

Sacramento River Water Reliability Study

The U.S. Bureau of Reclamation and Placer County Water Agency in 2002 initiated the Sacramento River Water Reliability Study on behalf of cost-sharing partners— the City of Roseville, the City of Sacramento, and Sacramento Suburban Water District—to develop a water supply plan that would use a Sacramento River diversion to meet water supply needs of the Placer-Sacramento region. The plan would include water supply infrastructure components, water treatment and pumping facilities, storage facilities, and major transmission and distribution pipelines. The study will include a feasibility study and an EIS/EIR for identified water supply alternatives as the basis for seeking necessary biological opinions and permits from the responsible resource agencies to allow execution of necessary agreements and construction of the recommended water supply infrastructure.

The final version (March 2005) of the Initial Alternatives report for the study identified an Elverta Diversion Alternative and recommended it for further study. The alternative would pump water from the Sacramento River near Elverta Road and Garden Highway to a new treatment facility north of the Airport. After treatment, the water would be transported via pipeline to areas east of the Natomas Basin. It is anticipated that the intake and water treatment plant would be owned and operated by the City of Sacramento. No project-specific analysis has been prepared yet for any of the alternatives identified in the study.

Upper and Lower Northwest Interceptor Projects

These projects are managed by the Sacramento Regional County Sanitation District. The Upper Northwest Interceptor (UNWI) is an underground sewer interceptor—a large sewer pipeline—that extends approximately 20 miles from Orangevale to Natomas. When complete, the UNWI pipeline will carry wastewater flows from northeast Sacramento County to the new Natomas Pump Station located near the junction of I-5 and I-80. All segments of the UNWI are expected to be complete by 2010. The Lower Northwest Interceptor (LNWI) will convey flows from the Natomas Pump Station to the Sacramento Regional Wastewater Treatment Plant in Elk Grove. The LNWI alignment is approximately 20 miles long and begins at the existing Natomas Pump Station in

northwestern Sacramento County and ends at the SRWTP in southern Sacramento County. The LNWI is scheduled to be completed in 2007.

4.2.5 ANALYSIS OF CUMULATIVE IMPACTS

Many of the projects described in Section 4.2.4 would permanently disturb undeveloped land that is currently in agricultural use or that has recently been in agricultural use. These projects would have cumulative significant effects on agricultural resources through the conversion of Important Farmland (Prime Farmland, Farmland of Statewide Importance, and Unique Farmland) to nonagricultural uses. These land conversions also have the potential to cause permanent adverse cumulative effects on terrestrial special-status species for which these lands provide habitat. However, federal and state resource agency approvals of these projects would depend on their ability to offset species impacts through the provision of preserved or enhanced habitats. Given the abundance of prehistoric archaeological resources in the Natomas Basin, all projects with ground-disturbing components have the potential to damage or destroy known or previously unknown buried cultural materials and contribute to a significant cumulative loss of cultural resources. Construction projects conducted simultaneously could combine to have temporary cumulative air quality, noise, and/or traffic impacts. The following subsections discuss the potential for the proposed project to make cumulatively considerable contributions to these cumulative impacts.

4.2.5.1 AGRICULTURAL RESOURCES

Implementation of the proposed project would involve the conversion of large acreages of Important Farmland (Prime Farmland and Farmland of Statewide Importance) to managed marsh and managed grassland at borrow sites in all years of construction, and would entail the conversion of portions of agricultural parcels to nonagricultural uses at levee toe widening, berm, and new canal alignment locations. Borrow operations would include retaining the top soil on the parcels used for borrow, such that the physical ability of these lands to support future agricultural uses would not be lost. Nevertheless, the intention is to convert these lands to managed habitat, much of which (managed marsh) would not be considered an agricultural use. Approximately 420 acres and 1,080 acres of agricultural land are expected to be converted to nonagricultural uses in 2008 and 2009–2010, respectively, as a result of implementation of the proposed project. Of the 1,080 acres converted in 2009–2010, 500 acres would be retained at the Airport in managed grassland and would continue to be suitable for farming of crops such as alfalfa and hay. The project would also entail the preservation of about 130 acres of land in rice production in perpetuity.

The Natomas Basin has already experienced the conversion of a substantial area of agricultural land, much of it Prime Farmland and other categories of Important Farmland, to residential and commercial development. As noted in the descriptions of planned development projects in Section 4.2.4, the Natomas Basin is the focus of much of the growth planning in the Sacramento area, in both Sutter County and Sacramento County, and significant losses of Important Farmland to urban development are expected to continue in this area. These losses would continue an overall trend of net loss of Important Farmland that has been documented in Sutter and Sacramento Counties for each consecutive 2-year interval of mapping by the California Department of Conservation from 1992 through 2004 (see Table 5-1 in Volume I of the Local Funding EIR for details of land use conversions involving Important Farmland).

In combination with the conversions of Important Farmland in the Natomas Basin associated with past, current, and future projects, the contribution of SAFCA's proposed project would be cumulatively considerable. Implementation of Mitigation Measure 3.2-b would reduce the proposed project's contributions to this cumulative impact, but not to a less-than-significant level. The contribution of the proposed project to cumulative conversion of Important Farmland to nonagricultural uses would be **significant and unavoidable**.

4.2.5.2 WATER QUALITY/ FISHERIES AND AQUATIC RESOURCES

Construction activities have the potential to temporarily degrade water quality and fish habitat through the direct release of soil and construction materials into water bodies or the indirect release of contaminants into water bodies through runoff. Other projects, including the extensive array of development projects anticipated in the Natomas Basin and SAFCA's bank protection project, would have a similar potential to release materials into watercourses that support fish. The implementation of BMPs and adherence to the conditions of a storm water pollution prevention plan (Mitigation Measure 3.5-a) would ensure that the requirements of the Clean Water Act and Porter-Cologne Water Quality Control Act are met. Given the temporary nature of any impacts and the protections afforded by regulatory programs under the Clean Water Act and Porter-Cologne Water Quality Control Act, any degradation of surface waters by construction activities of the proposed project and other projects would be minimized. Consequently, the potential effects of project construction on water quality are not expected to constitute a cumulatively considerable contribution to an impact on water quality, fish habitat, or aquatic species.

The proposed improvements along the NCC south levee would also include waterside slope stabilization activities (flattening of oversteepened areas of the waterside slope) that would require the removal of vegetation, some of which may constitute a loss of SRA habitat. Adherence to Section 1602 (California Fish and Game Code) permit conditions (second part of Mitigation Measure 3.6-b) would limit potential disturbance to fish habitat associated with levee improvements on the water side of the NCC and would ensure that restoration, rehabilitation, and/or replacement of any affected channel habitat would result in no net loss of SRA habitat. Other projects in the Natomas Basin would be required to implement similar measures to prevent impacts. In addition, SAFCA's bank protection project would incorporate features that would compensate for temporary effects on SRA habitat and result in long-term increases in nearshore and SRA cover values relative to pre-project conditions. Consequently, the proposed project would not contribute to a cumulative impact on fish habitat.

Cumulative impacts on water quality and fisheries and aquatic resources would be **less than significant**.

4.2.5.3 TERRESTRIAL BIOLOGICAL RESOURCES

Implementation of the proposed project has the potential to contribute to the loss or degradation of sensitive habitats and to adversely affect special-status terrestrial species (special-status plants, valley elderberry longhorn beetle, giant garter snake, Swainson's hawk, burrowing owl, and others). Potential effects of the proposed project related to wildlife would be associated with construction disturbances of wildlife and their habitats, as well as permanent loss of habitat for the affected species. These effects could contribute to species declines and losses of habitat that have led to the need to protect these species under the federal Endangered Species Act (ESA) and the California Endangered Species Act (CESA).

Potential cumulative adverse effects on sensitive biological resources in the Natomas Basin include elements of SAFCA's long-term flood control improvement program, such as post-2010 seepage remediation projects on the Sacramento and American River levees, the replacement of relief wells with seepage berms in 20–30 years, and further flattening of the landside slopes of the levees. These actions would increase the footprint of the flood control features and result in additional habitat conversion. However, land acquisition and habitat conversion for the proposed project includes the anticipated area necessary to provide adequate access for inspection and maintenance of proposed improvements, as well as a buffer between the flood control system and adjacent land uses. It is anticipated that future landside expansion of levee and berm footprints would be accommodated within this currently proposed buffer area. Therefore, no additional land acquisition or conversion of agricultural crop lands would occur. However, additional removal of woodland habitat and minimal (likely less than 1 acre) fill of irrigation/drainage ditches may be required.

Future levee improvements would have adverse effects on sensitive habitats and special-status species similar to those of the proposed project, including loss of suitable habitat and wildlife disturbance, and potential loss, during

construction. The proposed project is intended to provide up-front habitat replacement, enhancement, and preservation adequate to compensate for anticipated future loss of woodland habitat. Replacement woodland habitat would be planted as part of the proposed project, in advance of the future loss, so the created habitat has time to develop and provide habitat benefits at the time of the loss.

Bank protection at the nine Sacramento River erosion sites to be conducted by SAFCA in 2008–2010 would result in wildlife disturbances during construction. However, the overall effect is anticipated to be beneficial, because this project would prevent future loss of extensive mature riparian vegetation that provides nest sites for Swainson's hawk and important habitat for many common and sensitive wildlife species.

Proposed NMWC projects, including the Sankey Diversion and Fish Screen Project, would also result in habitat and wildlife disturbances during construction. The Sankey Diversion would include permanent loss of habitat for some special-status species, including giant garter snake, but an appropriate habitat replacement and management plan is being developed in consultation with the U.S. Fish and Wildlife Service and California Department of Fish and Game to provide adequate compensation for the loss. Despite construction-related adverse effects from the fish screen project, the overall effect would be beneficial and habitat quality would improve.

The SMF Master Plan includes a number of components that are anticipated to result in adverse effects on sensitive habitats and special-status species. The majority of these effects would be associated with Phases 2 and 3, which would not commence until 2014. Adverse effects in all phases could include a combination of permanent habitat loss and construction-related effects. There could also be effects from expanded long-term operation of the Airport. Sacramento County Airport System (SCAS) has identified some habitat enhancement and protection measures that would be implemented to compensate for adverse effects, and additional measures are anticipated to be identified as subsequent CEQA evaluation and regulatory permitting is completed.

Substantial adverse effects on special-status species and sensitive habitats will be associated with the extensive future urban growth expected to occur in the Natomas Basin. This growth will continue to reduce the amount of habitat available to support populations of special-status species. Potential adverse effects from future approved expansion within the NBHCP permit area have been addressed, and successful implementation of the NBHCP would ensure that there is no overall adverse effect on special-status species from implementation of these projects. Similarly, an HCP is being implemented for the *Metro Air Park Specific Plan*. Additional urban expansion is being promoted through the Natomas Joint Vision, which would result in development and open space conservation within the Sacramento County portion of the Natomas Basin that was not covered in the NBHCP. Potential effects on biological resources from implementation of this potential future development are at various stages of evaluation. Projects will be required to incorporate adequate impact avoidance and minimization measures and permanent habitat conservation to mitigate and compensate for the anticipated adverse effects.

Implementation of the proposed project and mitigation measures in Section 3.7, "Terrestrial Biological Resources," would ensure that the effects of the proposed project are reduced or avoided in accordance with the requirements of the ESA and CESA and other regulatory programs that protect habitats, such as Section 404 of the Clean Water Act and Section 1602 of the California Fish and Game Code. As discussed in Section 3.7, the proposed project incorporates habitat creation, enhancement, and preservation components designed to offset adverse effects of the project. In addition, mitigation measures require further development of these habitat improvement components, including preparation and approval of management plans. Successful implementation of these mitigation measures would result in permanent protection and management of habitat for giant garter snake, including creation and enhancement of connectivity between giant garter snake populations in the Natomas Basin, expected to result in an overall improvement of conditions for giant garter snakes in the basin. An increase in permanently protected foraging habitat for Swainson's hawk, eventual increase in potential nesting habitat, and preservation of existing nest sites would also maintain or improve current conditions for this species in the Natomas Basin. Implementation of project components and mitigation measure would similarly ensure that potential adverse effects on other special-status species and on sensitive habitats are reduced to a less-than-significant level and would not be cumulatively considerable.

Successful implementation of the NBHCP depends on a number of assumptions that could be jeopardized by implementation of other projects and activities in the basin, including the proposed project and the various cumulative projects. The proposed project has been designed to support achievement of the goals and objectives of the NBHCP, and implementation of Mitigation Measure 3.7-i would ensure that the proposed project does not jeopardize successful implementation of the NBHCP.

Because SAFCA would implement minimization, avoidance, and compensation measures in accordance with the requirements of ESA, CESA, and other relevant regulatory requirements and the proposed project would include additional habitat protection and enhancement components, the project's contributions to impacts on terrestrial species would not be cumulatively considerable.

Cumulative impacts on terrestrial biological resources would be **less than significant**.

4.2.5.4 CULTURAL RESOURCES

Prehistoric human habitation sites are common in riverbank and floodplain areas, and burial sites are often encountered in the course of ground-disturbing activities. It is likely that known or unknown archaeological resources could be disturbed and cultural resources damaged or destroyed during construction activities for the proposed project. Significant and unavoidable losses of a unique archaeological resource as defined in Public Resources Code Section 21083.2 could occur where excavations encounter archaeological deposits that cannot be removed or recovered (e.g., under levees), or where recovery would not be sufficient to prevent the loss of significance of the cultural materials. Historic resources could also be damaged or require removal from areas near flood control facilities under the proposed project. If these resources would meet the definition of historical resources included in Public Resources Code Section 21084.1, their modification or destruction would be considered significant. Although mitigation would be implemented to reduce effects on potentially significant cultural resources, significant impacts, particularly on archaeological resources, may still occur. Losses of archaeological resources would add to a historical trend in the loss of these resources as artifacts of cultural significance and as objects of research importance. For these reasons, despite the implementation of Mitigation Measures 3.8-c, 3.8-d, and 3.8-e, the proposed project has the potential to make a cumulatively considerable impact on cultural resources. The contribution of the proposed project to cumulative impacts on cultural resources would be **significant and unavoidable**.

4.2.5.5 TRANSPORTATION AND CIRCULATION

Effects of construction activities on emergency access would be site specific, intermittent, and temporary, and are not expected to be cumulatively considerable.

The proposed construction activities would temporarily increase traffic levels on local and regional roadways. Mitigation would be implemented to reduce effects to the extent feasible, but the proposed project would still result in substantial temporary increases in traffic in relation to the existing traffic load. At times, the levee improvements could require as many as 1,400 truck trips per day to several construction sites along the Sacramento River east levee. The proposed project's significant temporary effects on local traffic circulation could compound impacts of increased regional short-term (construction-related) and long-term traffic increases associated with new development. In general, the temporary traffic increases associated with the proposed project would be limited to the roadways between the RD 1001 construction site and the NCC south levee and PGCC west levee, and to the western portion of the Natomas Basin between in-basin borrow sites and the Sacramento River east levee. With the exception of SAFCA's proposed bank protection project on the water side of the Sacramento River east levee, there are no other anticipated projects in the vicinity of the proposed project that are likely to compound the significant temporary traffic effects of the proposed project. The proposed bank protection project, if it includes hauling of construction materials by land rather than by barge, would generate only a moderate amount of haul traffic. Because of the limited potential for the traffic associated with the proposed project to combine with increased traffic from other future projects, and because of the short-term, intermittent

nature of any cumulative traffic impacts, these impacts would not be cumulatively considerable. The cumulative impact on traffic circulation associated with the proposed project would be **less than significant**.

4.2.5.6 AIR QUALITY

Future projects will contribute to air pollutant emissions in Sutter and Sacramento Counties and to the nonattainment status of FRAQMD and SMAQMD for ozone and respirable particulate matter 10 micrometers or less (PM_{10}). As described under Impact 3.11-a, project-related construction emissions would be a significant and unavoidable air quality impact. When taken in total with other projects in the region, the project's construction-related emissions would be considered cumulatively considerable. Long-term operational emissions associated with the proposed project would be negligible, however, and would not make a cumulatively considerable contribution to air quality effects, given that operational emissions would be the same as under current conditions (no increase in maintenance activities would occur). The proposed project's incremental effect with respect to short-term construction emissions of ozone precursors and PM_{10} is cumulatively considerable when added to an existing and future significant cumulative air quality impact.

Please refer to Section 3.11, "Air Quality," for information on emissions of greenhouse gases (GHGs), global climate change, and regulatory information on this topic. No air district in California, including FRAQMD or SMAQMD, has identified a significance threshold for analyzing GHG emissions generated by a proposed project or a methodology for analyzing air quality impacts related to global warming. Although the state of California has identified GHG reduction goals through adoption of Assembly Bill 32, the California Global Warming Solutions Act of 2006, the effect of GHG emissions as they relate to global climate change is inherently a cumulative impact issue. While the emissions of one single project will not cause global climate change, GHG emissions from multiple projects throughout the world could result in a cumulative impact with respect to global climate change.

In comparison to criteria air pollutants, such as ozone and PM_{10}, carbon dioxide (CO_2) emissions persist in the atmosphere for a much longer period of time. GHG emissions generated by the proposed project would predominantly be in the form of CO_2. Project construction would result in a net increase in emissions to occur over a period of 3 years (2008–2010), despite the implementation of Mitigation Measure 3.11-a. While any increase in GHG emissions would add to the quantity of emissions that would contribute to global climate change, it is noteworthy that emissions associated with the proposed project occur over a finite period of time (3 years), as opposed to operational emissions, which would occur over the lifetime of a project. The proposed project would have no net increase in operational GHG emissions. Nonetheless, because of the intensity and duration of construction activities, and the lack of available mitigation measures to abate GHG emissions from heavy-duty construction equipment exhaust and on-road hauling emissions, the project's incremental contribution to climate change from construction emissions would be significant and cumulatively considerable.

The proposed project's incremental effect on air quality with respect to short-term construction emissions is cumulatively considerable when added to an existing and future significant cumulative air quality impact. This cumulative impact would be **significant and unavoidable**.

4.2.5.7 NOISE

The proposed project would have a significant effect on noise levels experienced by the occupants of residences that are near sites of construction activity or haul routes for construction traffic. In most locations of proposed project activity (borrow sites, rural roadways, levee and canal construction areas), there are no other known projects that would generate noise levels noticeably above ambient noise levels, which are generated by sources that include aircraft operations, truck traffic on area roadways, and agricultural activity. Therefore, in most areas in which noise-generating proposed project activities would take place, there would be no cumulative noise effect.

In some locations along the Sacramento River east levee, construction work could take place simultaneously as part of the proposed project on the land side of the Sacramento River east levee and/or the west end of the NCC and on the water side of the levee as part of SAFCA's bank protection project. These two projects, if constructed in the same locations during the same time periods, have the potential to cumulatively affect noise levels at residences on the water side of the levee. Any simultaneous generation of construction noise from the two projects in the vicinity of the same sensitive receptors would be intermittent; in addition, the existing levee and woody vegetation would attenuate sound between the landside construction work and waterside residences. Nevertheless, the potential exists for residents in some locations to be exposed simultaneously to increased noise levels from levee improvements on the land side of the levee and bank protection activities on the water side, including during noise-sensitive hours.

SAFCA could attempt to schedule noise-generating construction activities for Sacramento River east levee improvements and bank protection so they would not occur simultaneously in the vicinity of residences along Garden Highway such that cumulative noise effects would be experienced at these residences. Such scheduling would preclude the potential for a cumulative noise effect at sensitive receptors. However, given construction schedule constraints associated with protected species for each project and the need to conduct construction work outside of the flood season, such scheduling cannot be assured. Furthermore, in some cases, it may be necessary to conduct construction work on these projects during noise-sensitive hours. Consequently, no feasible mitigation is available, and the combined effect of these two projects would be cumulatively considerable. Therefore, this impact would be **significant and unavoidable**.

4.2.5.8 VISUAL RESOURCES

The proposed project would include the removal of trees, other vegetation, and structures from the land side of the Sacramento River east levee within the footprint of the adjacent setback levee and berms, may include the removal of some vegetation and structural encroachments from the water side of the Sacramento River east levee as part of encroachment removal actions, and would include the removal of trees from areas along the water side of the NCC south levee. SAFCA's proposed bank protection project, post-2010 projects, levee integrity program, and eventual replacement of relief wells with seepage berms along the land side of the Sacramento River east levee would also require the removal of vegetation and other features that currently add to the rural and riverine character of views in the area. These changes would contribute to the substantial degradation of scenic resources in Natomas that are expected to result with various development projects and expansion of Airport facilities, as the area's visual character changes from rural agricultural landscape to urban/suburban setting. Although the proposed project includes the establishment of a substantial acreage of woodland plantings around the basin to offset the significant effect of the proposed project on scenic resources (oak and other native trees), the contributions of the proposed project to changes in the visual character and scenic resources of Natomas in the near term, before the new plantings become well established, would be cumulatively considerable. This impact, in the near term, would be **significant and unavoidable**.

5 OTHER CEQA-REQUIRED SECTIONS

This chapter includes the following requirements of CEQA that are not addressed elsewhere in this EIR: growth-inducing effects of the proposed project, significant and unavoidable environmental impacts, and significant irreversible environmental impacts.

5.1 GROWTH-INDUCING EFFECTS

5.1.1 CEQA REQUIREMENTS

CEQA requires that an EIR evaluate the growth-inducing impacts of a proposed project (Section 21100[b][5]). Growth-inducing impacts are described in pertinent part in Section 15126.2(d) of the State CEQA Guidelines as follows:

> [T]he ways in which a proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. Included in this are projects which would remove obstacles to population growth…. Increases in the population may tax existing community service facilities, requiring construction of new facilities that could cause significant environmental effects…. [In addition,] the characteristics of some projects…may encourage and facilitate other activities that could significantly affect the environment, either individually or cumulatively. It must not be assumed that growth in any area is necessarily beneficial, detrimental, or of little significance to the environment.

Direct growth inducement would result if a project, for example, involved the construction of new housing. Indirect growth inducement would result if a project established substantial new permanent employment opportunities that created a demand for additional housing and services, or removed an obstacle to housing development.

Growth inducement itself is not an environmental effect, but it may lead to environmental effects. For example, if substantial growth inducement occurs, it may result in secondary environmental effects, such as increased demand on community and public services and infrastructure, increased traffic and noise, degradation of air or water quality, degradation or loss of plant or animal habitats, or conversion of agricultural and open-space land to urban uses.

However, if the induced growth is consistent with or provided for by the adopted land use plans and growth management plans and policies for the area affected (e.g., city and county general plans, specific plans, transportation management plans), those plans may ensure that these impacts are either less than significant or mitigated to a less-than-significant level. Local land use plans provide for land use development patterns and growth policies that encourage orderly urban development supported by adequate urban public services such as water supply, roadway infrastructure, sewer services, and solid waste services.

5.1.2 GROWTH-INDUCING EFFECTS OF THE PROPOSED PROJECT

The proposed project, in itself, would not be growth inducing because it consists of improving the levee system in the Natomas Basin and making related landscape modifications and drainage and infrastructure improvements. As a component of SAFCA's overall program of flood control improvements, the growth-inducing impacts of the project have already been addressed in the *Environmental Impact Report on Local Funding Mechanisms for Comprehensive Flood Control Improvements for the Sacramento Area* (Local Funding EIR), Volume I, Section 6.1, "Growth-Inducing Effects," which is summarized below.

Because the proposed project would not involve the construction of housing, it would not be directly growth inducing. Construction activities associated with the proposed project would generate short-term employment, but it is anticipated that the construction jobs would be filled using the existing local employment pool, and the proposed project would not directly result in a population increase.

In general, the proposed project would accommodate growth currently planned for undeveloped lands in the Natomas Basin. This planned growth is described in Section 6.1.2 of the Local Funding EIR and provides substantial evidence that the proposed project would accommodate planned regional growth in a manner that would be consistent with emerging smart growth principles. Accordingly, it is reasonable to assume that this growth will proceed with or without implementation of the proposed project. In the absence of SAFCA's proposed improvements, the Natomas Basin may be mapped back into the federally regulated 100-year floodplain. However, developments would likely provide their own 100-year flood protection through measures such as the construction of ring levees around the developments. Thus, the proposed project, while accommodating planned regional growth, would not be growth inducing itself.

5.2 SIGNIFICANT AND UNAVOIDABLE ENVIRONMENTAL IMPACTS

CEQA Section 21100(b)(2)(A) provides that an EIR shall include a detailed statement setting forth "any significant effect on the environment that cannot be avoided if the project is implemented." Chapter 3, "Environmental Setting, Impacts, and Mitigation," provides a detailed analysis of all potentially significant environmental impacts of the project, feasible mitigation measures that could reduce or avoid the project's significant impacts, and whether these mitigation measures would reduce these impacts to less-than-significant levels. Chapter 4, "Cumulative Impacts," identifies the significant cumulative impacts of the project. If a specific impact cannot be reduced to a less-than-significant level, it is considered a significant and unavoidable impact. The proposed project would have the following significant and unavoidable environmental impacts (direct, indirect, and cumulative):

The proposed project would result in the following significant and unavoidable impacts:

- Conversion of important farmland to nonagricultural uses (direct and cumulative)
- Potential construction impacts on known prehistoric resources, discovery of human remains during construction, and damage to or destruction of previously undiscovered cultural resources (direct and cumulative)
- Temporary increase in traffic on local roadways during construction (direct)
- Effects on air quality with respect to short-term construction emissions: temporary emissions of ROG, NO_X, and PM_{10} (direct and cumulative), and incremental contributions to greenhouse gas emissions (cumulative)
- Generation of short-term construction noise, exposure of sensitive receptors to or generation of excessive groundborne vibration or noise, and exposure of residents to increased traffic noise levels from hauling activity (direct and cumulative)
- Changes in scenic vistas, scenic resources, and existing visual character of the project area (direct and cumulative)

Where feasible mitigation exists, it has been included to reduce these impacts; however, the mitigation would not be sufficient to reduce the impacts to a less-than-significant level.

5.3 SIGNIFICANT IRREVERSIBLE ENVIRONMENTAL IMPACTS

The State CEQA Guidelines require a discussion of the significant irreversible environmental changes that would be caused by the project should it be implemented.

The irreversible and irretrievable commitment of resources is the permanent loss of resources for future or alternative purposes. Irreversible and irretrievable resources are those that cannot be recovered or recycled, or those that are consumed or reduced to unrecoverable forms. The proposed project would result in the irreversible and irretrievable commitment of energy and material resources during project construction and maintenance, including the following:

- construction materials, including such resources as soil and rocks;
- land area committed to new/expanded project facilities; and
- energy expended in the form of electricity, gasoline, diesel fuel, and oil for equipment and transportation vehicles that would be needed for project construction and maintenance.

The use of these nonrenewable resources is expected to account for a minimal portion of the region's resources and would not affect the availability of these resources for other needs within the region. Construction activities would not result in inefficient use of energy or natural resources. Construction contractors selected would use best available engineering techniques, construction and design practices, and equipment operating procedures. Long-term project operation would not result in substantial long-term consumption of energy and natural resources.

6 ALTERNATIVES

6.1 ALTERNATIVES DEVELOPMENT

6.1.1 CEQA REQUIREMENTS

Section 15126.6[a] of the State CEQA Guidelines requires that an EIR (1) describe a range of reasonable alternatives to a proposed project, or to the location of the project, that would feasibly attain most of the basic project objectives but would avoid or substantially lessen any of the significant effects of the project and (2) evaluate the comparative merits of the alternatives. An EIR need not consider every conceivable alternative to a proposed project but must consider a reasonable range of potentially feasible alternatives that will foster informed decision making and public participation.

The range of alternatives required to be evaluated in an EIR is governed by a "rule of reason" that requires the EIR to set forth only those alternatives necessary to permit a reasoned choice. The EIR need examine in detail only those alternatives that the lead agency determines could feasibly attain most of the basic project objectives, taking into account factors that include site suitability; economic viability; availability of infrastructure; general plan consistency; other plans or regulatory limitations; jurisdictional boundaries; and whether the proponent can reasonably acquire, control, or otherwise have access to the alternative site (State CEQA Guidelines Section 15126.6[f]). CEQA does not require the alternatives to be evaluated at the same level of detail as the proposed project.

The State CEQA Guidelines recommend that an EIR should briefly describe the rationale for selecting the alternatives to be discussed, identify any alternatives that were considered by the lead agency but were rejected as infeasible, and briefly explain the reasons underlying the lead agency's determination (State CEQA Guidelines Section 15126.6[c]).

An EIR must also evaluate a "no-project" alternative, which represents "what would be reasonably expected to occur in the foreseeable future if the project were not approved, based on current plans and consistent with available infrastructure and community services." (State CEQA Guidelines Section 15126.6[e][2]).

The following are the significant environmental impacts of the proposed project that SAFCA seeks to eliminate or reduce through project alternatives:

- Conversion of important farmland to nonagricultural uses (direct and cumulative)
- Potential construction impacts on known prehistoric resources, discovery of human remains during construction, and damage to or destruction of previously undiscovered cultural resources (direct and cumulative)
- Temporary increase in traffic on local roadways during construction (direct)
- Effects on air quality with respect to short-term construction emissions: temporary emissions of reactive organic gases (ROG), oxides of nitrogen (NO_X), and respirable particulate matter with an aerodynamic diameter of 10 micrometers or less (PM_{10}) (direct and cumulative), and incremental contributions to greenhouse gas emissions (cumulative)

- Generation of short-term construction noise, exposure of sensitive receptors to or generation of excessive groundborne vibration or noise, and exposure of residents to increased traffic noise levels from hauling activity (direct and cumulative)

- Changes in scenic vistas, scenic resources, and existing visual character of the project area (direct and cumulative)

6.1.2 ALTERNATIVES SCREENING

6.1.2.1 PROJECT OBJECTIVES

The overall objectives of SAFCA's flood control improvement program, including the project analyzed in this EIR, are to:

(1) complete the projects necessary to provide 100-year protection for developed areas in the major floodplains of the Sacramento metropolitan area (Sacramento) 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.

The specific objectives of the project analyzed in this EIR are to:

(1) provide at least 100-year flood protection as quickly as possible while laying the groundwork to achieve at least "200-year" flood protection over time,

(2) use flood control projects in the vicinity of Sacramento International Airport (Airport) to facilitate changes in the management of Airport lands that reduce hazards to aviation safety, and

(3) use flood control projects to enhance habitat values by increasing the extent and connectivity of the lands in Natomas being managed to provide habitat for giant garter snake, Swainson's hawk, and other special-status species.

6.1.2.2 ALTERNATIVES FORMULATION PROCESS

SAFCA formulated the proposed project and a reasonable range of project alternatives intended to achieve the specific project objectives through the steps summarized in Section 2.1.3.1 in Chapter 2, "Project Description," and described below.

- **Identification of the deficiencies in the Natomas levee system that must be addressed to provide "200-year" flood protection.** In June 2005, SAFCA initiated its Natomas Levee Evaluation Program, which included extensive geotechnical explorations along the Natomas levees and along a proposed setback or backup levee alignment for the northern 5.5 miles of the Sacramento River east levee. SAFCA's study focused on the potential for seepage failure in a "200-year" flood event along the south levee of the Natomas Cross Canal (NCC), the Sacramento River east levee, and the north levee of the American River. Unresolved levee freeboard and streambank erosion issues affecting these levees were also evaluated to identify the scope of the improvements needed to safely contain the "200-year" flood.

- **Identification of the deficiencies that must be addressed to provide at least 100-year protection as quickly as possible.** To determine the magnitude of the problems with the Natomas levee system, SAFCA

also considered the potential for seepage failure in a 100-year flood event. The study determined that the NCC south levee, much of the Sacramento River east levee, and the Pleasant Grove Creek Canal (PGCC) west levee have the potential for failure in a 100-year event as a result of underseepage and, in some locations, through-seepage. In addition, all of the NCC south levee, many of the Sacramento River east levee reaches, and several sections of the PGCC west levee lack the required 3 feet of freeboard above the 100-year water surface profile. Using this information, SAFCA prioritized remedial efforts, focusing on those improvements necessary to achieve 100-year protection as quickly as possible.

- **Identification of feasible remedial measures to address the deficiencies.** Potential methods for providing underseepage mitigation are seepage berms (and combined seepage/stability berms when through-seepage is an issue in addition to underseepage), relief wells, and cutoff walls. As described in Section 2.3.2.1, "General Methods," in Chapter 2, "Project Description," the choice of seepage remediation is influenced by the depth and continuity of pervious soil layers, adjacent land use, environmental constraints, construction cost, construction schedule, and long-term maintenance capability.

  Of the three remediation methods, seepage berms are generally the preferred engineering method for addressing underseepage in the project area because they are the most reliable and the most adaptable to different geotechnical conditions (e.g., seismic groundshaking or revised design criteria). Relief wells require the least amount of construction disturbance but require routine maintenance and are the least reliable as a large-scale remediation method in the project area. Cutoff walls require little construction disturbance outside the levee footprint, provided that there is sufficient room for construction equipment, but they are often more costly than seepage berms and are less adaptable to changes in engineering standards. For most of the levee reaches studied, at least two seepage remediation options were considered feasible. SAFCA identified the optimal combination of remedial measures based on these engineering, geotechnical, land use, and environmental considerations.

- **Determination of the likely environmental impacts of the remedial measures.** The identification of the preferred combination of remedial measures included consideration of environmental effects. In some locations, the preliminary design was adjusted where relief well arrays could be substituted for seepage berms to preserve structures or substantial tree groves. Filling of the Elkhorn and Riverside Canals was identified as an unavoidable impact (see "Addition of measures to ensure that each alternative would improve aviation safety and enhance habitat values" below) that could be offset through project design features. The removal of many mature trees from the land side of the Sacramento River east levee was also identified as an unavoidable impact that could be partially offset through project design features.

- **Development of a reasonable range of flood control alternatives around the remedial measures.** Having identified the optimal combination of seepage remediation measures, SAFCA considered a range of feasible options for correcting levee freeboard deficiencies. A major consideration in the development of these options alternatives is the U.S. Army Corps of Engineers (USACE) policy that is under development that is described in Section 2.1.1.2, "Levee Encroachments and the Adjacent Setback Levee Concept," and Section 2.3.5.1, "Encroachment Management," in Chapter 2. Substantial encroachments are present on the Sacramento River east levee; therefore, consideration of the implications of emerging USACE policy was focused on the Sacramento River east levee. Another major consideration was the substantial and prolonged disruption of Garden Highway access that would be associated with raising the existing Sacramento River east levee in the freeboard-deficient reaches.

  The USACE policy could require the removal of vegetation greater than 2 inches in diameter on the levee slopes and within 15 feet of the waterside and landside levee toes and an assessment of the need for removal of encroachments on the levee slopes, including utilities, fences, structures, retaining walls, driveways, and other features that penetrate the levee prism, which are abundant on the Sacramento River east levee. Considering the Garden Highway access issues and recognizing that USACE acceptance that the system meets Federal Emergency Management Agency (FEMA) criteria for the 100-year level of protection may

require the removal of a substantial number of waterside slope encroachments and much woody vegetation from the water side of this levee by the end of 2010, SAFCA considered alternatives to raising the existing Sacramento River levee in place. Two basic options were identified: (1) constructing a new levee set back 500–1,000 feet from the existing levee that would replace the existing levee as the federal levee in the setback levee reaches, and (2) constructing a new "adjacent setback levee," consisting of a new levee crown and embankment adjoining the land side of the existing levee. Construction of a 500- to 1,000-foot setback levee or an adjacent setback levee would shift the jurisdictional levee landward, thereby providing more flexibility with respect to the management of structures and vegetation on the waterside slope of the existing levee. Consequently, the project alternatives considered involve combinations of three methods of addressing freeboard deficiencies on the Sacramento River east levee: raising the existing levee, constructing a levee set back 500–1,000 feet from the existing levee that would replace the existing levee in the reaches that are set back, and constructing an adjacent setback levee.

- **Addition of measures to ensure that each alternative would improve aviation safety and enhance habitat values.** Because of the proximity of the Elkhorn and Riverside Canals to the landside toe of the Sacramento River east levee, any option for addressing improvements to this levee would require relocation of these canals; even raising the existing levee to provide adequate freeboard above the 100-year flood elevation and providing a 3:1 horizontal-to-vertical (3H:1V) landside slope would require expanding the levee footprint into the existing canal alignment. Given the material quantities required for any of the Sacramento River east levee alternatives and other project components, substantial borrow activities are required for all alternatives. Borrow sites were selected for use in implementing any project alternative in accordance with the criteria outlined in Section 2.2.2, "Borrow Sites," in Chapter 2, "Project Description." To meet the three specific project objectives identified above, SAFCA, in coordination with Sacramento County Airport System (SCAS), developed the strategy of landscape modifications summarized in Section 2.1.3.2, "Planning of Project Elements to Meet Multiple Objectives," in Chapter 2. Although described in that section in relation to the needs of the proposed project, this strategy applies to any of the project alternatives.

6.1.2.3 PROJECT ALTERNATIVES CONSIDERED

Ability of Project Alternatives to Eliminate Significant Effects of the Proposed Project

As described in Chapter 2 and in Section 6.1.2.2 above, the proposed project was formulated with potential temporary and permanent environmental effects taken into consideration, and the proposed project was designed to be environmentally superior among the options available. No feasible action alternatives are available to meet the project objectives and eliminate or substantially reduce the significant effects of the proposed project identified above for the following reasons.

All feasible options to adequately correct the deficiencies of the Sacramento River east levee would widen the footprint of the flood control system itself both within the levee footprint and in the footprint of seepage berms, thereby converting Important Farmland to nonagricultural uses. In addition, all options would require a substantial amount of borrow material. For reasons of both project costs and reducing environmental effects, as discussed in Section 2.2.2, "Borrow Sites," in Chapter 2, the feasible sources of borrow are lands that The Natomas Basin Conservancy plans to convert to marsh and upland habitat and agricultural lands within the Natomas Basin. Therefore, any alternative would result in the conversion of a large acreage of agricultural land to nonagricultural uses, a significant and unavoidable impact.

Because the Natomas Basin is a floodplain area at the confluence of two major rivers, it is highly sensitive for prehistoric human burials and significant archaeological deposits. Some known cultural resources are very near the Sacramento River levee, and any levee repair work in these areas has the potential to significantly damage these sites. Furthermore, while site-specific avoidance measures can sometimes be taken to prevent the disturbance of known archaeological sites, any construction activity involving ground disturbance in the Natomas Basin has the potential to damage or destroy unknown burials or prehistoric deposits that may be significant

resources and therefore has the same potential as the proposed project to have a significant and unavoidable impact on cultural resources.

Under any project alternatives, large amounts of soil, gravel, and other materials would need to be imported to the various construction sites (NCC south levee, Sacramento River east levee, PGCC west levee, new canal alignments, and other project sites) and would involve large volumes of truck traffic on area roadways. Under all alternatives, the NCC south levee improvements alone would require 400–500 truck trips per day for borrow delivery. This amount of haul traffic in itself is likely to exceed the screening criterion of the Institute of Transportation Engineers (ITE) that is used as the significance threshold for impact analysis (the addition of 50 truck trips per hour during the a.m. or p.m. peak hour). The proposed project is estimated to require 980–1,050 truck trips per day for delivery of construction materials to the Sacramento River east levee improvement sites. Some alternatives would require less material and, therefore, less truck traffic; however, the haul traffic would remain very high in comparison to existing traffic levels, would be likely to exceed the significance threshold, and would be considered a significant and unavoidable impact.

Because of the large quantities of borrow required for any project alternative and the amount of construction equipment involved in any alternative for the needed levee improvements, air quality emissions would be well above the significance thresholds established by the applicable air districts under any project alternative. Several sensitive receptors are near borrow sites and haul routes, and any method of implementing the necessary improvements to the Sacramento River east levee would involve construction work near residences that are very close to the levee and therefore subject to potentially significant and unavoidable noise disturbance.

All feasible options for improving the Sacramento River east levee would require the removal of mature trees from the landside levee toe, a significant and unavoidable visual resource impact.

Alternatives Considered and Rejected

As described above, the project alternatives identified for consideration differ in the manner in which freeboard deficiencies on the Sacramento River east levee are addressed. The following alternatives were considered but were rejected from detailed consideration:

- **Raise Existing Sacramento River East Levee.** Improving the existing Sacramento River east levee without constructing either an adjacent setback levee or a levee setback farther east of the existing levee would result in the need to apply USACE policy regarding levee encroachments and vegetation removal to this levee. It is likely that a substantial number of encroachments may be determined to reduce the integrity of the levee or increase flood risk unacceptably and would need to be removed. Disputes with landowners over the legal implications of removing appurtenant structures can be expected, and removal would likely take several years to achieve because of environmental and legal issues. An estimated 35 acres of trees also may need to be removed from the water side of the levee and within 15 feet of the levee toe. Removal would trigger significant mitigation requirements that could be difficult, if not impossible, to complete. To adequately replace the habitat and aesthetic value of these trees, replacement would need to occur in a similar waterside location along the Sacramento River levee system. It is unknown where sufficient acreage is available to implement such replacement in a manner that would be acceptable to the USACE. In addition, it would be very difficult or impossible to compensate for the likely loss of a number of trees that are preferred Swainson's hawk nest sites along the edge of the Natomas Basin. For these reasons, an alternative that includes raising the Sacramento River east levee in place, without a setback levee, was rejected from detailed consideration in this EIR.

- **Set Back Up To 5 Miles of the Sacramento River East Levee.** SAFCA previously considered setting back up to 5 miles of the upper reaches of the Sacramento River east levee. However, a levee setback of more than the upper approximately 1.4 miles is complicated by (1) the presence of waterside residences along the existing levee from approximately Station 90+00 in the north to the American River north levee in the south,

and the need to maintain access to these residences from Garden Highway, and (2) the proximity of the Sacramento River east levee to the Airport, and the need to prevent project features from increasing potential hazards to aviation safety. SCAS has previously expressed objections to consideration of a levee setback within the 10,000-foot Airport Critical Zone because of the potential that the setback area, which would likely hold shallow water during winter and spring, could attract wildlife that would increase hazards to aircraft. For these reasons, a setback levee of more than 1.4 miles was rejected from detailed consideration in this EIR.

Alternatives Carried Forward in This EIR

The following alternatives were considered and carried forward for detailed analysis in this EIR:

- **Construct an Adjacent Setback Levee along the Sacramento River East Levee.** This alternative is the proposed project, carried forward in this EIR as Alternative 1.

- **Raise Levee in Place with a 1,000-Foot Levee Setback in the Upper 1.4 Miles along the Sacramento River East Levee.** This alternative would provide a location for a substantial amount of tree planting on the water side of the levee (i.e., the "levee setback" area), thereby partially offsetting the trees that may need to be removed along the existing levee to meet USACE criteria. This alternative is analyzed below as Alternative 2.

- **Construct an Adjacent Setback Levee with a 500-Foot Levee Setback in the Upper 1.4 Miles along the Sacramento River East Levee.** This alternative would provide the opportunity for partially offsetting the loss of landside tree groves through the establishment of new riparian plantings in the levee setback area as well as woodland plantings on the land side of the adjacent setback levee. This alternative is analyzed below as Alternative 3.

- **No-Project Alternative—No Flood Control Improvements in Natomas.** Consideration of a no-project alternative is required under CEQA. Under this alternative, it is assumed that under this alternative, the Natomas Basin flood control system would not be improved. This alternative is analyzed below as Alternative 4.

- **No SAFCA Levee Improvements—Private Levees in Natomas.** Developers in the Natomas Basin may choose to separately fund individual flood protection in the form of private compartment levees that would protect the new developments. This alternative is analyzed below as Alternative 5.

Alternatives 1 through 5 are described in the following section. The environmental effects of the alternatives are compared in Section 6.3.

6.2 DESCRIPTION OF ALTERNATIVES CARRIED FORWARD FOR EVALUATION IN THE EIR

6.2.1 ALTERNATIVE 1: PROPOSED PROJECT

The proposed project is described in detail in Chapter 2. The elements of the proposed project for all 3 years of construction (2008–2010) can be summarized as follows:

- **Levee raising and seepage remediation: NCC south levee**—Raise and realign the NCC south levee to provide additional freeboard and more stable waterside and landside slopes and to reduce the need for removal of waterside vegetation. Construct a seepage cutoff wall through the levee crown in Reaches 3–7.

- **Levee raising and seepage remediation: Sacramento River east levee**—Construct an adjacent setback levee from the NCC to the American River north levee, raised where needed to provide adequate freeboard, with seepage berms, relief wells, and cutoff walls for seepage remediation as required.

- **Levee raising and seepage remediation: PGCC west levee**—Raise levee, flatten waterside and landside slopes, and construct seepage berms along the PGCC west levee (specific berm widths and potential use of cutoff walls in some areas to be determined).

- **Improvements to major irrigation and drainage infrastructure**—Construct a new canal designed to provide drainage and associated giant garter snake habitat (the "GGS/Drainage Canal") between the North Drainage Canal and the West Drainage Canal, and improve the West Drainage Canal to provide enhanced giant garter snake habitat. Implement Airport West Ditch improvements in connection with construction of the GGS/Drainage Canal to allow the Airport to decommission the agricultural irrigation function of this facility and eliminate the hazards currently associated with it. The airport stormwater detention function provided by this ditch would continue. The ditch would therefore be recontoured as a gently sloping swale to facilitate periodic maintenance such as mowing. Relocate the Elkhorn Canal (highline irrigation canal) and the Riverside Canal. Remove a deep culvert at the location of Pumping Plant No. 2, and reconstruct Reclamation District (RD) 1000 Pumping Plant No. 2.

- **Habitat creation and management**—Establish habitat enhancements in the new GGS/Drainage Canal and improved West Drainage Canal. Recontour and create managed marsh and grassland on lands used as borrow sources. Establish grassland on the adjacent setback levee slopes and seepage berms. Install woodland plantings to offset the loss of portions of tree groves in the landside levee footprint.

- **Additional actions to meet FEMA requirements**—Remove encroachments from a portion of the water side and land side of the Sacramento River east levee as needed to ensure that the levee can be certified as meeting the minimum requirements of the National Flood Insurance Program (NFIP) and USACE design criteria (specific criteria still under discussion). Modify the State Route (SR) 99/70 crossing of the NCC as needed to meet FEMA requirements.

- **Right-of-way acquisition**—Acquire right-of-way through fee title or easement interest within the footprint of the project features, at the borrow sites, and to prevent encroachments into the flood control system.

The proposed project would meet all the project objectives, as described in Section 2.4 in Chapter 2.

6.2.2 Alternative 2: Raise Levee in Place with a 1,000-Foot Levee Setback in the Upper 1.4 Miles along the Sacramento River East Levee

6.2.2.1 Differences Between Alternative 2 and the Proposed Project

All elements of Alternative 2 for the 3 years of construction (2008–2010) would be the same as described in Section 6.2.1 for the proposed project except for levee raising and seepage remediation with respect to the Sacramento River east levee, proposed habitat creation, and removal of encroachments from the Sacramento River east levee (differences from the proposed project are shown in italicized text):

- **Levee raising and seepage remediation: Sacramento River east levee**—*Set back 1.4 miles of the Sacramento River east levee by 1,000 feet in Reaches 1 and 2 (from approximately Station 5+00 to Station 88+00) and construct a 100-foot seepage berm along the setback levee. Raise the existing levee from the southern end of the setback levee through Reach 11B, and construct seepage berms, relief wells, and cutoff walls for seepage remediation as required from the southern end of the setback levee through Reach 20B.*

- **Habitat creation and management**—Establish habitat enhancements in the new GGS/Drainage Canal and improved West Drainage Canal. Recontour and create managed marsh and grassland on lands used as borrow sources. Establish grassland on the adjacent setback levee slopes and seepage berms. *Install woodland plantings to offset the loss of portions of tree groves in the landside levee footprint. Install approximately 150*

acres of trees in the levee setback area to offset the removal of trees from the water side of the existing levee to meet USACE design criteria (see below).

- **Additional actions to meet FEMA requirements**—*Remove substantial encroachments from the water side and land side of the Sacramento River east levee to ensure that the levee can be certified as meeting the minimum requirements of the NFIP and USACE design criteria* (specific criteria still under discussion). Modify the SR 99/70 crossing of the NCC as needed to meet FEMA requirements.

6.2.2.2 GENERAL FEATURES OF ALTERNATIVE 2

Under Alternative 2, SAFCA would correct the freeboard deficiencies and seepage potential of the Sacramento River east levee by:

(1) constructing a setback levee with a 100-foot-wide seepage berm from approximately Station 5+00 in Reach 1 to Station 88+00 in Reach 2 that would be approximately 1,000 feet east of the existing levee alignment at its farthest point (Exhibit 6-1),

(2) raising the existing levee from approximately Station 88+00 in Reach 2 through Station 635+00 at the southern end of Reach 11B to provide sufficient freeboard to contain the "200-year" flood, and

(3) constructing the same seepage remediation described for the proposed project (combination of seepage berms, cutoff walls, and relief wells) from approximately Station 88+00 in Reach 2 to Station 925+50 at the end of Reach 20A (no seepage remediation is needed in Reach 20B).

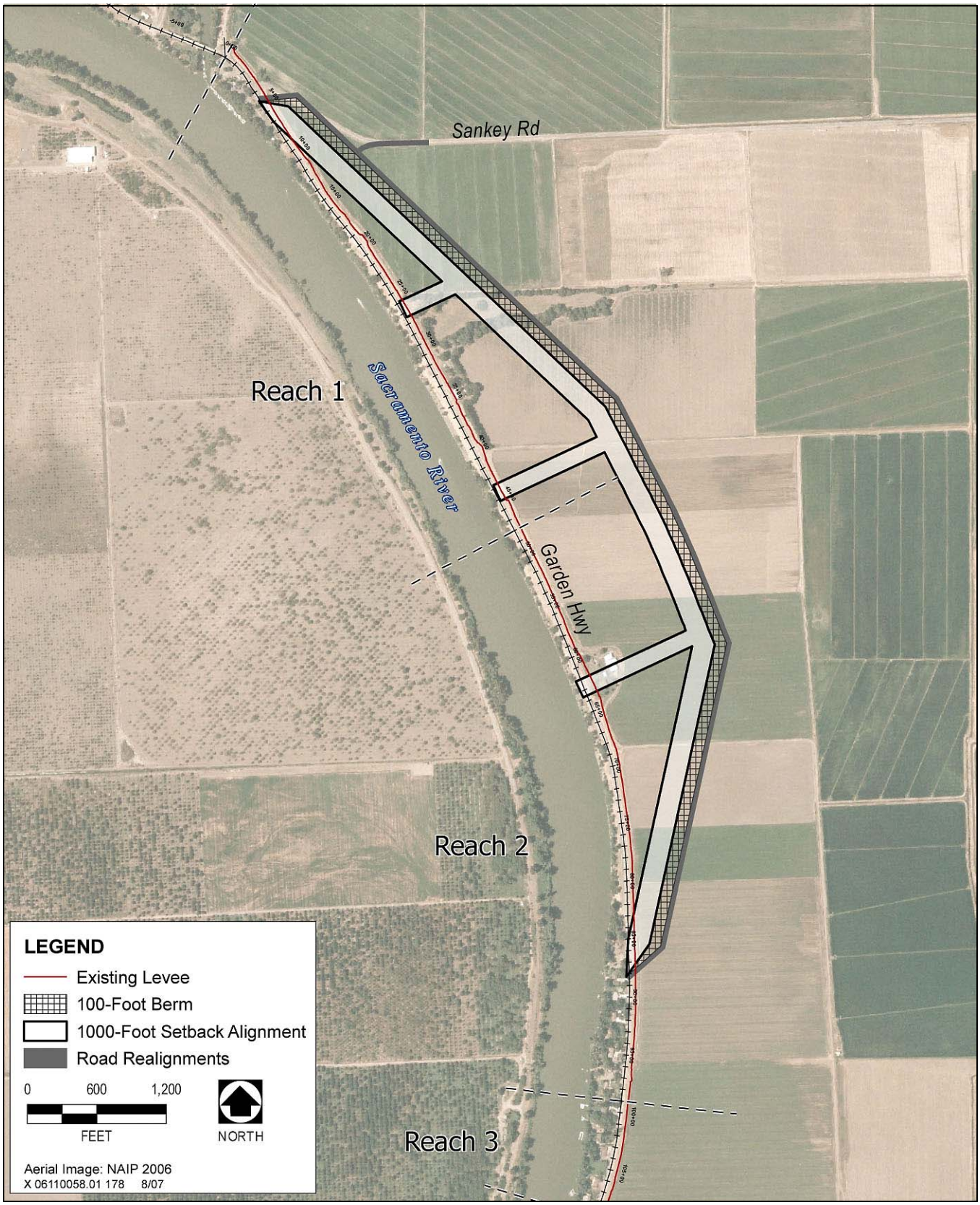
The setback levee would be constructed with 3H:1V waterside and landside slopes and with sufficient freeboard to contain the "200-year" flood. Raising the existing levee would also include flattening the landside slope to a 3H:1V backslope. A maintenance road would extend along the land side of the levee.

Garden Highway would be moved to the land side of the setback levee, east of the seepage berm and maintenance access. The landside section of roadway would reconnect to Garden Highway in the north at the proposed realignment of the Sankey Road intersection (Station 5+00), and in the south at the end of the setback levee (Station 88+00).

The setback levee would need to be designed such that it would not alter the flow split between the Yolo Bypass and the Sacramento River and therefore would not alter river hydraulics. Preliminary modeling has shown that "cross levees," consisting of levee sections constructed perpendicular to the main levee, would prevent additional flows from being conveyed through the levee setback area and down the Sacramento River channel, altering the hydraulic balance of the system. Exhibit 6-1 illustrates the setback levee concept with three cross levees forming four cells. Once the setback levee is constructed, the existing levee would be breached in several places between the cross levees to allow the cells to fill with shallow water in winter and spring, creating backwater areas that could enhance fish habitat and riparian habitat.

Construction of the setback levee would reduce the need to address ongoing erosion problems in the upper reaches of the Sacramento River east levee.

To meet USACE requirements, a substantial number of structural features may need to be removed from the water side of the existing levee. In addition, implementation of this alternative would require the removal of trees from the water side of the levee, totaling as much as approximately 35 acres, in addition to 12 acres of trees that would need to be removed from the levee and berm footprint on the land side, for a total loss of 45 acres of woodland. Approximately 270 acres of trees would be planted as replacement at a 6:1 ratio, with about 150 acres planted in the levee setback area (i.e., between the setback levee and the existing levee alignment) and another 120 acres of trees would be planted along the land side of the levee, as described conceptually for the proposed project.



Sources: HDR 2007, EDAW 2007

Concept Plan for a 1,000-Foot Setback Levee under Alternative 2 **Exhibit 6-1**

6.2.2.3 CONSTRUCTION PLAN FOR ALTERNATIVE 2

The general construction activities for Alternative 2 and the sequence of construction activities would be similar to those described for the proposed project. Construction of the NCC south levee improvements, PGCC west levee improvements, and improvements to major infrastructure would be the same as described for the proposed project, and habitat creation at borrow sites and in the GGS/Drainage Canal would be the same or very similar (the area of disturbance for borrow would differ somewhat and, therefore, the acreage of subsequent habitat creation may differ). Construction material quantities and equipment use for the Sacramento River east levee improvements would be similar to those described for the proposed project. Table 6-1 shows the quantities of each material type that would be used for construction of the Sacramento River east levee improvements under this alternative, along with the haul trips per day assuming a nearby random fill source and construction conducted 12 hours per day. Some of the random fill for the setback levee and cross levees would be available from degradation of the existing levee in Reaches 1 and 2.

Construction of the setback levee and relocation of Garden Highway along the land side of the setback levee would be completed before portions of the existing levee in the levee setback reaches would be degraded. The construction work would be divided so that approximately equal amounts of construction work would take place each year.

Table 6-1
Estimated Material Quantities and Truck Trips Required for Alternative 2

Material Type	Quantity (cubic yards)	Haul Trips per Day
Random Fill	1,722,000	1,460
Select Fill	1,310,000	1,400
Reusable Fill	264,000	220
Drain Rock	294,000	270
Aggregate Base[1]	131,400	160
Asphalt Concrete[1]	65,800	90
Temporary Aggregate Base[2]	47,400	60
Temporary Asphalt Concrete[2]	12,000	30
Total	**3,846,600**	**3,690**

Notes:
[1] For relocation of Garden Highway along the land side of the 1,000-foot setback levee.
[2] For temporary relocation of sections of Garden Highway during improvements to the existing levee.
Source: Estimates provided by HDR in 2007

Table 6-2 compares Alternative 2 to the proposed project in terms of the overall quantity of material and the number of haul trips that would be required. Because the raised existing levee under Alternative 2 would have a narrower footprint than the adjacent setback levee, this alternative would require approximately 19% less material and 9% fewer haul trips than the proposed project.

Table 6-2 Comparison of Material Quantities and Haul Trips between Alternative 2 and the Proposed Project		
	Proposed Project	Alternative 2
Quantity of Material (cubic yards)	4,729,800	3,846,600
% Difference from Proposed Project	–	-19%
Number of Haul Trips	4,040	3,690
% Difference from Proposed Project	–	-9%
Source: Data provided by HDR and EDAW in 2007		

6.2.2.4 ABILITY TO MEET PROJECT OBJECTIVES

Alternative 2 would meet the second and third specific project objectives listed in Section 6.1.2.1 for the reasons described for the proposed project in Section 2.4 in Chapter 2. However, improving the existing Sacramento River levee in place is unlikely to provide the same level of assurance as the proposed project that the USACE will accept that the flood control system meets FEMA criteria for the 100-year level of protection. This is because of (1) the uncertainties about future requirements for encroachment and vegetation removal, (2) the substantial amounts of encroachments and large woody vegetation on the water side of the existing Sacramento River east levee, (3) uncertainties about the logistics and timing of removal of structural encroachments from the water side of the levee, and (4) uncertainties about being able to provide acceptable offsets for the loss of woody vegetation, including Swainson's hawk nest trees, along the water side of the existing levee.

6.2.3 ALTERNATIVE 3: CONSTRUCT AN ADJACENT SETBACK LEVEE WITH A 500-FOOT LEVEE SETBACK IN THE UPPER 1.4 MILES ALONG THE SACRAMENTO RIVER EAST LEVEE

6.2.3.1 DIFFERENCES BETWEEN ALTERNATIVE 3 AND THE PROPOSED PROJECT

All elements of Alternative 3 for the 3 years of construction (2008–2010) would be the same as described in Section 6.2.1 for the proposed project except for levee raising and seepage remediation with respect to a portion of the Sacramento River east levee, and proposed habitat creation (differences from the proposed project are shown in italicized text):

- **Levee raising and seepage remediation: Sacramento River east levee**—*Set back 1.4 miles of the Sacramento River east levee by 500 feet in Reaches 1 and 2 (from approximately Station 5+00 to Station 88+00) and construct a 100-foot seepage berm along the setback levee. Construct an adjacent setback levee from the southern end of the setback levee* to the American River north levee, raised where needed to provide adequate freeboard, with seepage berms, relief wells, and cutoff walls for seepage remediation as required.

- **Habitat creation and management**—Establish habitat enhancements in the new GGS/Drainage Canal and improved West Drainage Canal. Recontour and create managed marsh and grassland on lands used as borrow sources. Establish grassland on the adjacent setback levee slopes and seepage berms. Install woodland plantings *in the levee setback area and on the land side of the levee* to offset the loss of portions of tree groves in the landside levee footprint.

6.2.3.2 GENERAL FEATURES OF ALTERNATIVE 3

Under Alternative 3, SAFCA would correct the freeboard deficiencies and seepage potential of the Sacramento River east levee by:

(1) constructing a setback levee with a 100-foot-wide seepage berm from approximately Station 5+00 in Reach 1 to Station 88+00 in Reach 2 that would be approximately 500 feet east of the existing levee alignment at its farthest point (Exhibit 6-2);

(2) constructing an adjacent setback levee from approximately Station 88+00 in Reach 2 to the end of Reach 20A, raised where necessary to provide sufficient freeboard to contain the "200-year" flood; and

(3) constructing the same seepage remediation described for the proposed project (combination of seepage berms, cutoff walls, and relief wells) from approximately Station 88+00 in Reach 2 to Station 925+50 at the end of Reach 20A (no seepage remediation is needed in Reach 20B).

The configuration of the setback levee, seepage berm along the setback levee, and Garden Highway would be as described above for Alternative 2, except that the levee would be set back 500 feet to reduce the loss of farmland on the land side of the setback levee in comparison with Alternative 2. As described for Alternative 2, the setback levee would need to be designed such that it would not alter the flow split between the Yolo Bypass and the Sacramento River and therefore would not alter river hydraulics. Cross levees would be used to prevent additional flows from being conveyed through the levee setback area and down the Sacramento River channel, altering the hydraulic balance of the system. Exhibit 6-2 illustrates the setback levee concept with three cross levees forming four cells.

Under Alternative 3, approximately 25 acres of woodland would be lost from construction of the adjacent setback levee and setback levee. Approximately 150 acres of woodland would be created as replacement at a 6:1 ratio, with approximately 70 acres of the trees planted between the setback levee and the existing levee and approximately 80 acres planted on the land side along the levee system.

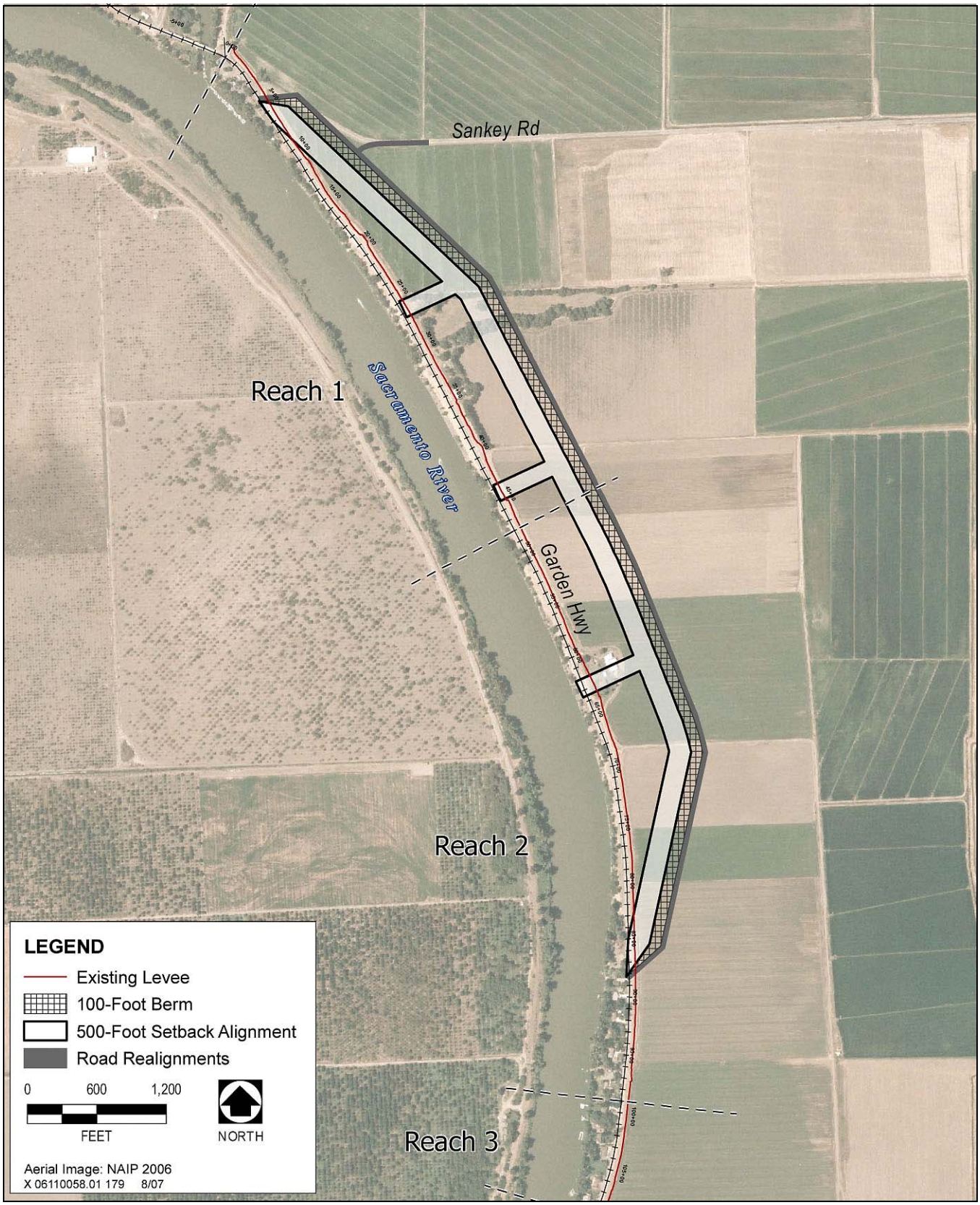
6.2.3.3 CONSTRUCTION PLAN FOR ALTERNATIVE 3

The general construction activities for Alternative 3 and the sequence of construction activities would be similar to those described for the proposed project. Construction of the NCC south levee improvements, PGCC west levee improvements, and improvements to major infrastructure would be the same as described for the proposed project, and habitat creation at borrow sites and in the GGS/Drainage Canal would be the same or very similar (the area of disturbance for borrow would differ somewhat and, therefore, the acreage of subsequent habitat creation may differ). Construction material quantities and equipment use for the Sacramento River east levee improvements would be similar to those described for the proposed project. Table 6-3 shows the quantities of each material type that would be used for construction of the Sacramento River east levee improvements under this alternative, along with the haul trips per day assuming a nearby random fill source and construction conducted 12 hours per day. Some of the random fill for the setback levee and cross levees would be available from degradation of the existing levee in Reaches 1 and 2.

Table 6-3
Estimated Material Quantities and Truck Trips Required for Alternative 3

Material Type	Quantity (cubic yards)	Haul trips per Day
Random Fill	4,179,000	3,500
Reusable Fill	513,000	450
Drain Rock	528,000	460
Aggregate Base[1]	38,500	55
Asphalt Concrete[1]	5,500	10
Total	**5,264,000**	**4,475**

Notes:
[1] For relocation of Garden Highway to the land side of the 500-foot setback levee.
Source: Estimates provided by HDR in 2007



Sources: HDR 2007, EDAW 2007

Concept Plan for a 500-Foot Setback Levee under Alternative 3 **Exhibit 6-2**

Table 6-4 compares Alternative 3 to the proposed project in terms of the overall quantity of material that would be required and the number of haul trips. Because the setback levee in Reaches 1 and 2 would have a greater footprint than the adjacent setback levee in these reaches, this alternative would require approximately 11% more material and 11% more haul trips than the proposed project.

Table 6-4
Comparison of Material Quantities and Haul Trips between Alternative 3 and the Proposed Project

	Proposed Project	Alternative 3
Quantity of Material (cubic yards)	4,729,800	5,264,000
% Difference from Proposed Project	–	11%
Number of Haul Trips	4,040	4,475
% Difference from Proposed Project	–	11%
Source: Data provided by HDR and EDAW in 2007		

6.2.3.4 ABILITY TO MEET PROJECT OBJECTIVES

Alternative 3 would meet all the specific project objectives listed in Section 6.1.2.1 for the reasons described for the proposed project in Section 2.4 in Chapter 2.

6.2.4 ALTERNATIVE 4: NO-PROJECT ALTERNATIVE—NO FLOOD CONTROL IMPROVEMENTS IN NATOMAS

Under this alternative, SAFCA would not provide the Natomas Basin with at least a 100-year level of flood protection by the end of 2010 and would not be able to facilitate achieving a "200-year" level of protection by the end of 2012. None of the flood control improvements or related habitat enhancements previously described in this EIR would be implemented.

Federal floodplain regulations would prevent the Natomas Basin from absorbing new development as currently anticipated in the regional blueprint for future (2030) growth adopted by the Sacramento Area Council of Governments (Sacramento Area Council of Governments and Valley Vision 2006). As a result, up to 60,000 dwelling units and associated commercial and industrial developments may be redirected to other areas in the region over the next 2 decades.

Under the No-Project Alternative, Sacramento County would, if deemed necessary for economic reasons, continue to contract with tenant farmers to grow crops on Airport bufferlands that would be used for borrow material under the proposed project and action alternatives. Crops would be cultivated in accordance with the provisions of the Airport wildlife hazard management plan required by the Federal Aviation Administration and the *Airport Resource Management Plan*, a voluntary internal guidance document. Farmers would continue to submit annual crop plans to Sacramento County, and those crop plans would be reviewed and approved pursuant to the provisions of these plans.

The No-Project Alternative would not meet any of the project objectives. SAFCA would not provide 100-year flood protection to the Natomas Basin or lay the groundwork for "200-year" flood protection over time. Landscape changes in the Airport bufferlands that could reduce hazardous wildlife presence near the Airport Operations Area would not occur, and the modifications to irrigation and drainage infrastructure that would allow the Airport to decommission the Airport West Ditch would not occur; therefore, hazards to aviation safety would not be reduced. The extent and connectivity of the lands in Natomas being managed to provide habitat for giant

garter snake, Swainson's hawk, and other special-status species habitat for special-status species in the basin would not be increased.

6.2.5 ALTERNATIVE 5: NO SAFCA LEVEE IMPROVEMENTS—PRIVATE LEVEES IN NATOMAS

Under this alternative, SAFCA would not provide the Natomas Basin with at least a 100-year level of flood protection by the end of 2010 and would not be able to facilitate achieving a "200-year" level of protection by the end of 2012. None of the flood control improvements or related habitat enhancements previously described in this EIR would be implemented. However, some of the new developments being planned for the Natomas Basin may choose to separately fund individual flood protection in the form of private compartment levees that would protect the new developments. These levees would be costly to construct but would provide the affected developments with at a least a 100-year level of flood protection. Assuming the protected areas could meet the minimum requirements of the NFIP, they would obtain relief from federal regulations through revisions to the Natomas Basin's floodplain map. Exhibit 6-3 shows a concept plan for protecting current and anticipated future development projects in the Natomas Basin with a compartment levee and developer-funded enhancement of existing levees. Although this approach is still conceptual in nature and has not been submitted as a formal plan or application, it demonstrates that developers are pursuing alternatives in the event that public agency sponsored flood control projects are not initiated in a timely manner. The concept plan depicted in Exhibit 6-3 would require an estimated 8 million cubic yards of borrow material, assuming that the levee would need to be approximately 25 feet high and have 3:1 side slopes to meet USACE criteria.

This alternative would partially meet the first project objective by providing 100-year protection to a portion of the Natomas Basin, but would not provide 100-year flood protection to the remainder of the Natomas Basin or lay the groundwork for "200-year" flood protection for the basin over time. The alternative would not meet the second or third project objectives. Landscape changes in the Airport bufferlands that could reduce hazardous wildlife presence near the Airport Operations Area would not occur, and the modifications to irrigation and drainage infrastructure that would allow the Airport to decommission the Airport West Ditch would not occur; therefore, hazards to aviation safety would not be reduced. The extent and connectivity of the lands in Natomas being managed to provide habitat for giant garter snake, Swainson's hawk, and other special-status species habitat for special-status species in the basin would not be increased. It is likely that connectivity of habitat would be substantially and adversely affected by construction of a compartment levee.

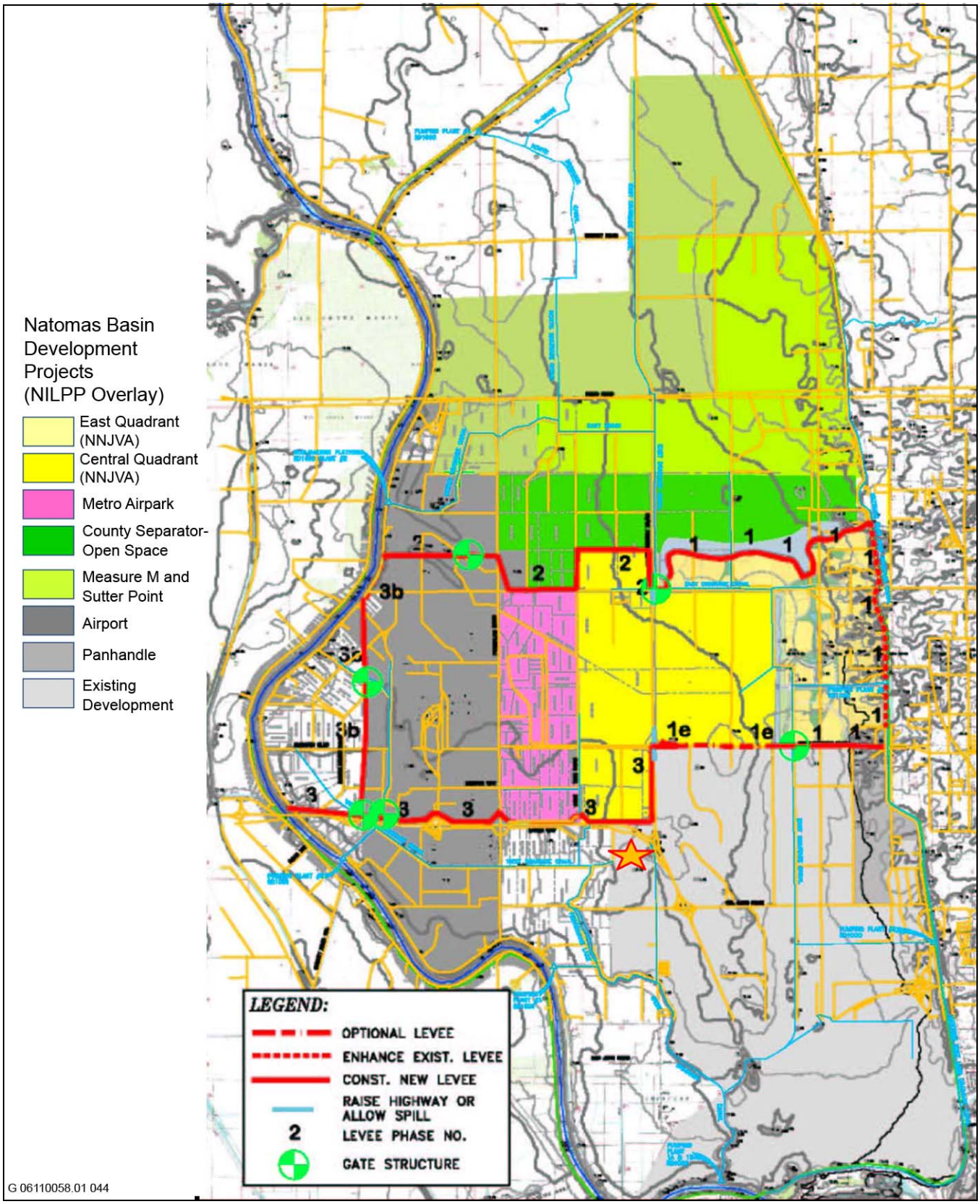
6.3 ENVIRONMENTAL EFFECTS OF THE ALTERNATIVES

6.3.1 ENVIRONMENTAL EFFECTS OF THE PROPOSED PROJECT

The potential environmental effects of the proposed project are described in Chapter 3, "Environmental Setting, Impacts, and Mitigation." See Sections 3.2–3.16 for detailed descriptions of potential effects of the proposed project.

6.3.2 ENVIRONMENTAL EFFECTS OF ALTERNATIVE 2

Implementation of Alternative 2 would not eliminate any of the significant environmental effects of the project but would reduce impacts related to air quality in comparison with the proposed project. Most impacts of Alternative 2 would be the same as, or very similar to, the impacts of the proposed project and, for this reason, are described in comparison with those of the proposed project. A summary of the relative intensity of the impacts of Alternative 2 compared with that of the impacts of the proposed project is provided at the end of each resource topic discussion below.



Source: Civil Engineering Solutions, Inc.

Natomas Compartment Levee Concept **Exhibit 6-3**

Agriculture and Land Use: Alternative 2 would not conflict with any applicable land use plan, policy, or regulation. The raised portion of the Sacramento River east levee under Alternative 2 would have a smaller footprint than the adjacent setback levee under the proposed project. However, construction of the setback levee would convert a 150-acre area of Important Farmland to nonagricultural use, resulting in a greater farmland conversion than under the proposed project. The same mitigation described for the proposed project would apply, but the significant conversion of farmland would remain significant and unavoidable. [Greater]

Geology and Soils: Alternative 2 would involve types of levee and canal construction similar to those described for the proposed project. The risk of construction-related erosion impacts under this alternative would be the same as described for the proposed project. The risk of potential damage to proposed levee improvements from seismic activity, settlement, or liquefaction, or from construction on unstable soils or expansive soils under this alternative would be the same as described for the proposed project. Therefore, this alternative would present the same less-than-significant risks associated with geologic hazards as the proposed project. [Similar]

Hydrology and Hydraulics: Because the 1,000-foot setback levee would be designed to maintain the same flow split between the Yolo Bypass and the Sacramento River as under existing conditions, Alternative 2 would have the same hydraulic profile as the proposed project. Alteration of drainage patterns from disruption of drainage systems during construction and shallow excavation of soil from large parcels would be similar to the effects described for the proposed project. These potential effects would be significant, and the same mitigation described for the proposed project would apply and would reduce the impact to a less-than-significant level. [Similar]

Water Quality: Alternative 2 would involve the same types of construction activities as the proposed project and would have the same potential for soil erosion, sedimentation of local drainages and waterways, and accidental spills of construction-related substances. Potential effects on water quality associated with the use of relief wells would be the same as described for the proposed project, and mitigation would be the same and would reduce impacts to a less-than-significant level. [Similar]

Fisheries and Aquatic Resources: Construction of this alternative would result in the same potential impacts on fish habitat described for the proposed project, and the same mitigation would apply to reduce potential impacts to a less-than-significant level. Setting back the upper portion of the Sacramento River east levee would also provide habitat benefits for fish. [Similar]

Terrestrial Biological Resources: Under Alternative 2, effects on terrestrial biological resources associated with the Sacramento River east levee improvements would be substantially different from those described for the proposed project. These differences result from incorporation of the 1,000-foot setback levee in the north and absence of an adjacent setback levee in the remainder of the reaches. The levee setback would convert approximately 10 additional acres of rice (giant garter snake habitat) and 100 acres of generally high-quality agricultural foraging habitat for Swainson's hawk to nonagricultural uses.

As much as 35 acres of riparian woodland on the water side in Reaches 4B–19 may require removal to conform with USACE guidance. In addition to its overall value as habitat for various species, this woodland supports active Swainson's hawk nests, elderberry shrubs, and other important biological resources. Adverse effects on these resources on the water side of the levee would be greater than adverse effects from the adjacent setback levee footprint on the land side of the levee, both in terms of the acreage of habitat lost and the quality of that habitat. Overall, adverse effects on terrestrial biological resources resulting from implementation of Alternative 2 would be substantially greater than those of the proposed project. Mitigation described for the proposed project would apply to this alternative as well; however, it is uncertain whether adequate mitigation could be developed to compensate for the loss of waterside vegetation, including Swainson's hawk nest trees. The resulting impacts may be significant and unavoidable. [Greater]

Cultural Resources: Alternative 2 would be similar to the proposed project in terms of alterations of contributing elements of RD 1000, which is eligible for inclusion on the National Register of Historic Places (NRHP). It would

also involve the same kinds of ground-disturbing impacts in the same areas that could affect prehistoric resources. Therefore, the impacts and mitigation measures described for the proposed project would apply to Alternative 2 as well. Potential impacts on cultural resources would be significant and unavoidable. [Similar]

Paleontological Resources: Alternative 2 would include excavations in the same areas of Riverbank or Modesto Formations described for the proposed project that could damage unknown, subsurface unique paleontological resources. This potential impact would be the same as described for the proposed project and would be significant. The same mitigation would apply to reduce the potential impact to a less-than-significant level. [Similar]

Transportation and Circulation: Under Alternative 2, construction-related trips on local roadways during peak construction periods would be somewhat lower than the peak traffic under the proposed project. However, increases in traffic associated with Alternative 2 would likely exceed the thresholds based on ITE guidance for temporary traffic increases. In addition, raising the existing Sacramento River east levee in place would require lane or road closures along portions of Garden Highway for prolonged periods during construction, causing traffic and access delays that would be greater than those described for the proposed project. The same mitigation would apply, but impacts would remain significant and unavoidable. [Greater]

Air Quality: Because this alternative requires about 9% fewer construction-related trips, temporary emissions of ROG, NO_X, and PM_{10} would be slightly reduced compared to the proposed project. However, mitigated emissions of these criteria pollutants would still exceed district-recommended significance thresholds. As under the proposed project, this alternative would not cause long-term changes in these emissions or cause exposure of sensitive receptors to toxic air emissions. Overall, the impacts of Alternative 2 would be similar to, but somewhat less than, the impacts of the proposed project. [Less]

Noise: Under this alternative, construction activities would be similar to those for the proposed project and could generate noise levels that exceed the local noise standards for stationary sources at nearby sensitive receptors in all construction seasons. Because Alternative 2 involves raising the existing Sacramento River east levee in place rather than constructing the adjacent setback levee, noise impacts would be greater for residents living along Garden Highway. As under the proposed project, residences adjacent to the proposed haul routes would also be exposed to higher noise levels from truck traffic. This alternative would have the same effect on groundborne vibration and noise as the proposed project because the reconstruction of Pumping Plant No. 2 would be the same. Overall, the noise impacts of Alternative 2 would be similar to but somewhat greater than those of the proposed project. [Greater]

Recreation: Temporary changes in recreational opportunities during project construction for Alternative 2 would be similar to those described for the proposed project, although reconstruction of the Sacramento River east levee crown would require sequential closing of sections of Garden Highway, which would likely inconvenience recreational travelers somewhat more. Because Alternative 2 would include a seepage berm at the Costa Park site, this alternative would also be similar to the proposed project in terms of encroachment on parkland. The mitigation for this significant impact would be the same as described for the proposed project and would reduce the impact to a less-than-significant level. Recreation impacts under Alternative 2 would be similar to those under the proposed project. [Similar]

Visual Resources: The impacts of Alternative 2 on visual resources would be similar to those of the proposed project on the land side of the Sacramento River east levee where trees would need to be removed. The modifications of the levee system would not substantially affect scenic vistas. However, the removal of large amounts of vegetation from the water side of the levee to comply with USACE criteria would substantially reduce aesthetic values. This alternative would have a greater significant and unavoidable impact than the proposed project. [Greater]

Utilities and Service Systems: Alternative 2 would be similar to the proposed project in terms of the potential to cause temporary disruption of irrigation supply during construction along the NCC and Sacramento River east levee. Utility service could be substantially disrupted during relocation or as a result of accidental damage during construction activity. Project construction would not generate construction waste materials that would exceed the capacity of local landfills or fail to comply with solid waste statutes and regulations. The same mitigation measures described for the proposed project would apply to this alternative and would reduce impacts to a less-than-significant level. [Similar]

Hazards and Hazardous Materials: Alternative 2 would be similar to the proposed project in terms of the potential for spills of hazardous materials during construction and exposure to hazardous materials that could be encountered at construction sites. Flood control improvements and canal construction at the Yuki Farm site would pose the same potential risks of encountering hazardous substances described for the proposed project. Lighting of construction sites at night could interfere with aircraft landing operations and pose a safety hazard, as described for the proposed project. Because elements related to use of borrow material and creation of habitat areas would be the same as the proposed project, this alternative would have the same potential to result in higher frequency of collisions between aircraft and wildlife at the Airport. Construction activities could also result in interference with the use of SR 99/70 as an emergency evacuation route and have the potential to cause wildland fires from use of construction equipment. Mitigation for these effects would be the same as described for the proposed project and would reduce the impacts to a less-than-significant level. [Similar]

6.3.3 ENVIRONMENTAL EFFECTS OF ALTERNATIVE 3

Implementation of Alternative 3 would not eliminate or reduce any of the significant environmental effects of the project. Most impacts of Alternative 3 would be the same as, or very similar to, the impacts of the proposed project and, for this reason, are described in comparison with those of the proposed project. A summary of the relative intensity of the impacts of Alternative 3 compared with that of the impacts of the proposed project is provided at the end of each resource topic discussion below.

Agriculture and Land Use: Alternative 3 would not conflict with any applicable land use plan, policy, or regulation. Construction of the setback levee would convert an approximately 75-acre area of Important Farmland to nonagricultural use, resulting in a greater farmland conversion than under the proposed project. The same mitigation described for the proposed project would apply, but the significant conversion of farmland would remain significant and unavoidable. [Greater]

Geology and Soils: Alternative 3 would involve types of levee and canal construction similar to those described for the proposed project. The risk of construction-related erosion impacts under this alternative would be the same as described for the proposed project. The risk of potential damage to proposed levee improvements from seismic activity, settlement, or liquefaction, or from construction on unstable soils or expansive soils under this alternative would be the same as described for the proposed project. Therefore, this alternative would present the same less-than-significant risks associated with geologic hazards as the proposed project. [Similar]

Hydrology and Hydraulics: Because the 500-foot setback levee would be designed to maintain the same flow split between the Yolo Bypass and the Sacramento River, this alternative would have the same hydraulic profile as the proposed project. Alteration of drainage patterns from disruption of drainage systems during construction and shallow excavation of soil from large parcels would be similar. Therefore, hydrologic and hydraulic impacts under Alternative 3 would be similar to impacts under the proposed project. These potential effects would be significant, and the same mitigation described for the proposed project would apply and would reduce the impact to a less-than-significant level. [Similar]

Water Quality: Alternative 3 would involve the same types of construction activities as the proposed project and would have the same potential for soil erosion, sedimentation of local drainages and waterways, and accidental spills of construction-related substances. Potential effects on water quality associated with the use of relief wells

would be the same as described for the proposed project, and mitigation would be the same and would reduce impacts to a less-than-significant level. [Similar]

Fisheries and Aquatic Resources: Construction of this alternative would result in the same potential impacts on fish habitat described for the proposed project, and the same mitigation would apply to reduce potential impacts to a less-than-significant level. Setting back the upper portion of the Sacramento River east levee would also provide habitat benefits for fish. [Similar]

Terrestrial Biological Resources: Potential effects on terrestrial biological resources under Alternative 3 would be the same as under the proposed project and Alternative 2 for the NCC and PGCC. Effects along the Sacramento River would be similar to those of the proposed project. The only notable difference is associated with construction of the 500-foot setback levee. In comparison with the proposed project, construction of the setback levee would result in the loss of approximately 5 additional acres of rice in Reach 1 and approximately 75 acres of high-quality agricultural foraging habitat for Swainson's hawk and other raptors, which would be converted to woodland. Although the woodland would provide suitable nesting habitat, it would come at the expense of lost foraging habitat. Overall, potential adverse effects on sensitive resources would be similar to those of the proposed project. The same mitigation would apply and would reduce impacts to a less-than-significant level. [Similar]

Cultural Resources: Alternative 3 would be similar to the proposed project in terms of alterations of contributing elements of RD 1000. It would also involve the same kinds of ground-disturbing impacts in the same areas that could affect prehistoric resources. Therefore, the impacts and mitigation measures described for the proposed project would apply to Alternative 3 as well. Potential impacts on cultural resources would be significant and unavoidable. [Similar]

Paleontological Resources: Alternative 3 would include excavations in the same areas of Riverbank or Modesto Formations described for the proposed project that could damage unknown, subsurface unique paleontological resources. This potential impact would be the same as described for the proposed project and would be significant. The same mitigation would apply to reduce the potential impact to a less-than-significant level. [Similar]

Transportation and Circulation: Under Alternative 3, construction-related trips on some local roadways would likely exceed the thresholds based on ITE guidance for temporary traffic increases. Because this alternative would require approximately 11% more haul trips than the proposed project, peak-hour traffic impacts on local roadways would be greater. The same mitigation described for the proposed project would apply, but the impacts on traffic would remain significant and unavoidable. Traffic impacts would be similar to, but greater than, those of the proposed project. [Greater]

Air Quality: Because this alternative requires about 11% more construction-related trips, temporary emissions of ROG, NO_X, and PM_{10} would be slightly greater than those of the proposed project and would exceed district-recommended significance thresholds. As under the proposed project, this alternative would not cause long-term changes in these emissions or cause exposure of sensitive receptors to toxic air emissions. The same mitigation described for the proposed project would apply to this alternative, but the impact of temporary emissions would remain significant and unavoidable. [Greater]

Noise: Under this alternative, construction activities would be very similar to those described for the proposed project and could generate noise levels that exceed the local noise standards for stationary sources at nearby sensitive receptors in all construction seasons. As under the proposed project, residences adjacent to the proposed haul routes would be exposed to higher noise levels from truck traffic. The same mitigation would apply, but the impact would remain significant and unavoidable. [Similar]

Recreation: Temporary changes in recreational opportunities during project construction would be similar to those under the proposed project. Encroachments on parkland under this alternative would be the same. The same mitigation would apply and would reduce the impact to a less-than-significant level. [Similar]

Visual Resources: This alternative would be similar to the proposed project in terms of temporary impacts on scenic vistas and changes in light and glare from the use of construction equipment in the project area. Riparian growth on the water side of the levee would be enhanced with the plantings in the levee setback area over time. A similar amount of vegetation on the land side of the levee would be removed. Impacts on visual resources would be similar to those described for the proposed project and would be significant and unavoidable. [Similar]

Utilities and Service Systems: The potential effects of Alternative 3 related to utilities and service systems would be the same as for the proposed project and Alternative 2. [Similar]

Hazards and Hazardous Materials: The potential effects of Alternative 3 related to hazards and hazardous materials would be the same as for the proposed project and Alternative 2. [Similar]

6.3.4 ENVIRONMENTAL EFFECTS OF ALTERNATIVE 4

A summary of the relative intensity of the impacts of Alternative 4 compared with that of the impacts of the proposed project is provided at the end of each resource topic discussion below.

Agriculture and Land Use: The No-Project Alternative would not conflict with any land use plan or policy or directly result in the conversion of agricultural land to nonagricultural uses. However, without SAFCA's improvements to the levee system to provide 100-year flood protection, the risk of a levee failure would remain. A levee failure along the NCC, the PGCC, or the upper reaches of the Sacramento River east levee could result in scouring of agricultural land, loss of top soil, and the loss of Important Farmland. Nevertheless, any such loss is uncertain and is unlikely to be as great as the conversion of farmland under the proposed project or the action alternatives. [Less]

Geology and Soils: The No-Project Alternative would have no impact associated with geological hazards or soil erosion. [No impact]

Hydrology and Hydraulics: The No-Project Alternative would have no effect on water surface elevations associated with 100-year and "200-year" conditions and would cause no hydraulic effects either upstream or downstream of the project area. [No impact]

Water Quality: The No-Project Alternative would have no direct water quality impacts. There would be no effects on groundwater quality resulting from usage of relief wells or disruption of local drainage systems by seepage or stability berms. However, without SAFCA's improvements to the levee system to provide 100-year flood protection, the risk of a levee failure would remain. A levee failure in the Natomas Basin could result in flooding that could introduce large quantities of agricultural pesticides, oil, gasoline, and other hazardous materials into flood waters and subsequently into stream channels and groundwater. However, the potential for such an occurrence is uncertain, and the magnitude and duration of any related effects on water quality cannot be predicted. [Less]

Fisheries and Aquatic Resources: Under the No-Project Alternative, no new facilities would be constructed and no existing facilities would be altered, expanded, or demolished. The No-Project Alternative would have no effect on fisheries or aquatic resources. [No impact]

Terrestrial Biological Resources: No ground-disturbing activities would occur as a result of the No-Project Alternative. Consequently, no indirect or direct impacts on terrestrial biological resources would occur. [No impact]

Cultural Resources: No ground-disturbing activities would occur as a result of the No-Project Alternative. Consequently, no indirect or direct impacts on cultural resources would occur. [No impact]

Paleontological Resources: No ground-disturbing activities would occur as a result of the No-Project Alternative. Consequently, no indirect or direct impacts on paleontological resources would occur. [No impact]

Transportation and Circulation: No additional vehicle trips would be generated because no construction would take place. Consequently, this alternative would not result in any adverse direct environmental effects with respect to transportation and circulation. However, without SAFCA's improvements to the levee system to provide 100-year flood protection, the risk of a levee failure would remain. A levee failure along the NCC, the PGCC, or the Sacramento River east levee could result in minor to substantial flooding of the Natomas Basin, including the Airport, Interstate 5, and SR 99/70, as well as local roadways. However, the potential for such an occurrence is uncertain, and the magnitude and duration of any related effect on traffic and circulation cannot be estimated. [Less]

Air Quality: The No-Project Alternative would have no impact associated with emissions of air pollutants or odors. [No impact]

Noise: Under the No-Project Alternative, no construction work would take place and no construction-generated noise would result. No new stationary sources of noise would be created, and there would be no new source of groundborne vibration or noise. [No impact]

Recreation: The No-Project Alternative would neither temporarily nor permanently affect existing recreational resources or opportunities. The No-Project Alternative would have no effect on recreational resources. [No impact]

Visual Resources: Implementation of the No-Project Alternative would not affect scenic vistas, scenic resources, or the existing visual character of the surrounding area, and it would not create any additional source of light or glare. The No-Project Alternative would have no effect on visual resources. [No impact]

Utilities and Service Systems: Implementation of this alternative would not result in potential damage to public utility infrastructure or water supply and drainage facilities. The No-Project Alternative would have no direct effect on utilities and service systems. However, without SAFCA's improvements to the levee system to provide 100-year flood protection, the risk of a levee failure would remain. A levee failure in the Natomas Basin could result in minor to substantial flooding that could substantially interrupt utilities and public services. However, the potential for such an occurrence is uncertain, and the magnitude and duration of any related effect on these services cannot be predicted. [Less]

Hazards and Hazardous Materials: Implementation of the No-Project Alternative would not expose construction workers or the general public to potential release of hazardous materials into the environment. The No-Project Alternative would have no effect on public health or hazards. However, without SAFCA's improvements to the levee system to provide 100-year flood protection, the risk of a levee failure would remain. A levee failure in the Natomas Basin could result in flooding that could upset hazardous material storage and spread agricultural pesticides, oil, gasoline, and other hazardous materials in flood waters, creating hazardous conditions for the public and the environment. Sudden flooding of the Natomas Basin would pose serious risks to aviation safety as well. However, the potential for such an occurrence is uncertain, and the magnitude and duration of any related risks cannot be predicted. [Less]

6.3.5 ENVIRONMENTAL EFFECTS OF ALTERNATIVE 5

Agriculture and Land Use: Alternative 5 would conflict with established land use plans and policies for the Natomas Basin that promote planning on a regional scale and would result in the physically dividing an existing

community. Construction of a compartment levee would require a substantial amount of borrow material (approximately 8 million cubic yards), which would likely be obtained from nearby agricultural land, and would convert more than 300 acres of Important Farmland to nonagricultural uses in the levee footprint. Impacts on farmland would be significant and unavoidable. [Greater]

Geology and Soils: Alternative 5 would have the same potential construction-related impacts on geology and soils as the proposed project. Impacts would be less than significant with mitigation. [Similar]

Hydrology and Hydraulics: Alternative 5 would have no effect on water surface elevations associated with 100-year and "200-year" conditions and would cause no hydraulic effects either upstream or downstream of the project area. Unlike the proposed project, however, this alternative would substantially affect drainage in the Natomas Basin by placing a compartment levee across existing interior canals and altering surface runoff patterns. [Greater]

Water Quality: Alternative 5 would have the same potential for direct water quality impacts during construction as the proposed project. The risks to water quality associated with a levee failure of the federal levee system on the perimeter of the Natomas Basin would be as described for Alternative 4. [Similar]

Fisheries and Aquatic Resources: The potential for construction-related effects on fisheries associated with Alternative 5 would be the same as described for the proposed project. [Similar]

Terrestrial Biological Resources: Implementation of Alternative 5 would convert a large part of the central Natomas Basin, within the compartment levee, to uses that may be incompatible with the habitat needs of special-status species in the basin. Adherence to the federal and California Endangered Species Acts would be required to ensure that effects are appropriately mitigated. [Greater]

Cultural Resources: The potential for effects of construction activity to adversely affect known and unknown cultural resources would be significant and unavoidable, as for Alternatives 1–3. Construction of the compartment levee would significantly alter the elements of RD 1000. [Similar]

Paleontological Resources: Construction under this alternative would have the potential to disturb unique paleontological resources, as described for Alternatives 1–3. [Similar]

Transportation and Circulation: Alternative 5 would have the potential to result in construction-related significant traffic effects, as described for Alternatives 1–3. The severity of the impacts would depend on the proximity of the borrow sources and the schedule of construction. It is expected that impacts would be greater than the impacts those of Alternatives 1–3 because a substantially greater volume of borrow material would likely need to be hauled to construction sites. In addition, the flooding risks to roadways outside the compartment levee would remain, as described for Alternative 4. [Greater]

Air Quality: The construction-related emissions of this alternative would be greater than the effects described for Alternatives 1–3 because construction of this alternative would require a greater amount of borrow material, equipment use, and hauling than any of those alternatives. [Greater]

Noise: This alternative would involve the same types of construction and hauling activities as described for the proposed project, but on a larger scale. Because the haul routes for truck traffic under this alternative and the construction schedule for this alternative are not known, it cannot be predicted what the volume of truck traffic on roadways may be and whether and how many sensitive receptors may be affected. Therefore, it is assumed that the construction-related noise effects of this alternative would be similar to the effects described for the proposed project. [Similar]

Recreation: This alternative would have no little or effect on recreational resources. [No impact]

Visual Resources: Construction of the compartment levee would have a significant effect on the scenic qualities of the rural landscape in RD 1000. Effects would be significant and unavoidable. [Greater]

Utilities and Service Systems: The construction-related effects of this alternative on utilities would be similar to the effects described for Alternatives 1–3. Construction of the compartment levee would require rerouting of irrigation facilities and some utilities. The risk of failure of the federal levee system on the perimeter of the Natomas Basin would remain, and the risks to utilities would be as described for Alternative 4. [Similar]

Hazards and Hazardous Materials: The construction-related effects of this alternative on risks of exposure to hazardous substances during construction would be similar to the effects described for Alternatives 1–3. The risk of failure of the federal levee system on the perimeter of the Natomas Basin would remain, and the risks associated with spills of hazardous materials would be as described for Alternative 4. [Similar]

6.3.6 COMPARISON OF THE ENVIRONMENTAL EFFECTS OF THE ALTERNATIVES

Table 6-5 summarizes the potential environmental effects of the project alternatives.

Table 6-5
Summary Comparison of the Environmental Effects of the Alternatives

Environmental Issues	Proposed Project	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Agriculture and Land Use	SU	Greater	Greater	Less	Greater
Geology and Soils	LTS	Similar	Similar	NA	Similar
Hydrology and Hydraulics	LTS	Similar	Similar	NA	Greater
Water Quality	LTS	Similar	Similar	Less	Similar
Fisheries and Aquatic Resources	LTS	Similar	Similar	NA	Similar
Terrestrial Biological Resources	LTS	Greater	Similar	NA	Greater
Cultural Resources	SU	Similar	Similar	NA	Similar
Paleontological Resources	LTS	Similar	Similar	NA	Similar
Transportation and Circulation	SU	Greater	Greater	Less	Greater
Air Quality	SU	Less	Greater	NA	Greater
Noise	SU	Greater	Similar	NA	Similar
Recreation	LTS	Similar	Similar	NA	NA
Visual Resources	SU	Greater	Similar	NA	Greater
Utilities and Service Systems	LTS	Similar	Similar	Less	Similar
Hazards and Hazardous Materials	LTS	Similar	Similar	Less	Similar

* For each environmental issue, the alternative is compared to the project based on the level of severity of impacts (i.e., greater, less, and similar). LTS = Less than significant or less than significant with mitigation; SU = Significant and unavoidable with mitigation; NA = No impact

6.4 ENVIRONMENTALLY SUPERIOR ALTERNATIVE

An EIR must identify the "environmentally superior alternative" among the alternatives evaluated. Alternative 4, the No-Project Alternative, would have the least effects and is therefore the environmentally superior alternative. If the environmentally superior alternative is the no-project alternative, Section 15126.6(e)(2) of the State CEQA Guidelines requires that the EIR identify an environmentally superior alternative among the other alternatives.

Many of the potential impacts associated with the Alternative 2 and Alternative 3 would be comparable to the impacts of the proposed project because these alternatives would involve a similar construction duration and similar equipment. Although Alternative 2 would have a lesser impact on air quality because of the reduced number of construction-related trips, it would have greater impacts than the proposed project on agriculture and land use, terrestrial biological resources, transportation and circulation, noise, and visual resources.

Alternative 3 would have slightly greater impacts on terrestrial biological resources because of an increased loss of foraging habitat for raptors compared to the proposed project. Alternative 3 would also result in more traffic impacts and emissions of ROG, NO_X, and PM_{10} than the proposed project because of the greater number of construction-related trips that would be required.

For these reasons, the proposed project is the environmentally superior alternative for purposes of State CEQA Guidelines Section 15126.6(e)(2).

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8 LIST OF PREPARERS

Following is a list of the individuals who prepared sections of the EIR, provided significant background materials, or participated in preparing the EIR.

SACRAMENTO AREA FLOOD CONTROL AGENCY

Timothy Washburn ..... Agency Counsel
John Bassett ..... Director of Engineering, Project Manager
Peter Buck ..... Natural Resource Supervisor

EDAW

Phil Dunn ..... Principal-in-Charge
Roberta Childers ..... Project Manager
Anne King ..... Assistant Project Manager/Biological Resources Lead
Dave Rader ..... Assistant Project Manager/Environmental Analyst—Water Resources, Recreation, Transportation and Circulation
Nisha Chauhan ..... Project Coordinator/Environmental Analyst—Geology, Utilities and Service Systems, Hazards and Hazardous Materials
Steve Chainey ..... Lead Ecologist/Habitat Planning
Leo Edson ..... Wildlife Hazards, Biological Resources QA
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Wendy Copeland ..... Paleontology
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Lorrie Jo Williams ..... Graphics
Lisa Clement ..... GIS
Phi Ngo ..... GIS
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Amber Martin ..... Word Processing
Marvin Del Fierro ..... Document Production

MBK ENGINEERS

Ric Reinhardt ..... Natomas Levee Improvement Program Manager; Hydraulic Modeling Review
Mike Archer ..... Hydraulic Modeling

HDR ENGINEERING

Chris Krivanek .....Project Manager, Sacramento River East Levee Design
Laurie Warner-Herson.....CEQA Documentation Assistance and QA

MEAD & HUNT

Steve Sullivan.....Project Manager, Canal Design and Borrow Investigation

Marieke Armstrong .....Environmental Specialist

WOOD RODGERS

Jonathan Kors..... Project Manager, Natomas Cross Canal South Levee Design

APPENDIX A

Notice of Preparation and Scoping Comments

Sacramento Area Flood Control Agency

NOTICE OF PREPARATION

To: Agencies and Interested Parties

From: Sacramento Area Flood Control Agency

Date: June 4, 2007

Subject: **Notice of Preparation of an Environmental Impact Report (EIR) on the Natomas Levee Improvement Program's Landside Components**

and

Announcement of a Public Scoping Meeting on June 19, 2007

SAFCA will be the lead agency and will prepare an environmental impact report (EIR) for the project identified below. SAFCA needs to know the views of each responsible and trustee agency, and each involved federal agency, as to the scope and content of the environmental information that is germane to the agency's statutory responsibilities in connection with the proposed project. SAFCA also invites the views of the public as to the scope and content of the EIR.

INTRODUCTION

The California Environmental Quality Act (CEQA) specifies that a public agency must prepare an EIR on any project that it proposes to carry out or approve that may have a significant direct or indirect effect on the environment. SAFCA is proposing to implement flood control improvements in the Natomas Basin in Sacramento and Sutter Counties to address levee freeboard deficiencies, levee underseepage and through-seepage, and levee encroachments. These improvements are necessary to forward SAFCA's goal of providing urban-standard ("200-year") flood protection to the Sacramento metropolitan area. SAFCA has determined that these landside flood control improvements may result in significant effects on the environment. Therefore, acting as the lead agency for CEQA compliance, SAFCA will prepare an EIR that evaluates the significant environmental effects of these landside components of the Natomas Levee Improvement Project.

PURPOSE OF THE NOTICE OF PREPARATION

The purposes of this notice of preparation (NOP) are to:

1. Provide background information, briefly describe the proposed flood control improvements, and summarize the probable environmental effects associated with implementation of these improvements.

2. Announce a public scoping meeting to facilitate public input to be held at 6 p.m. on June 19, 2007, at the Sacramento County Board of Supervisors Chambers, Hearing Room Two, 700 H Street, Sacramento, California.

3. Solicit input by July 3, 2007, from public agencies, and interested organizations and individuals, about the content and scope of the EIR, including alternatives to be considered, potentially significant environmental effects on the environment to be addressed, and identification of responsible and/or trustee agencies.

PROJECT DESCRIPTION

SAFCA's proposed improvements that will be analyzed in the EIR would be implemented along the land side of the Natomas Cross Canal (NCC) south levee, the Sacramento River east levee, and the Pleasant Grove Creek Canal (PGCC) west levee in Sacramento and Sutter Counties (Exhibits 1 and 2). The EIR will address improvements to the NCC south levee and Reaches 1 through 4 of the Sacramento River east levee (from the Natomas Cross Canal to approximately Elverta Road) at a project level, with construction in these reaches anticipated to go forward in spring 2008. Improvements to Reaches 5 through 20 of the Sacramento River east levee and the PGCC west levee will be analyzed at a program level in the EIR. Construction in these reaches is expected to go forward in 2009 and 2010.

The improvements evaluated in the EIR will include the following:

- Freeboard increases—Portions of the Sacramento River east levee, the NCC south levee, and the PGCC west levee would be raised to achieve a minimum of 3 feet of freeboard above the 200-year water surface profile. Levee raises may be achieved through a crown-only raise where the raise is minor or through a full levee raise, consisting of an embankment raise from the landside and/or waterside toe upward to the increased crown elevation. Either method would entail temporary traffic rerouting where roadways are on the levees. The landside levee slope would be reconstructed to meet the U.S. Army Corps of Engineers (USACE) preferred criterion of a 3:1 horizontal-to-vertical (3H:1V) slope.

- Seepage remediation—All of the subject levees contain reaches where through-seepage and underseepage has been identified as a problem. Alternatives for addressing through-seepage and underseepage in the Natomas area include cutoff walls, landside seepage berms and stability berms, and relief wells. A combination of these methods is expected to be used, with different methods used in different parts of the levee system based on site conditions and other factors.

- Encroachment management—Encroachments, such as residential fences, gates, and other structures, exist within the levees and adjacent maintenance areas that can affect levee integrity, hinder inspections, and prevent maintenance access. In addition, some trees and other large woody vegetation may undermine the integrity of levee slopes. Guidance being developed by the USACE may require the removal of all trees and other large woody vegetation from levee slopes and the adjacent maintenance areas. Ensuring the integrity of the levee system and the ability to certify that the system meets Federal Emergency Management Agency (FEMA) criteria for the 100-year level of protection could require removing some or all encroachments and large woody vegetation from the levees. Both structural encroachments and vegetation are especially abundant on the water side of the Sacramento River east levee. As an alternative to substantial removal of structural and vegetation encroachments along the Sacramento River east levee, SAFCA will evaluate an "adjacent setback levee," consisting of the construction of a new levee crown and embankment adjoining the land side of the existing levee (Exhibit 3).

The proposed Sacramento River east levee improvements, including a 3:1 landside levee slope, would result in expansion of the levee/maintenance area footprint by a minimum of 45 feet in several levee reaches in the southern part of the basin and approximately 55 feet in most other reaches. In addition, seepage berms could extend several hundred feet out from the landside levee toe. These levee improvements would require filling canals that are near the landside levee toe and removing some mature trees that are within the footprint of the flood control works. The proposed project would include reconstructing the canals farther from the levee and redesigning and improving the drainage infrastructure and giant garter snake habitat in the western part of the Natomas Basin to compensate for filling the existing agricultural canals. Preliminary project plans also include

methods of retaining as much woodland as possible outside of the levee/maintenance area footprint through the use of special design features where possible. To compensate for tree removal and the temporal loss of trees, the proposed project would include a large acreage of replacement trees. The location of replacement woodlands would be defined through the project planning process. The proposed levee improvement also would require a substantial amount of soil borrow material. Potential sources include sites within the Natomas Basin and northeast of the basin.

OTHER SAFCA FLOOD CONTROL PROJECTS

SAFCA at this time is also proposing to implement bank protection measures to control erosion at nine sites along the east bank of the Sacramento River bordering the Natomas Basin. These improvements will be evaluated as a separate project in a separate EIR prepared concurrently with the EIR for levee improvements described in this NOP. The levee improvement and bank protection projects are both part of SAFCA's efforts to complete comprehensive flood control improvements to provide urban-standard ("200-year") flood protection for the Sacramento area, and are part of the Natomas Levee Improvement Program recently evaluated in SAFCA's programmatic EIR on Local Funding Mechanisms for Comprehensive Flood Control Improvements for the Sacramento Area (EIR on Local Funding Mechanisms) (State Clearinghouse # 2006072098). However, neither the bank protection project nor the levee improvement project is dependent on the construction of the other project; each can be built without regard to the timing or scope of the other project. SAFCA will ensure that each EIR appropriately analyzes the cumulative impacts of the two projects. Potential areas of impact overlap are temporary truck traffic increases, and air quality emissions and noise during construction.

PROBABLE ENVIRONMENTAL EFFECTS

The EIR will describe the direct and indirect significant environmental effects of the proposed levee improvements. The EIR will also evaluate cumulative effects of the proposed flood control improvements when considered in conjunction with other related past, present, and reasonably foreseeable future projects, including other SAFCA projects. The environmental analysis will be tiered off the analysis in the EIR on Local Funding Mechanisms. Tiering, described in State CEQA Guidelines Section 15152, refers to using the analysis of general matters contained in a broader EIR when preparing later EIRs on narrower proposals. Consistent with Section 15152, this EIR will incorporate by reference general discussions from the EIR on Local Funding Mechanisms, such as the discussion of growth-inducing effects, and will focus on the significant effects on the environment that were not adequately addressed in that EIR.

On the basis of preliminary evaluation, SAFCA has determined that the proposed levee improvements that will be evaluated in the EIR could have the following significant environmental effects:

- **Agriculture and Land Use**. Conversion of farmland to non-agricultural use.
- **Air Quality**. Temporary increases in pollutant emissions associated with construction activities.
- **Cultural Resources**. Disturbance of historic or archaeological resources.
- **Hazards and Hazardous Materials**. Potential introduction of contaminants into water courses as a result of construction activities.
- **Noise and Vibration**. Temporary increases in noise and vibration levels near sensitive receptors during construction.
- **Paleontological Resources**. Potential disturbance or destruction of previously undiscovered fossils during activities involving excavation.

- **Terrestrial Biological Resources**. Disturbance or loss of riparian vegetation, woodland vegetation, jurisdictional wetlands, or other sensitive natural communities or special-status species habitats; construction disturbance or take of special-status terrestrial species.

- **Transportation and Circulation**. Temporary disruption of traffic circulation during construction.

- **Utilities and Service Systems**. Potential disruption of service and need for the relocation of utilities.

- **Visual Resources**. Temporary and long-term changes in scenic views or visual character of project sites.

- **Water Resources**. Temporary effects on water quality during construction.

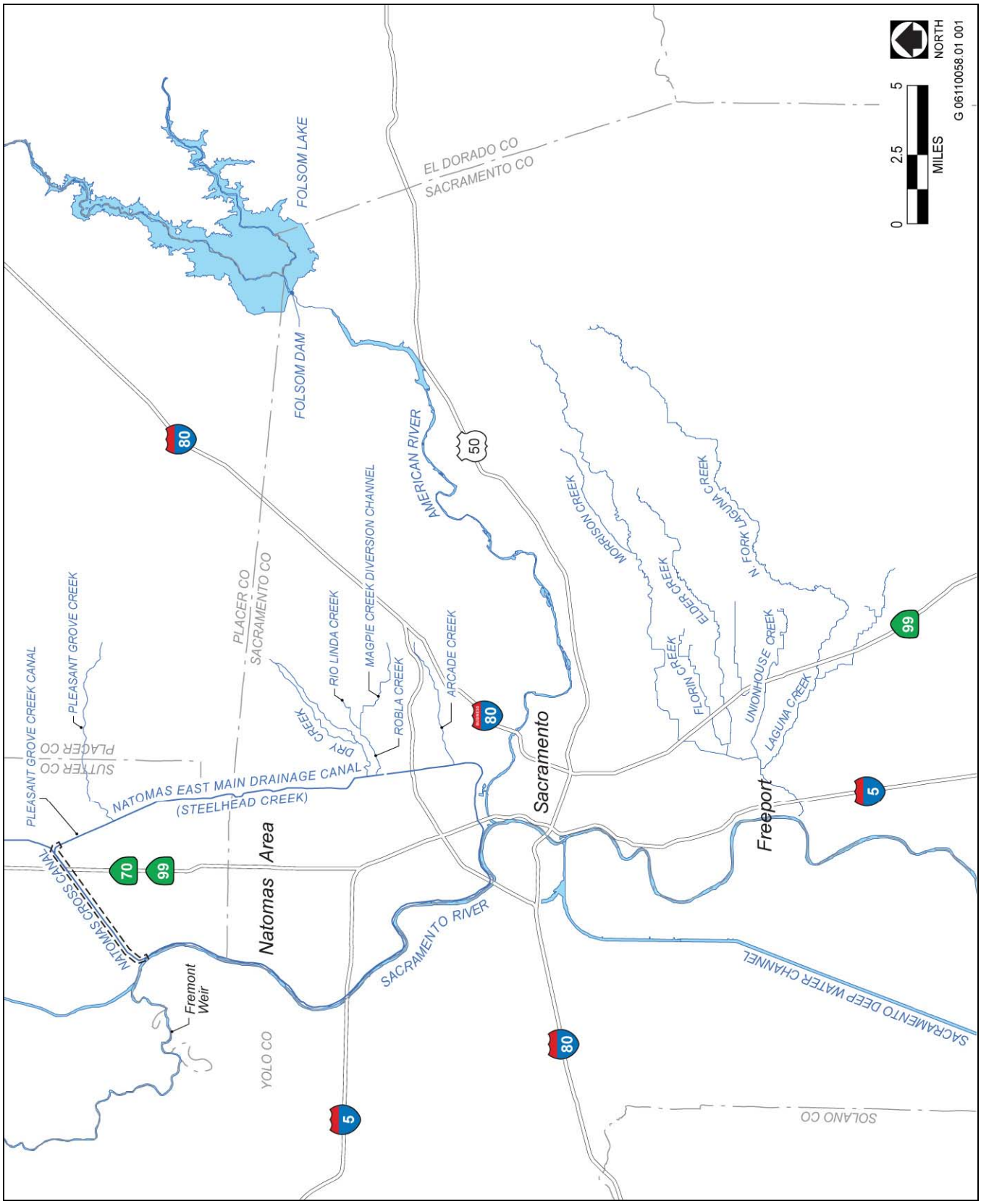
SCOPING MEETING

A public scoping meeting will be held, as discussed above under "Purpose of the Notice of Preparation." The objectives of the meeting are to brief interested parties on the proposed projects, and obtain the views of agency representatives and the public on the scope and content of both the EIR on the levee improvement project and the EIR on the bank protection project, including the alternatives to be addressed and the potentially significant environmental impacts.

PROVIDING SCOPING COMMENTS

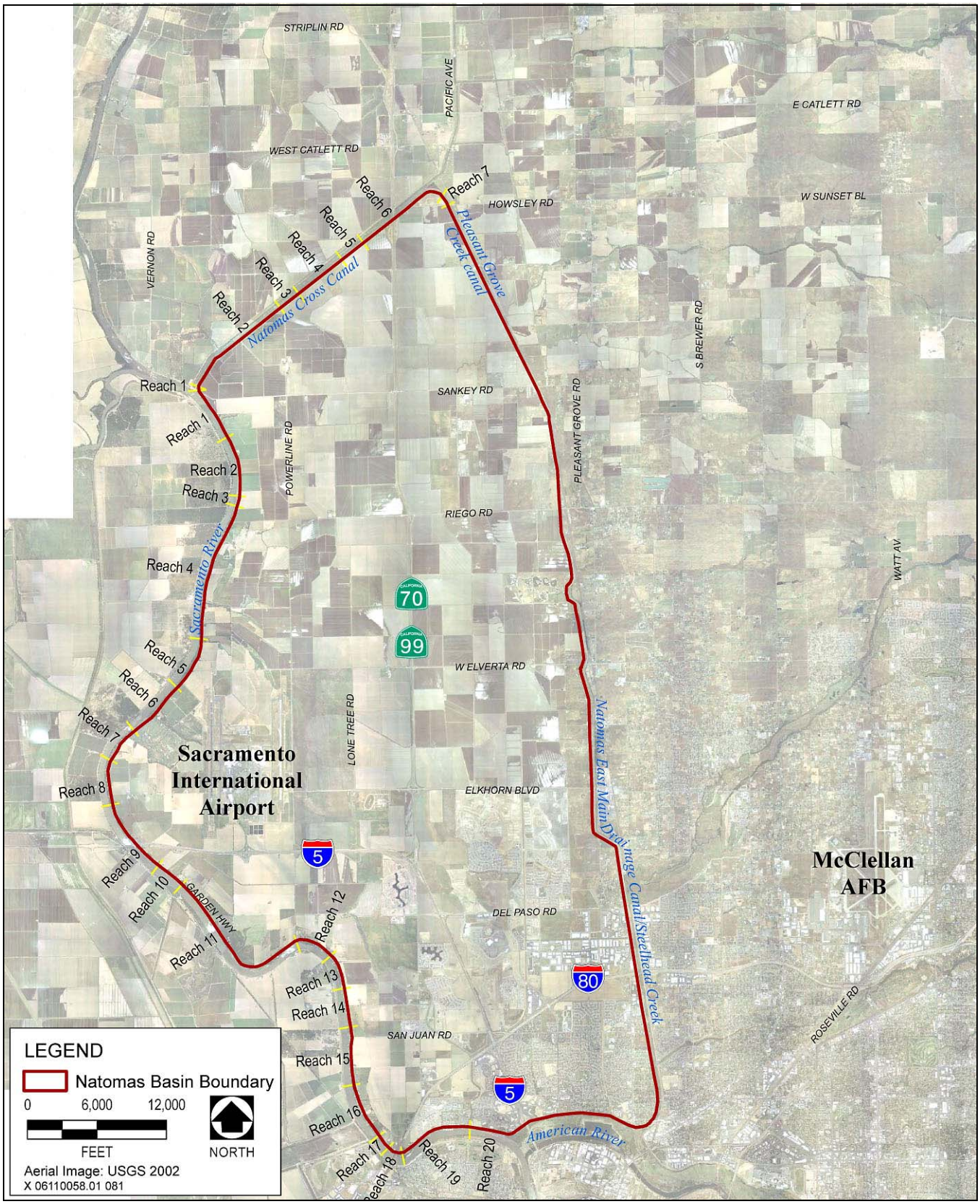
Interested parties may provide written or oral comments on the desired content and scope of the environmental information in the EIR at the scoping meeting or may provide written comments directly to SAFCA. Because of time limits mandated by state law, **written comments must be provided to SAFCA at the earliest possible date, but no later than 5 p.m. on July 3, 2007**. Agencies that will need to use the EIR when considering permits or other approvals for the proposed project should provide SAFCA with the name of a contact person. Comments provided by e-mail should include the name and address of the sender. Please send all written and/or e-mail comments to:

Mr. John Bassett, Director of Engineering
Sacramento Area Flood Control Agency
1007 Seventh Street, 7th Floor
Sacramento, CA 95814
Telephone: (916) 874-7606
Fax: (916) 874-8289
E-mail: bassettj@saccounty.net

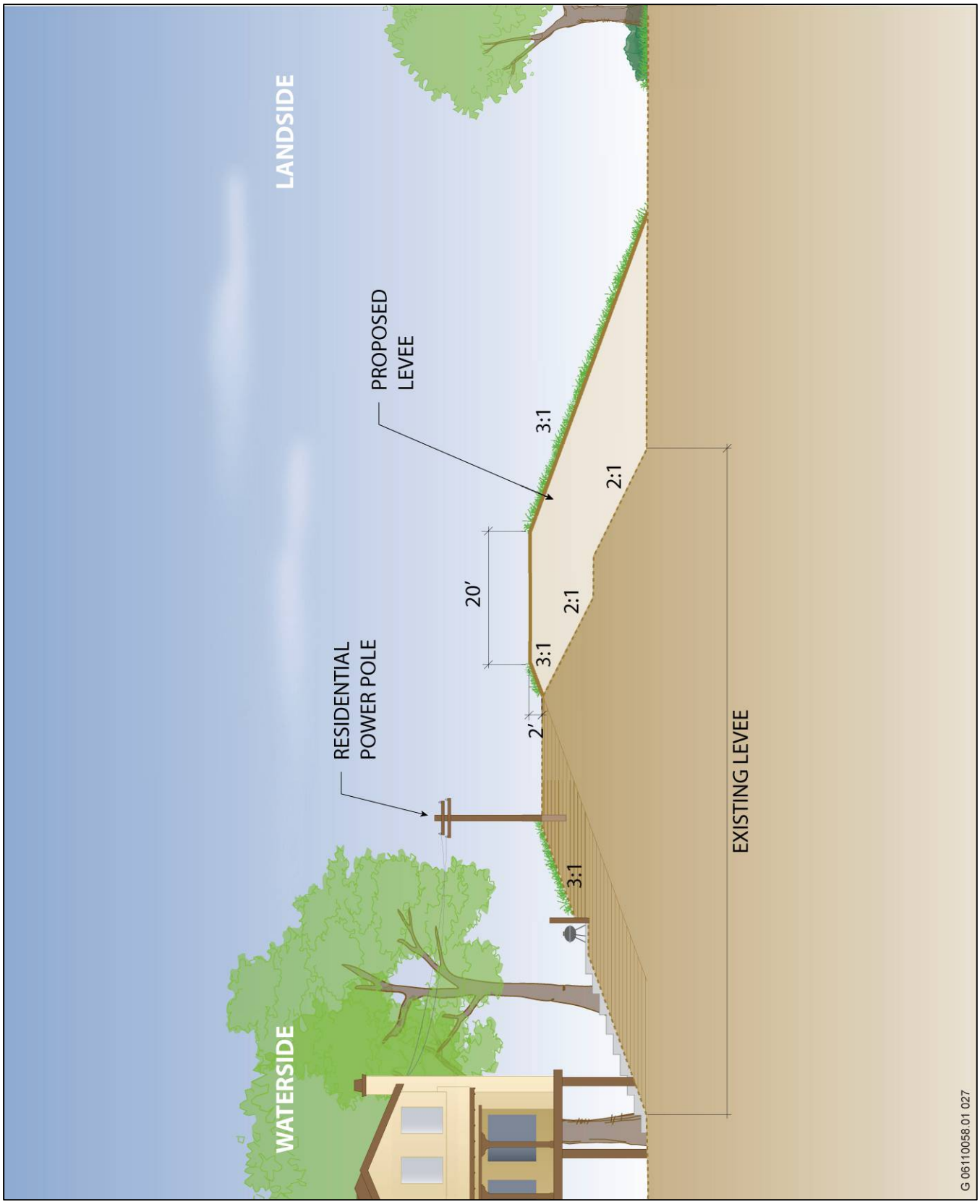


Source: Casil: EDAW 2006

Project Area for Comprehensive Sacramento Area Flood Protection **Exhibit 1**



Natomas Levee Improvement project Area **Exhibit 2**



Adjacent Setback Levee Concept **Exhibit 3**

STATE OF CALIFORNIA -- THE RESOURCES AGENCY

ARNOLD SCHWARZENEGGER, Governor

DEPARTMENT OF WATER RESOURCES
1416 NINTH STREET, P.O. BOX 942836
SACRAMENTO, CA 942360001
(916) 653-5791

RECEIVED
2007 JUN 11 PM 2:21
STATE CLEARINGHOUSE

June 8, 2007

John Bassett
Sacramento Area Flood Control Agency
1007 7th Street, 7th Floor
Sacramento, California 95814

Natomas Levee Improvement Program Landside Components
State Clearinghouse (SCH) Number: 2007062016

The project corresponding to the subject SCH identification number has come to our attention. The limited project description suggests your project may be an encroachment on the State Adopted Plan of Flood Control. You may refer to the California Code of Regulations, Title 23 and Designated Floodway maps at http://recbd.ca.gov/. Please be advised that your county office also has copies of the Board's designated floodways for your review. If indeed your project encroaches on an adopted food control plan, you will need to obtain an encroachment permit from the Reclamation Board prior to initiating any activities. The attached Fact Sheet explains the permitting process. Please note that the permitting process may take as much as 45 to 60 days to process. Also note that a condition of the permit requires the securing all of the appropriate additional permits before initiating work. This information is provided so that you may plan accordingly.

If after careful evaluation, it is your assessment that your project is not within the authority of the Reclamation Board, you may disregard this notice. For further information, please contact me at (916) 574-1249.

Sincerely,

Christopher Huitt
Staff Environmental Scientist
Floodway Protection Section

cc: Governor's Office of Planning and Research
State Clearinghouse
1400 Tenth Street, Room 121
Sacramento, CA 95814

STATE OF CALIFORNIA – THE RESOURCES AGENCY ARNOLD SCHWARZENEGGER, Governor

DEPARTMENT OF WATER RESOURCES
1416 NINTH STREET, P.O. BOX 942836
SACRAMENTO, CA 942360001
(916) 653-5791

July 3, 2007

John Bassett, Director of Engineering
Sacramento Area Flood Control Agency
1007 Seventh Street, 7th Floor
Sacramento, CA 95814

Notice of Preparation of an EIR on the Natomas Levee Improvement Program Landside Components.

Mr. Bassett –

Thank you for the opportunity to review and comment on the Notice of Preparation for EIR on the Natomas Levee Improvement Program Bank Protection at Nine Sites on the Sacramento River East Levee. California Department of Water Resources (DWR) staff has reviewed the environmental document and provide the following comments.

General Comments

The area described in the Project Description is protected by federal levees that have been incorporated into the state plan of flood control. The effective operation of federal flood control levees along the Sacramento River system is essential for the protection of public safety and property located in the floodplain protected by those levees. In California, The Reclamation Board is responsible for operations and maintenance of the Federal Flood Control Project Levees in the Central Valley. DWR is the floodplain manager for the State and also coordinate its activities with the Federal Emergency Management Agency (FEMA) in administrating the federal Flood Insurance Program.

A Reclamation Board permit will be required for any plan of work that encroaches on an adopted plan of flood control. Your project may be encroaching on an adopted plan of flood control and thus, an encroachment permit may be required for your project. A permit will also be required for activities outside of the adopted flood control plan if those activities could be injurious to or interfere with the successful execution, functioning or operation of any facilities of an adopted plan of flood control. The attached Fact Sheet provides information on the permitting process.

The EIR should describe in appropriate detail how the regulatory concerns of the Reclamation Board will be addressed. The regulations of the Reclamation Board are found in the California Code of Regulations (CCR) Title 23, Division 1. These regulations are designed to protect the integrity and function of the flood control system. Any activity that interferes with the operation, integrity, and function of the adopted plan of flood control is of concern to the Reclamation Board.

State officials, more than ever, are emphasizing public safety and in particular the flood hazard in California. The conditions of the levees that protect many areas are a major concern. Existing levees were constructed decades ago; most of these levees were intended primarily to maintain river flow for navigation and to reclaim overflow land for agricultural production. Non-residential land uses such as agricultural production are compatible with the state plan of flood control for which the levees were constructed.

Detailed knowledge of the physical condition of a given reach of levees is limited. Although the state performs levee inspections, those inspections are conducted to ascertain whether maintenance is being performed according to certain minimum standards and not to evaluate the structural integrity of the levee. Unless obvious, problems with levee integrity may not be identified during the course of state inspections.

In many cases, the lack of information regarding the integrity of the levee system does not allow the Reclamation Board and/or DWR to assure the communities that there is an adequate level of protection for additional urbanization. Levees sufficient to protect urbanization should be certified as having the minimum protection required for Federal Emergency Management Agency (FEMA) certification.

The consequences of urban development in a floodplain protected by levees can be significant in terms of not only public safety and protection of property but to the State in terms of financial resources. When it accepts a federal flood control project, the state agrees to indemnify the federal government. Flooding that result from a failure of a portion of the state plan of flood control exposes both the state and the local maintaining agency to significant liability.

Recently, local and national media outlets have been presenting claims the world scientific community recognizes global warming and the effects of these phenomenon. Scientific studies have confirmed the average high tide levels are increasing throughout the world. As concerns of levee stability and safety comes to light after the disastrous effects of hurricane Katrina and the levee failures in New Orleans public safety is an immediate concern.

Development in areas within a federal and state recognized floodplain should be strongly discouraged. Recent climate change reports have stated the increases in storm intensity and average high tide levels which can be problematic for unforeseen future levee maintenance and improvements. The Reclamation Board recognizes the scientific community concerns and the urgent need to improve and maintain the 100-year flood control levee system. As the world seas increase in height, the average high-tide levels will rise as well. Future plans to address these concerns are a vital component that has been previously overlooked but has been brought to light after the recent disastrous events in New Orleans. Future development should strongly consider the consequences of building in areas with potentially disastrous effects of levee failure compounded by the rising seas and effects of the high tides on these levees.

Specific Comments

Levels of flood protection adequate to protect human habitation as project levees are effected.

The Reclamation recommends the following:

- Provide in-depth project status of FEMA and the US Army Corps of Engineers certifications of proposed effected levees with regard to the desired project alternatives.
- Discuss the re-evaluation of the Federal and State adopted flood control project levees within the 100-year floodplain/floodway based on the 1997 storms or other 100-year storm event after the construction of the project.
- Recommend re-certification of levees by FEMA and the US Army Corps of Engineers after the proposed project alternative has been selected as the project in light of the current levee safety concerns.
- Discuss the treatment of addressing the levee seepage and stability concerns.
- Discuss implications of change in use; loss of agriculture or other activity loss due to growth inducing impacts of development with regard to greater infrastructure development.
- Discuss mitigation measures for long term impacts on public safety during construction and future development.
- Discuss the proposed survey process for evaluating the spoils of the excavation and the fill material for construction on project levees.
- Discuss the proposed modification of flood control structures to accommodate pipelines and intake structures.

Thank you once again for the opportunity to comment on the Draft EIR. If you have any questions or need additional information, please contact Mr. Stephen Bradley, Chief Engineer for the Reclamation Board at (916) 574-0680.

Sincerely,

for

Christopher Huitt

cc: Governors Office of Planning and Research, State Clearinghouse
Nadell Gayou, DWR

Encroachment Permits Fact Sheet

Basis for Authority

State law (Water Code Sections 8534, 8608, 8609, and 8710 – 8723) tasks the Reclamation Board with enforcing appropriate standards for the construction, maintenance, and protection of adopted flood control plans. Regulations implementing these directives are found in California Code of Regulations (CCR) Title 23, Division 1.

Area of Reclamation Board Jurisdiction

The adopted plan of flood control under the jurisdiction and authority of the Reclamation Board includes the Sacramento and San Joaquin Rivers and their tributaries and distributaries and the designated floodways.

Streams regulated by the Reclamation Board can be found in Title 23 Section 112. Information on designated floodways can be found on the Reclamation Board's website at http://recbd.ca.gov/designated_floodway/ and CCR Title 23 Sections 101 - 107.

Regulatory Process

The Reclamation Board ensures the integrity of the flood control system through a permit process (Water Code Section 8710). A permit must be obtained prior to initiating any activity, including excavation and construction, removal or planting of landscaping within floodways, levees, and 10 feet landward of the landside levee toes. Additionally, activities located outside of the adopted plan of flood control but which may foreseeable interfere with the functioning or operation of the plan of flood control is also subject to a permit of the Reclamation Board.

Details regarding the permitting process and the regulations can be found on the Reclamation Board's website at http://recbd.ca.gov/ under "Frequently Asked Questions" and "Regulations," respectively. The application form and the accompanying environmental questionnaire can be found on the Reclamation Board's website at http://recbd.ca.gov/forms.cfm.

Application Review Process

Applications when deemed complete will undergo technical and environmental review by Reclamation Board and/or Department of Water Resources staff.

Technical Review

A technical review is conducted of the application to ensure consistency with the regulatory standards designed to ensure the function and structural integrity of the adopted plan of flood control for the protection of public welfare and safety. Standards and permitted uses of designated floodways are found in CCR Title 23 Sections 107 and Article 8 (Sections 111 to 137). The permit contains 12 standard conditions and additional special conditions may be placed on the permit as the situation warrants. Special conditions, for example, may include mitigation for the hydraulic impacts of the project by reducing or eliminating the additional flood risk to third parties that may caused by the project.

Additional information may be requested in support of the technical review of

your application pursuant to CCR Title 23 Section 8(b)(4). This information may include but not limited to geotechnical exploration, soil testing, hydraulic or sediment transport studies, and other analyses may be required at any time prior to a determination on the application.

Environmental Review

A determination on an encroachment application is a discretionary action by the Reclamation Board and its staff and subject to the provisions of the California Environmental Quality Act (CEQA) (Public Resources Code 21000 et seq.). Additional environmental considerations are placed on the issuance of the encroachment permit by Water Code Section 8608 and the corresponding implementing regulations (California Code of Regulations – CCR Title 23 Sections 10 and 16).

In most cases, the Reclamation Board will be assuming the role of a "responsible agency" within the meaning of CEQA. In these situations, the application must include a certified CEQA document by the "lead agency" [CCR Title 23 Section 8(b)(2)]. We emphasize that such a document must include within its project description and environmental assessment of the activities for which are being considered under the permit.

Encroachment applications will also undergo a review by an interagency Environmental Review Committee (ERC) pursuant to CCR Title 23 Section 10. Review of your application will be facilitated by providing as much additional environmental information as pertinent and available to the applicant at the time of submission of the encroachment application.

These additional documentations may include the following documentation:

- California Department of Fish and Game Streambed Alteration Notification (http://www.dfg.ca.gov/1600/),
- Clean Water Act Section 404 applications, and Rivers and Harbors Section 10 application (US Army Corp of Engineers),
- Clean Water Act Section 401 Water Quality Certification, and
- corresponding determinations by the respective regulatory agencies to the aforementioned applications, including Biological Opinions, if available at the time of submission of your application.

The submission of this information, if pertinent to your application, will expedite review and prevent overlapping requirements. This information should be made available as a supplement to your application as it becomes available. Transmittal information should reference the application number provided by the Reclamation Board.

In some limited situations, such as for minor projects, there may be no other agency with approval authority over the project, other than the encroachment permit by Reclamation Board. In these limited instances, the Reclamation Board

may choose to serve as the "lead agency" within the meaning of CEQA and in most cases the projects are of such a nature that a categorical or statutory exemption will apply. The Reclamation Board cannot invest staff resources to prepare complex environmental documentation.

Additional information may be requested in support of the environmental review of your application pursuant to CCR Title 23 Section 8(b)(4). This information may include biological surveys or other environmental surveys and may be required at anytime prior to a determination on the application.

State of California - The Resources Agency ARNOLD SCHWARZENEGGER, Governor
DEPARTMENT OF FISH AND GAME
http://www.dfg.ca.gov
North Central Region
1701 Nimbus Road, Suite A
Rancho Cordova, CA 95670
(916) 358-2900

SACOG '07 JUN 21 PM4:33

June 12, 2007

Mr. John Bassett, Director of Engineering
Sacramento Area Flood Control Agency
1007 Seventh Street, 7th Floor
Sacramento, CA 95814

Dear Mr. Bassett:

The Department of Fish and Game (DFG) has reviewed the Notice of Preparation of a draft Environmental Impact Report (DEIR) for the Natomas Levee Improvement Program's Landside Components project (proposed project; SCH # 2007062016). The project consists of proposed improvements along the land side of the Natomas Cross Canal (NCC) south levee, the Sacramento River east levee, and the Pleasant Grove Creek Canal (PGCC) west levee in Sacramento and Sutter Counties. The EIR will address improvements to the NCC south levee and Reaches 1 through 4 of the Sacramento River east levee (from the Natomas Cross Canal to approximately Elverta Road) at a project level, with construction in these anticipated to go forward in spring 2008. Improvements to Reaches 5 through 20 of the Sacramento River east levee and the PGCC west levee will be analyzed at a program level in the EIR. Construction in these reaches is expected to go forward in 2009 and 2010.

Significant natural resources of the project include unique habitats such as riparian and other wetlands, as well as habitat for sensitive species, particularly the Swainson's hawk (*Buteo swainsoni*; SWH), and the giant garter snake (*Thamnophis gigas*; GGS).

We recommend that the DEIR discuss and provide adequate mitigation for the following concerns:

1. The project's impact upon fish and wildlife and their habitat. We recommend that the DEIR identify all natural habitats and provide a discussion of how the proposed project will affect their function and value.

2. The project's impact upon significant habitat such as wetlands and riparian habitat. The project should be designed so that impacts to wetlands are avoided. Mitigation should be provided for unavoidable impacts based upon the concept of no net loss of wetland habitat values or acreage.

3. The project's impact to special status species including species that are state and/or federal listed as threatened and endangered.

4. The DEIR should provide an analysis of specific alternatives which reduce impacts to fish, wildlife, water quality, and vegetative resources.

5. The project's growth inducing and cumulative impacts upon fish, wildlife, water quality, and vegetative resources. CEQA Guidelines section 15130 states that "the following elements are necessary to an adequate discussion of significant cumulative impacts... a list of past, present, and probable future projects producing related or cumulative impacts, including, if necessary, those projects outside the control of the agency..." These guidelines also require that "when utilizing a list... a summary of the expected environmental effects to be produced by those projects with specific reference to additional information stating where that information is available... and a reasonable analysis of the cumulative impacts of the relevant projects [be provided]. An EIR shall examine reasonable, feasible options for mitigating or avoiding the project's contribution to any significant cumulative effects." The following is a list of possible future projects that may represent reasonable foreseeable cumulative development in the basin. The DFG recommends that the DEIR/EA provide an update of the status of each of the below projects and any other projects in the basin that are under active consideration, and assess whether or not the impacts of the projects on biological resources may be considered cumulative to the proposed project.

   Possible future projects in the Natomas Basin (in addition to those already mentioned in the DEIR/EA):

   - American Basin Fish Screen Habitat Improvement Project
   - Sacramento River Water Reliability Study
   - DWR/USACE Critical Erosion Site Repairs
   - Northwest Interceptor Project
   - Natomas Joint Vision Plan
   - Camino Norte Project
   - WAPA Transmission Line
   - PG&E Transmission Line
   - Placer Parkway
   - Caltrans I-80 Median Lanes and Auxiliary Lanes Project Sacramento County
   - Downtown to Natomas Light Rail Transportation Project

- Sacramento Municipal Utility Substation Expansion Projects (numerous)
- Greenbriar mixed use project
- Sutter Pointe Specific Plan

6. The DEIR should contain an evaluation of the proposed project's consistency with applicable land use or species recovery plans, such as General Plans, Specific Plans, Critical Habitat Designation, and Habitat Conservation Plans (HCP), including the Natomas Basin HCP and the Metro Air Park HCP. The DEIR should also provide an analysis of the proposed project's effects on the existing Natomas Basin HCP and the Metro Air Park HCP's operating conservation programs.

In addition, the DEIR should consider and analyze whether implementation of the proposed project will result in reasonably foreseeable potentially significant impacts subject to regulation by the DFG under section 1600 et seq. of the Fish and Game Code. In general, such impacts result whenever a proposed project involves work undertaken in or near a river, stream, or lake that flows at least intermittently through a bed or channel, including ephemeral streams and water courses. Impacts triggering regulation by the DFG under these provisions of the Fish and Game Code typically result from activities that:

- Divert, obstruct, or change the natural flow of the bed, channel, or bank of any river, stream, or lake;
- Use material from a streambed; or
- Result in the disposal or deposition of debris, waste, or other material where it may pass into any river, stream, or lake.

In the event implementation of the proposed project involves such activities, and those activities will result in reasonably foreseeable substantial adverse effects on fish or wildlife, a Lake or Streambed Alteration Agreement (LSAA) will be required by the DFG. Because issuance of a LSAA is subject to review under the California Environmental Quality Act (CEQA), the DEIR should analyze whether the potentially feasible mitigation measures set forth below will avoid or substantially reduce impacts requiring a LSAA from the DFG.

This project will have an impact to fish and/or wildlife habitat. Assessment of fees under Public Resources Code Section 21089 and as defined by Fish and Game Code Section 711.4 is necessary. Fees are payable by the project applicant upon filing of the Notice of Determination by the lead agency.

Pursuant to Public Resources Code Sections 21092 and 21092.2, the DFG requests written notification of proposed actions and pending decisions regarding this project. Written notifications should be directed to this office.

Thank you for the opportunity to review this project. If the DFG can be of further assistance, please contact Mr. Todd Gardner, Staff Environmental Scientist, at (209) 745-1968 or myself at (916) 358-2382.

Sincerely,

Kent Smith
Habitat Conservation Program Manager

cc: Ms. Holly Herod
U.S. Fish and Wildlife Service
2800 Cottage Way, Room W2605
Sacramento, CA 95825-1888

Mr. Todd Gardner
North Central Region
Department of Fish and Game
1701 Nimbus Road, Suite A
Rancho Cordova, CA 95670

SCH# 2007 062 058
07 JUL 2 PM 2:58

DEPARTMENT OF CONSERVATION

DIVISION OF LAND RESOURCE PROTECTION

801 K STREET • MS 18-01 • SACRAMENTO, CALIFORNIA 95814

PHONE 916 / 324-0850 • **FAX** 916 / 327-3430 • **TDD** 916 / 324-2555 • **WEBSITE** conservation.ca.gov

June 26, 2007

Mr. John Bassett
Director of Engineering
Sacramento Area Flood Control Agency
1007 Seventh Street, 7th Floor
Sacramento, CA 95814

Subject: Notice of Preparation of a Draft Environmental Impact Report for the Natomas Levee Improvement Program's Landside Components, Sacramento and Sutter County

Dear Mr. Bassett:

The Department of Conservation's Division of Land Resource Protection (Division) monitors farmland conversion on a statewide basis and administers the California Land Conservation (Williamson) Act, California Farmland Conservancy Program, and other agricultural land conservation programs. We have reviewed the NOP cited above, and our understanding of the proposed project is as follows:

Portions of the Pleasant Grove Creek Canal west levee and Natomas Cross Canal south levee the Sacramento River East levee would be improved to achieve a minimum of 3 feet freeboard above the 200-year water surface profile. Landside levee slopes would be reconstructed to meet the U.S. Army Corps of Engineers (USACE) preferred criterion of a 3:1 slope. Cut-off walls, seepage berms and stability berms and relief wells would be incorporated in seepage remediation actions. In addition, encroachments that exist within levees and maintenance areas that may affect levee integrity, hinder inspections and access for maintenance purposes would be corrected. The NOP indicates that some stands of large woody vegetation and trees may be removed.

We respectfully offer the following comments and ask that they be addressed in the scope of the DEIR:

We ask that the type, amount, and location of farmland lost to project implementation be included in the discussion of impacts. The conversion of Prime Farmland, Unique Farmland or Farmland of Statewide Importance is

considered a potentially significant adverse impact. Cumulatively, how many acres would be ultimately converted from their current agricultural uses? Is any acreage to be used for construction of recharge basins? As this project has more than one phase, it would be helpful if a summary were provided depicting how much of this acreage would be converted from agriculture to other uses, such as infrastructure, hard points, proposed habitat areas, and ultimately, urbanized areas. How many acres of Williamson Act contracted lands would be impacted and potentially converted? Loss of more than 100 acres of Williamson Act-contracted lands is considered of local, regional and statewide significance (CEQA Guidelines section 15206 (b) (3). What are the locations of agricultural operations that would be indirectly impacted, and how? What specific measures will be taken so that the growers who would be indirectly impacted would be compensated?

We encourage the use of the Department's Land Evaluation Site Assessment (LESA) model to assist the lead agency in its determination of level of significance project impacts may have on agricultural resources. The model can be found on the Department's website at www.conservation.ca.gov/dlrp. Please contact us if assistance is needed.

We ask that the DEIR contain a discussion of why trees should be removed on the waterside of the levees, in light of the many efforts to reconnect riparian vegetation and restore riverine corridors. The construction of setback levees would serve to contain flood flows, allow native vegetation to return or allow the continuance of agricultural activities.

Termination of Contract

Termination of a Williamson Act contract by acquisition can only be accomplished by a public agency, having the power of eminent domain, for a public improvement. Public agencies include departments or agencies of the United States. The Department must be notified in advance of any proposed public acquisition (Government Code §51290 - 51292), and specific findings must be made. The public agency must consider the Department's comments prior to taking action on the acquisition. We recommend discussion in the final document of whether such action is envisioned by this project and how the acquisition will meet the required findings. However, notification must be submitted separately from the CEQA process and CEQA documentation. Please refer to the following Notification Provisions:

Acquisition Notification Provisions of the Williamson Act

Notification provisions of the Williamson Act (Government Code Section 51291) require an agency to notify the Director of the Department of Conservation of the possible acquisition of Williamson Act contracted land for a public improvement. Such notification must occur when it appears that land enrolled in a Williamson Act contract may be required for a public use, is acquired, the original public improvement for the acquisition is changed, or the land acquired is

not used for the public improvement. The local governing body responsible for the administration of the agricultural preserve must also be notified.

Notification (Government Code Section 51291 (b))

The following information must be included in the notification correspondence.

The total number of acres of Williamson Act contracted land to be acquired and whether the land is considered prime agricultural land according to Government Code Section 51201.

The purpose for the acquisition and why the land was identified for acquisition. (If available, include documentation of eminent domain proceedings or a property appraisal and written offer in lieu of eminent domain per GC §§7267.1 and 7267.2 to void the contract per GC §51295; include a chronology of steps taken or planned to effect acquisition by eminent domain or in lieu of eminent domain.)

A description of where the parcels are located.
Characteristics of adjacent land (urban development, Williamson Act, noncontract agricultural, etc.)

A vicinity map and a location map (may be the same as #8).

A copy of the contract(s) covering the land.

CEQA documents for the project.

The findings required under GC §51292 , documentation to support the findings and an explanation of the preliminary consideration of §51292. (Include a map of the proposed site and an area of surrounding land identified by characteristics and large enough to help clarify that no other, noncontract land is reasonably feasible for the public improvement.)

Acquisition (Government Code Section 51291 (c))

The following information must be included in the notification when land within an agricultural preserve has been acquired. The notice must be forwarded to the Director within 10 working days of the acquisition of the land. The notice must also include the following:

A general explanation of the decision to acquire the land, and why non-contracted land is not available for the public improvement.

Findings made pursuant to Government Code Section 51292, as amended.

If the information is different from that provided in the previous notice sent upon consideration of the land, a general description of the land, and a copy of the contract covering the land shall be included in the notice.

Significant Change in Public Improvement (Government Code Section 51291 (d))
Once notice is given as required, if the public agency proposed any significant change in the public improvement, the Director must be notified of the changes before the project is completed.

Land Acquired is not Used for Public Improvement (Government Code Section 51295)
If the acquiring public agency does not use the land for the stated public improvement and plans to return it to private ownership, before returning the land to private ownership the Director must be notified of the action. Additional requirements apply. The mailing address for the Director is: Bridgett Luther, Director, Department of Conservation, 801 K Street, MS 18-01, Sacramento, CA 95814.

Thank you for the opportunity to provide early input for the project, and we appreciate its complexity. Please contact Jeannie Blakeslee at (916) 323-4943 if you have any questions regarding this letter or if you need assistance with the LESA model.

Sincerely,

for

Brian Leahy
Assistant Director

DEPARTMENT OF TRANSPORTATION
DISTRICT 3 – SACRAMENTO AREA OFFICE
VENTURE OAKS - MS 15
P.O. BOX 942874
SACRAMENTO, CA 94274-0001
PHONE (916) 274-0614
FAX (916) 274-0648
TTY (530) 741-4509

Flex your power!
Be energy efficient!

June 29, 2007

07SAC0094
03-SAC-99 PM VAR
Natomas Levee Improvement Program Landside Components
Notice of Preparation
SCH# 2007062016

Mr. John Bassett
Sacramento Area Flood Control Agency
1007 7th Street, 7th Floor
Sacramento, CA 95814

Dear Mr. Bassett:

Thank you for the opportunity to review and comment on the Notice of Preparation (NOP) for the Natomas Levee Improvement Program Landside Components project. The project proposes improvements along the land side of the Natomas Cross Canal south levee, the Sacramento River east levee, and the Pleasant Grove Creek Canal west levee in Sacramento and Sutter Counties. Our comments are as follows:

- The locations of the improvements need to be better defined in the environmental document. From the descriptions in the NOP and the map provided, it appears that the Natomas Cross Canal improvements may impact State Route 99 at Elverta Road and possibly State Route 70. A Transportation Management Plan (TMP) will need to be submitted to Caltrans for any work done on State right of way or near State right of way that may impact traffic operations on that facility.

If you have any questions about these comments please contact Alyssa Begley at (916) 274-0635.

Sincerely,

BRUCE DE TERRA, Chief
Office of Transportation Planning—South

cc: State Clearinghouse

CALIFORNIA STATE LANDS COMMISSION
100 Howe Avenue, Suite 100-South
Sacramento, CA 95825-8202

PAUL D. THAYER, *Executive Officer*
(916) 574-1800 FAX (916) 574-1810
Relay Service From TDD Phone **1-800-735-2929**
from Voice Phone **1-800-735-2922**

Contact Phone: **(916) 574-1814**
Contact FAX: **(916) 574-1885**

June 22, 2007

File Ref: SCH# 2007062016
& 2007062017

John Bassett
Sacramento Area Flood Control Agency
1007 7th Street, 7th Floor
Sacramento, CA 95814

Subject: Natomas Levee Improvement Program Bank Protection at Nine Sites on the Sacramento River East Levee

Dear Mr. Bassett :

The State acquired sovereign ownership of all tidelands and submerged lands and beds of navigable waterways upon its admission to the United States in 1850. The State holds these lands for the benefit of all the people of the State for statewide Public Trust purposes which include waterborne commerce, navigation, fisheries, water-related recreation, habitat preservation, and open space. The landward boundaries of the State's sovereign interests in areas that are subject to tidal action are generally based upon the ordinary high water marks of these waterways as they last naturally existed. In non-tidal navigable waterways, the State holds a fee ownership in the bed of the waterway between the two ordinary low water marks as they last naturally existed. The entire non-tidal navigable waterway between the ordinary high water marks is subject to the Public Trust. The State's sovereign interests are under the jurisdiction of the State Lands Commission.

The proposed project may involve the Sacramento River, which is State sovereign land under jurisdiction of the State Lands Commission. To the extent the proposed project involves activity waterward of the high watermark, approval from the Commission is required.

Please contact Jeslyn McComas at (916) 574-1895, should you have any questions regarding leasing information.

Sincerely,

Marina R. Brand, Assistant Chief
Division of Environmental Planning
and Management

cc: Office of Planning and Research
State Clearinghouse
P.O. Box 3044
Sacramento, CA 95812-3044

Jeslyn McComas, CSLC

DEPARTMENT OF
PARKS AND RECREATION

PARK PLANNING, DESIGN &
DEVELOPMENT DIVISION

CITY OF SACRAMENTO
CALIFORNIA

915 I STREET – 5TH FLOOR
SACRAMENTO, CA
95814

(916) 808-1923
FAX 808-8266

June 26, 2007

Mr. John Bassett, Director of Engineering
Sacramento Area Flood Control Agency
1007 Seventh Street, 7th Floor
Sacramento, CA 95814

RE: Notice of Preparations of two Environmental Impact Reports (EIR's) on the Natomas Levee Improvement Program's Landside Components and Bank Protection projects

Dear Mr. Bassett:

Thank you for submitting the Notice of Preparations for your Natomas Levee Improvement Program's Landside Components and Bank Protection projects. We do not have any comments to submit on the nine bank protection projects. However, after reviewing the project description for the Landside Components, we believe that the EIR should include an evaluation of potential affects on Recreation elements. There are two potential impacts that should be considered:

1. The entrance into Sand Cove Park is located on Garden Highway in Reach 19 of your Natomas Levee Improvement Program's project area. Temporary closures of this road for project construction will necessitate closures of this park as well. It will also hinder the ability of Parks' maintenance crews to access the park at that time.

2. The project description mentions the expansion of the levee/maintenance area footprint by a minimum of 45 feet in several levee reaches in the southern part of the basin, and approximately 55 feet in most other reaches. The City of Sacramento has several parks located on the landside of the levee, including Shorebird Park (Reach 19), Natomas Oaks Park (Reach 20) and the undeveloped Costa Site across from Sand Cove Park (Reach 19). Expansion of the levee footprint will potentially reduce usable park areas at these sites.

We would request that these recreational elements get evaluated in the EIR on the Natomas Levee Improvement Program's Landside Components. Thank you for the opportunity to comment.

Sincerely,

Teresa Haenggi

Teresa Haenggi
Parks Planner

May 22, 2007

Tim Washburn
SAFCA
1007 7th Street, 7th Floor
Sacramento, Ca. 95814

Dear Tim:

We very much appreciated your presentation to Habitat 2020 at the May 14 meeting. Your effort to engage us in early discussion of various issues involved in improving North Natomas levees is a valuable opportunity. We now are more educated on the challenges faced by SAFCA in protecting wildlife, habitat, people and property in the Natomas Basin. Thank you very much for a most interesting and informative presentation.

Here are our initial comments on the presentation.

1) Consistent with the goals of the Heartland Project, Habitat 2020 would want to see SAFCA include a public trail throughout the project in order to provide passive recreation and education opportunities in North Natomas.

2) Habitat 2020 wants to see more detailed information about impacts of the proposed project on trees used for nesting Swainson's Hawks and white-tailed kites, and heritage oaks protected by County ordinance.

3) The project described to Habitat 2020 May 14 would have very serious and significant impacts on the Natomas Basin Habitat Conservation Plan requiring a major amendment to the Plan. The City of Sacramento and County of Sutter have incidental take protection because of the NBHCP. They risk losing this protection if they violate the Plan. They are bound by their commitments in the NBHCP (which is a contract with federal and state regulatory agencies) in joint powers agreements such as SAFCA.

4) The strategy that you described would mine agricultural soils for levee expansion, re-engineering the basin on a large scale. It would have significant impacts on hundreds of acres of productive and prime agricultural lands. What would be the impact on Swainson's Hawk foraging habitat of the mining of upland soils and creation of wetlands in their place? Swainson's Hawk conservation depends on maintenance of agriculture. It is not clear how the impacts on agricultural lands and Swainson's Hawk could be mitigated. This was not discussed in the EIR for
the funding mechanism. We think SAFCA must address and answer the question: which method — slurry walls or 300 foot seepage blanket — provides the better protection with the least impacts to the environment?

5) The temporal loss of habitat in the Natomas Basin is also a very serious issue given the fragility of protection today, the permitted development remaining (in the City and Sutter Co), and the City and County of Sacramento campaign to further develop in Natomas ("Joint Vision").

The SAFCA project would impact existing preserves. The temporal loss to existing preserves in particular raises issues about violation of ESA/CESA. One way to help manage these issues would be to require local governments to adopt a moratorium on additional urban entitlements for a period of 20-30 years to allow the Basin to recover before consideration of further damage to habitat with more urbanization. Another mitigation measure might be to acquire vacant land within the NBHCP Permit Areas (such as in Sutter Co. Measure M area or Metro Airpark) and retire permits for these acquisitions, thus reducing the urban footprint now permitted in the basin.

6) SAFCA's assumptions about the North Natomas levee problem deserve a much more thorough public review and discussion with input from the state experts. We want to see a publicly available peer review of independent experts such as California Department of Water Resources of the assumptions used in the project analysis. We are particularly concerned with the rejection of the setback levee concept.

7) We are concerned about what looks like a lack of consideration for climate change impacts on river flows and the need for a much bigger picture assessment of where resources for flood control would most cost effectively be utilized to absorb higher flows along with reducing freeboard at Natomas levees.

8) Letters submitted already to SAFCA on behalf of Friends of the Swainson's Hawk, ECOS, and Sierra Club, and Friends of the River, commenting on the EIR for the SAFCA funding mechanisms for flood control improvements disagree with SAFCA on some issues.

In particular, we disagree with the assertion that setback levees and increased high-water diversions through the bypass are not feasible. Levee setbacks along the Natomas Basin will not decrease the volume that is diverted by the Fremont Weir if the gates of the Fremont Weir were lowered a couple of feet. Issues arising from increased diversions through the bypass could be resolved by assertion of leadership by DWR or a Federal entity, and it would not be a lengthy process. The fact is there isn't enough space between the levees during high water years, a problem which may become more exacerbated due to the effects of climate change, which is predicted to generate some years that are wetter (and some that are drier) than in the past, and different flow patterns due to lower snow pack.

The Airport concerns about waterfowl being attracted to the proposed Natomas levee setback area are groundless. The existing farmland collects stormwater and is thus attractive to wintering waterfowl at present. Most of the year, the setback area would be dry. During wet season, trees growing in the setback area would prevent waterfowl flocks, which need large areas of open water to land and take off. Airport's high bird strike rate (highest or second-highest on the West Coast - not the nation) results from the unwise decisions of the County and FAA to locate the Airport directly beneath the Pacific Flyway. Most waterfowl using the flyway don't land in Natomas.

Meanwhile, a setback levee could also aid the fisheries of the river by providing high water refuge with safe return to the river when high waters recede. This benefit may be of value to state and federal regulatory agencies. We have seen setback levees working well on the Yolo side of Sacramento River north of West Sacramento. The setback and the trees on the setback area have broken the force of the current and protected the bank from erosion while giving the river more room.

We very much appreciate your presentation of SAFCA's current thinking on these issues and helping us understand the difficulties in finding options that will reduce impacts on sensitive wildlife habitats. We do believe there are better alternatives than the ones proposed and that substantially more mitigation will be needed for the improvements proposed to offset temporal losses and impacts to the NBHCP. **Please respond to this letter by email.**

Habitat 2020 Member Organizations:

Chris Lewis, Habitat 2020 Chair
SacValley California Native Plant Society
lewisc@surewest.net

Terry Davis
Sierra Club Mother Lode Chapter
coordinator@sierraclub-sac.org

Alta Tura, Chair
Urban Creeks Council
ucc@arcadecreekrecreation.com

Graham Brownstein
Environmental Council Sacramento
execdirector@ecosacramento.net

Judith Lamare, President
Friends of the Swainson's Hawk
judelam@sbcglobal.net

Mike Savino
Save Our Sandhill Cranes
yogoombah@yahoo.com

Cc: Congresswoman Doris Matsui, Assemblymember David Jones, Mayor Heather Fargo, Supervisor Dan Silva, Supervisor Roger Dickinson, Councilmember Ray Tretheway, Lester Snow, California Department of Water Resources, Ryan Brodrick, Department of Fish and Game, Steve Thompson, US Fish and Wildlife Service, John Roberts, Natomas Basin Conservancy, Ron Stork, Friends of the River.

The mission of Habitat 2020 is to protect the lands and waters where our wildlife and native plants live in Sacramento County. The member organizations are Sacramento Audubon, Save the American River Association, California Native Plant Society- Sacramento Valley Chapter, Sacramento Urban Creeks Council, Environmental Council Of Sacramento, Sierra Club- Mother Lode Chapter, Save Our Sandhill Cranes, and Friends of Swainson's Hawk.

Sacramento Area Flood Control Agency

June 4, 2007

Chris Lewis, Habitat 2020 Chair
SacValley California Native Plant Society
lewisc@surewest.net

Terry Davis
Sierra Club Mother Lode Chapter
coordinator@sierraclub-sac.org

Alta Tura, Chair
Urban Creeks Council
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execdirector@ecosacramento.net

Judith Lamare, President
Friends of the Swainson's Hawk
judelam@sbcglobal.com

Mike Savino
Save Our Sand Hill Cranes
yogommbah@yahoo.com

Dear Habitat 2020 Representatives,

Thank-you for your timely comments on my May 14, 2007 presentation to your group on SAFCA's Natomas Levee Improvement Program. With your concurrence, we will treat your letter dated May 22, 2007 as a response to the attached Notice of Preparation of an Environmental Impact Report (EIR) on the Natomas Levee Improvement Program's Landside Components and Notice of Preparation of an Environmental Impact Report (EIR) on the Natomas Levee Improvement Program Bank Protection at Nine Sites on the Sacramento River East Levee. This will ensure that the issues raised in your letter are part of the public record associated with these EIRs and will allow us to specifically consider these issues in preparing the EIR's. Of course, if you feel a need to supplement your comments in light of the information contained in the notices, please plan on attending the public scoping meeting on June 19, 2007 or otherwise providing us with any additional input prior to July 3, 2007.

We hope to issue Draft EIRs on the Landside and Bank Protection Components of the Natomas Levee Improvement Program later this summer. Once these documents have been issued, I would be happy to appear before your group again to continue our dialogue on how SAFCA can pursue its flood risk reduction goals for the Natomas Basin in a manner that preserves and enhances the Basin's environmental resources.

Sincerely,

Tim Washburn
Agency Counsel

cc: Congressmember Doris Matsui,
Assemblymember Dave Jones,
Mayor Heather Fargo
Supervisor Dan Silva
Supervisor Roger Dickinson
Councilmember Ray Tretheway
Lester Snow, California Department of Water Resources
Ryan Brodrick, California Department of Fish and Game
Steve Thompson, US Fish and Wildlife Service
John Roberts, Natomas Basin Conservancy
Ron Stork, Friends of the American River

From: Ralph Hants [mailto:catmancoos@yahoo.com]
Sent: Tuesday, July 03, 2007 4:58 PM
To: Lienert. Julie (MSA); Bassett. John (MSA)
Subject: Re: FW: From Website Contact Form

Julie and John, First of all let me thank you for helping me to obtain the NOP Julie. Secondly, after going to the second workshop primarily related to flood control per the Natomas Joint Vision, where my questions were not answered to my and others satisfaction; and, after cursory review of the NOP, I have come to the conclusion that there needs to be much further discussion on a number of different levels of interest, before i will feel relaxed about your plans. Drainage, eminent domain, rightsofway, continued agriculture, just to name a few, are what troubles me most. I also think the existing property owners most adversely affected should be allowed more input. Realizing time to be of the essence, since i am also in jeopardy; I reluctantly, but firmly oppose the current offerings until there is more thought and input added into the equation of Natomas Joint Vision. Most Respectfully, Ralph L. Hants and ten John Does

"Lienert. Julie (MSA)" <lienertj@SacCounty.NET> wrote:

Please find complete copy (2 pages) of NOP attached.

-----Original Message-----
From: Lienert. Julie (MSA)
Sent: Wednesday, June 20, 2007 10:00 AM
To: 'Ralph L. Hants'
Subject: RE: From Website Contact Form

Dear Mr. Hants:

Please find a copy of the NOP attached.

Sincerely,

Julie Lienert

-----Original Message-----

From: Ralph L. Hants [mailto:catmancoos@yahoo.com]

Sent: Wednesday, June 20, 2007 9:09 AM

To: info@safca.org

Subject: From Website Contact Form

Importance: High

FORM:

FORM submitted at 6/20/2007 9:08:48 AM

From: Ralph L. Hants

Email: catmancoos@yahoo.com

Phone: 916-925-8334

Comments: Ladies and Gentlemen, I am formally requesting your NOTICE OF PREPARATION related to the NATOMAS JOINT VISION, so that i may properly

address any issues i may have regarding such project. Sincerely, Ralph L. Hants

Submit: Submit

APPENDIX B

Hydraulic Modeling Results

Hydraulic Impact Analysis For Levee Raises Proposed By The Natomas Levee Improvement Program Landside Improvements Project

Prepared by

MBK ENGINEERS
2450 Alhambra Blvd., 2nd Floor
Sacramento, CA 95817
916/456-4400 (phone) • 916/456-0253 (fax)

September 7, 2007

Hydraulic Impact Analysis
For Levee Raises Proposed by the
Natomas Levee Improvement Program Landside Improvements Project

Introduction

The Natomas Levee Improvement Program (NLIP) Landside Improvements Project (NLIP Landside Project) proposes raising and strengthening the Sacramento River east levee between the Natomas Cross Canal and the American River and the Natomas Cross Canal south levee to ensure that they could pass a "200-year" flood event[1] with a minimum of three feet of freeboard. The design top of levee elevation is based on adding three feet of freeboard to the water surface resulting from routing the 200-year flood event through the Sacramento and Feather Rivers with the assumption that levees comprising the Sacramento River Flood Control Project (SRFCP) overtop without levee failure. This report provides the results of an analysis to determine if the NLIP Landside Project would have any impacts on SRFCP design water surface elevations in adjacent river channels or on flows that exceed system design in these channels or in floodplain areas upstream and downstream of the Natomas Basin.

The NLIP Landside Project involves improvements to the landside of the Natomas Basin levees. These improvements would not alter the existing geometry or hydraulic characteristics (e.g., construction of a setback levee a significant distance away from the existing levee and removal of the existing levee) of the river and stream channels surrounding the basin and would therefore not affect SRFCP design flows or stages. Therefore, it can be concluded that the design capacity of the system as defined by USACE[2] would not be impacted by the Project. Accordingly, this document focuses on whether or not construction of the NLIP Landside Project facilities would affect river and floodplain water surface elevations in flood events that exceed the SRFCP design. To answer this question, a hydraulic computer model was used to compute water surface elevations for the 100-year and 200-year flood events with and without the NLIP Landside Project facilities in place. The NLIP also proposes to construct bank protection improvements at nine sites along the Sacramento River east levee and at two sites along the NCC south levee. The potential impacts to river stages that may result from these bank protection improvements are addressed in a separate report.

Hydraulic Model

The MBK version of the Sacramento River UNET hydraulic simulation model that was originally developed by the United States Army Corps of Engineers (USACE) for the Sacramento-San Joaquin River Basins Comprehensive Study (Comprehensive Study) was used to complete this analysis.

[1] The 200-year flood event is a flood event that has a 0.5% chance of occurring in any given year.
[2] USACE, Sacramento River Flood Control Project, California, Levee and Channel Profiles, 15 March 1957

Levee Performance

For the without project scenario the hydraulic model simulations assumed that all levees within the SRFCP outside the Natomas Basin would hold water to the top of their current profile and would fail when overtopped. Flow over the levees was allowed to surcharge 0.5 feet before the levee would begin to fail. If the levee failure criteria were met, a levee breach with a bottom width of 500 feet was assumed for levee failures on the major waterways (Sacramento River, American River, Feather River, Sutter Bypass and Yolo Bypass). For all other waterways a levee failure bottom width of 200 feet was assumed. Breaches were assumed to reach their final width in 2 hours. These levee failure assumptions are consistent with historical levee breaks.

Hydrology

The analysis was made using the following hydrologic centerings[3] that were developed by the USACE for the Comprehensive Study UNET model:

- Sacramento River at Sacramento
- Feather River at Shanghai Bend
- American River at Folsom Dam

The Folsom Dam releases in the Comprehensive Study hydrologic data sets were replaced with flood routings produced in August 2006 by the USACE[4] that are based on today's operating rules.

Results

As discussed, the analysis focused on changes in water surface elevations for the 100-year and 200-year flood events with and without the NLIP Landside Project facilities in place. The analysis showed that the existing Natomas Basin levees that would be raised as part of the NLIP Landside Project, would not fail due to overtopping in either of the modeled flood events (see Figures 1 and 2). Therefore, it follows that incorporation of the NLIP Landside Project improvements into the analysis would have no effect on water surface elevations for the modeled flood events. The peak flows in the Sacramento River downstream of the Natomas Cross Canal were 112,000 cfs and 141,000 cfs in the 100-year and 200-year simulations, respectively. For perspective, the SRFCP design discharge in this reach is 107,000 cfs and the peak flow reported for the Verona gage during the January 1997 flood event was 102,000 cfs.

Because of the determination that the existing Natomas Basin levees would not overtop even under a 200-year flood analysis, a second analysis was performed. This analysis assumed that levees throughout the SRFCP would fail when the river water surface elevation reached within

[3] The hydrologic centerings represents a system-wide storm that produces the n-year frequency discharge at the stated location. The studies performed herein used hydrologic input data from the HEC-DSS file SACINFLO.DSS, dated 5/14/2002, developed by USACE for use with the Sacramento River UNET model.

[4] The flood routings are from the following USACE spreadsheet files:
Current Conditions – "01 Folsom 2006-08-17 R000_800CF.xls"

three feet of the top of levee. The water surface profiles for this analysis are shown on Figures 3 and 4. This analysis also showed that the existing Natomas Basin levees would not fail. This means that under two very different levee failure scenarios, the Natomas Basin levees are currently superior to other levees in the SRFCP system.

Conclusion

The proposed landside improvements to the Natomas Basin levees would not adversely impact the SRFCP upstream, downstream or within the river and stream channels around the basin because the existing Natomas Basin levees are superior in height to the levees throughout the SRFCP system. Raising and strengthening the Natomas Basin levees, as proposed under the NLIP Landside Project, would not change this existing relationship. The NLIP Landside Project would provide greater assurance that the Natomas Basin levees could reliably protect a growing urban area without creating adverse hydraulic impacts elsewhere in the SRFCP.

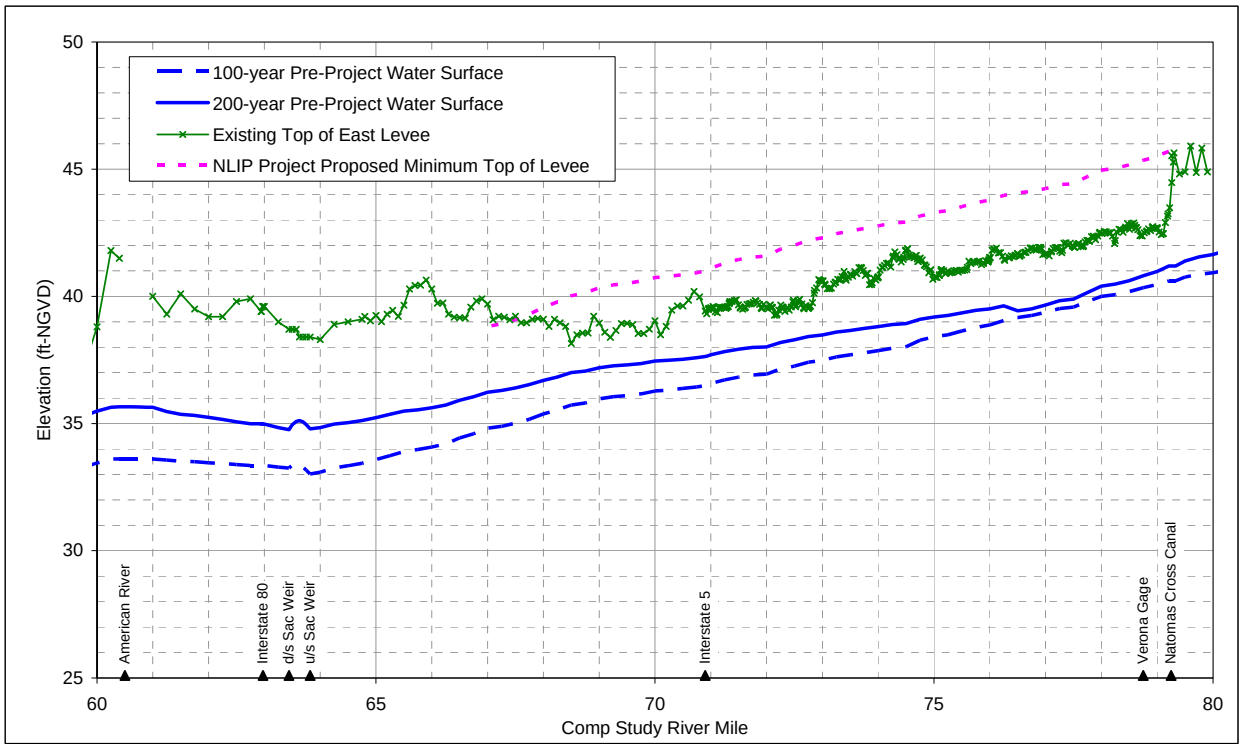

Figure 1. Overtopping Levee Failure Simulation Profiles – Sacramento River between Natomas Cross Canal and American River

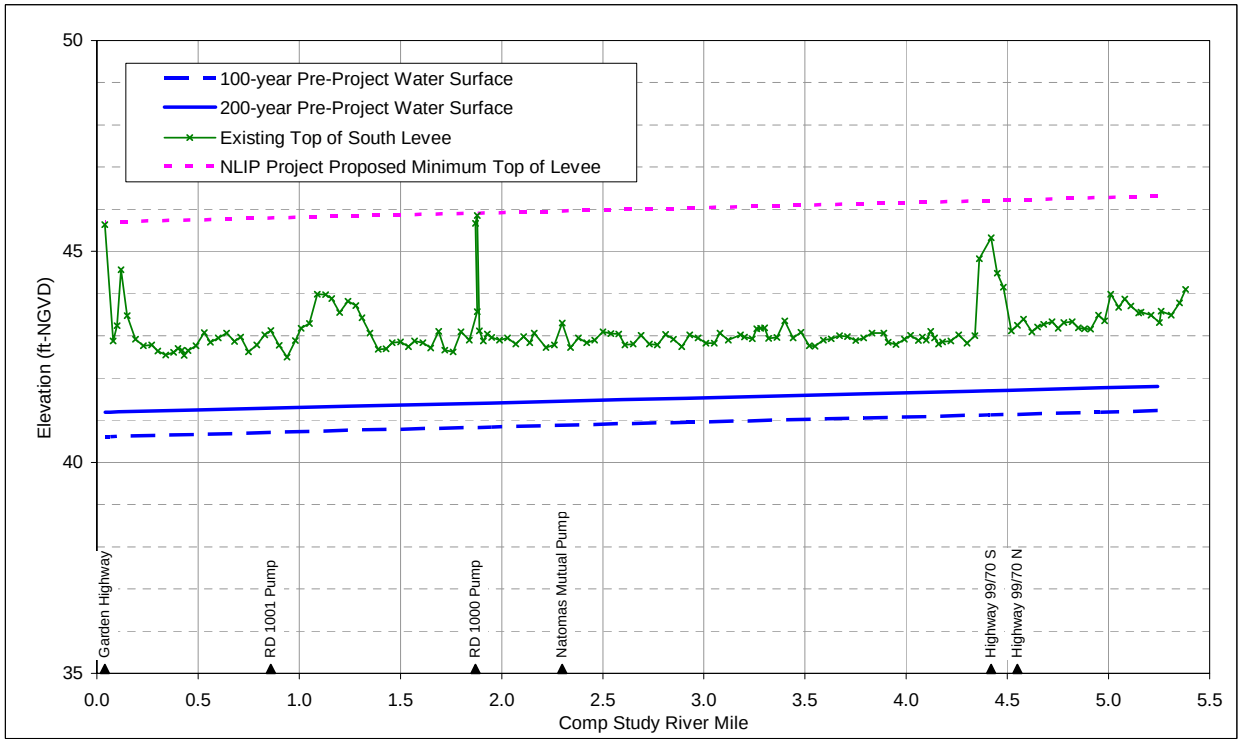

Figure 2. Overtopping Levee Failure Simulation Profiles – Natomas Cross Canal

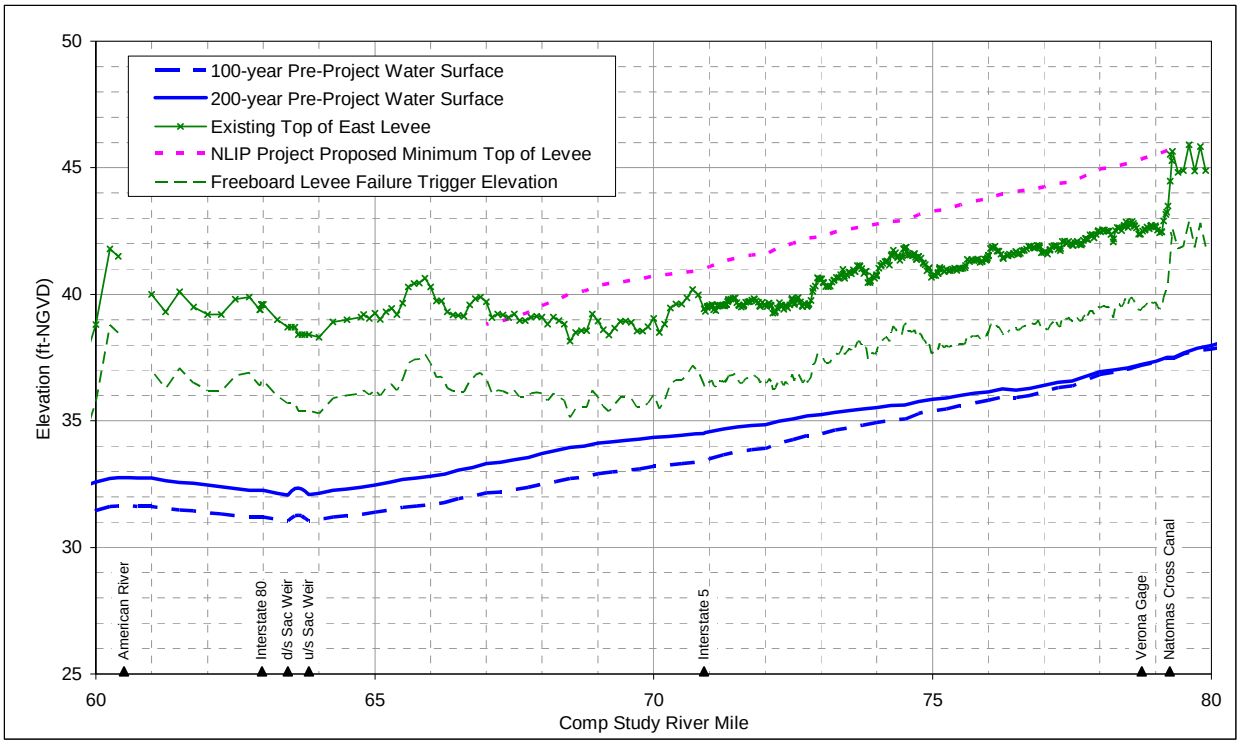

Figure 3. Freeboard Encroachment Levee Failure Simulation Profiles – Sacramento River between Natomas Cross Canal and American River

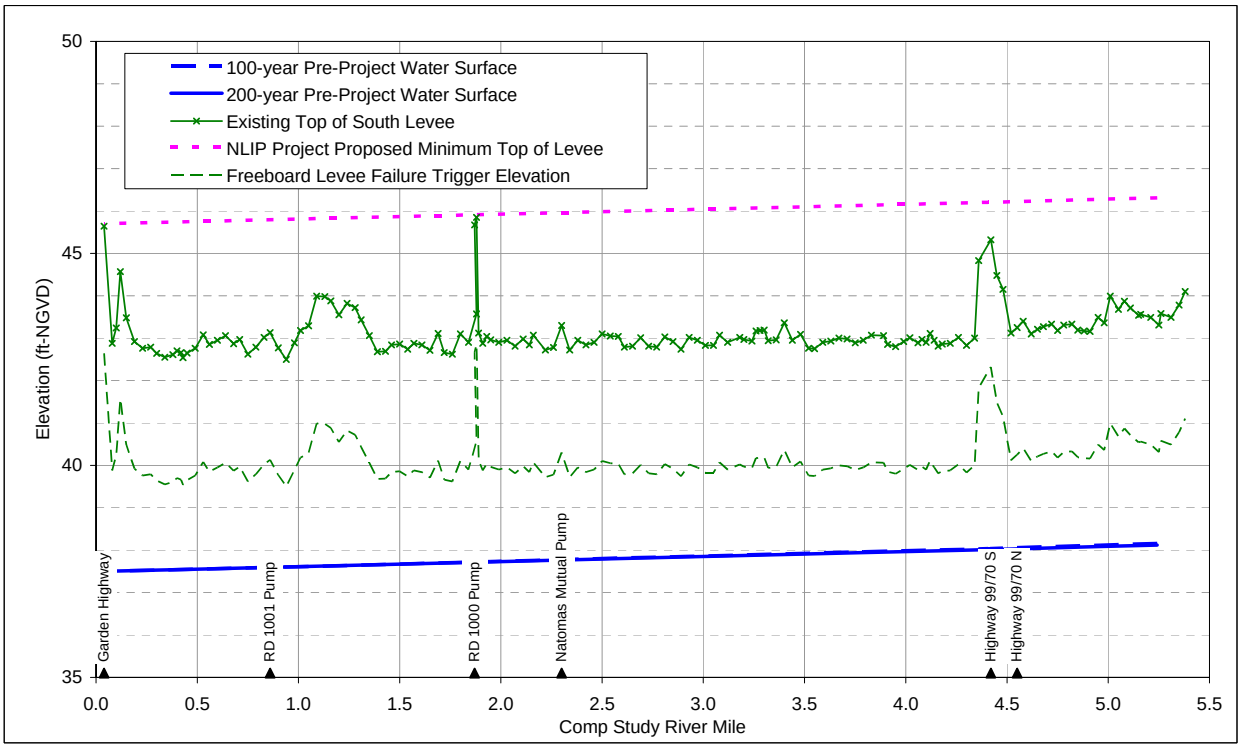

Figure 4. Freeboard Encroachment Levee Failure Simulation Profiles – Natomas Cross Canal

APPENDIX C

Air Quality Modeling Results

Unit	Quantity	Unit	ROG	NOX	PM10	Unit	Distance (miles/round-trip)	# of Haul Loads	Total Miles Traveled	Total Miles Traveled/Day	Time frame	Conversion Factor	
	4000.0	yd3 (export)					10.0	266.7	2666.7	444.4	6.0	days	
	*(assumes 10 miles to material disposal site)							*(assumes haul load = 15 yd3)					
lb/day	4.0		87.1	517.2	26.8	lb/yr						0.002204623	lb/gram
lb/day	2.0		43.2	167.7	8.6	lb/yr							
lb/day	4.0		22.1	168.3	9.1	lb/yr							
g/mile	20.0	employees	2.2	5.8	0.4	lb/yr				40.0	per employee	0.002204623	lb/gram
lb/VMT	0.0	trucks	-	-	-	lb/yr							
lb/VMT	4.0	trucks			753.0	lb/yr							
							Tons/yd3 (gravel/sand)	Tons/day					
lb/ton					202.9	lb/yr	1.25	833.33					
lb/ton			-	-	26.3	lb/yr	1.25	833.33					
			154.6	**859.0**	**1027.1**	**lb/yr**						2000	lb/ton
			25.8	**143.2**	**171.2**	**lb/day**							
	0.0	yd3					0.0	0.0	0.0	0.0	12.0	days	
								*(assumes haul load = 15 yd3)					
lb/day	2.0		87.1	517.2	26.8	lb/yr							
lb/day	2.0		44.2	155.2	8.2	lb/yr							
lb/day	1.0		12.5	56.6	3.1	lb/yr							
g/mile	20.0	employees	4.4	11.6	0.8	lb/yr				40.0	per employee	0.002204623	lb/gram
			148.2	**740.6**	**38.9**	**lb/yr**						2000	lb/ton
			12.3	**61.7**	**3.2**	**lb/day**							
	0.0	yd3					0.0	0.0	0.0	20.0	16.0	days	
								*assumes haul load = 15 yd3					
lb/day	2.0		58.9	207.0	10.9	lb/yr							
lb/day	4.0		366.2	1658.8	91.5	lb/yr							
g/mile	2.0		1.0	12.2	0.4	lb/yr	*assumes flat-bed trucks travel 20 miles/day on paved roads					0.002204623	lb/gram
g/mile	20.0	employees	5.9	15.5	1.1	lb/yr				40.0	per employee	0.002204623	lb/gram
lb/VMT	0.0	trucks	-	-	-	lb/yr							
lb/VMT	2.0	trucks			90.4	lb/yr							
			432.0	**1893.5**	**194.4**	**lb/yr**						2000	lb/ton
			27.0	**118.3**	**12.1**	**lb/day**							
	15000.0	yd3					10.0	1000.0	10000.0	1000.0	55.0	days	
	(borrow)							*assumes haul load = 15 yd3		*10 days to complete hauling			
lb/day	2.0		396.2	1537.4	79.2	lb/yr							
lb/day	2.0		399.1	2370.4	122.7	lb/yr							
lb/day	4.0		129.1	982.8	53.2	lb/yr							
lb/day	2.0		131.9	1070.3	58.2	lb/yr							
g/mile	10.0		15.4	190.3	6.0	lb/yr						0.002204623	lb/gram
g/mile	20.0	employees	20.4	53.4	3.9	lb/yr				40.0	per employee	0.002204623	lb/gram
lb/VMT	0.0	trucks	-	-	-	lb/yr							
lb/VMT	10.0	trucks			2,823.8	lb/yr	*assumes borrow area is 10 miles round trip, on paved roads						
			1092.1	**6204.5**	**3146.9**	**lb/yr**						2000	lb/ton
			19.9	**112.8**	**57.2**	**lb/day**							
	2600.0	yd3					20.0	173.3	3466.7	385.2	9.0	days	
								*(assumes haul load = 15 yd3)					
lb/day	3.0		97.3	377.4	19.5	lb/yr							
g/mile	10.0		5.3	66.0	2.1	lb/yr	*assumes concrete delivered from an offsite source 20 miles away					0.002204623	lb/gram
g/mile	20.0	employees	4.5	9.7	0.6	lb/yr				40.0	per employee	0.002204623	lb/gram
lb/VMT	0.0	trucks	-	-	-	lb/yr							
lb/VMT	10.0	trucks			978.9	lb/yr							
			107.1	**453.0**	**1001.0**	**lb/yr**						2000	lb/ton
			11.9	**50.3**	**111.2**	**lb/day**							
	0.0	yd3					0.0	0.0	0.0	0.0	4.0	days	
								*(assumes haul load = 15 yd3)					
lb/day	1.0		14.4	55.9	2.9	lb/yr							
lb/day	1.0		4.8	38.9	2.1	lb/yr							
lb/day	2.0		14.7	51.7	2.7	lb/yr							
g/mile	20.0	employees	1.5	3.9	0.3	lb/yr				40.0	per employee	0.002204623	lb/gram
			35.4	**150.4**	**8.0**	**lb/yr**						2000	lb/ton
			8.9	**37.6**	**2.0**	**lb/day**							
	0.0	yd3					0.0	0.0	0.0	0.0	8.0	days	
								*assumes haul load = 15 yd3					
lb/day	1.0		28.8	111.8	5.8	lb/yr							
lb/day	2.0		29.4	103.5	5.5	lb/yr							
lb/day	2.0		14.7	112.2	6.1	lb/yr							
lb/day	3.0		49.9	226.2	12.5	lb/yr							
lb/day	1.0		11.5	49.3	2.7	lb/yr						0.002204623	lb/gram
g/mile	20.0	employees	3.0	7.8	0.6	lb/yr				40.0	per employee	0.002204623	lb/gram
			137.4	**610.7**	**33.0**	**lb/yr**						2000	lb/ton
			17.2	**76.3**	**4.1**	**lb/day**							
	7000.0	yd3					20.0	466.7	9333.3	4666.7	15.0	days	
								*(assumes haul load = 15 yd3)					
lb/day	2.0		33.3	150.8	8.3	lb/yr							
lb/day	2.0		14.7	112.2	6.1	lb/yr							
lb/day	3.0		162.1	628.9	32.4	lb/yr							
g/mile	2.0		14.4	177.6	5.6	lb/yr	*assumes seeding material delivered from an offsite source 20 miles away					0.002204623	lb/gram
g/mile	20.0	employees	31.7	257.4	14.0	lb/yr				40.0	per employee	0.002204623	lb/gram
lb/VMT	0.0	trucks	-	-	-	lb/yr							
lb/VMT	2.0	trucks			2,635.5	lb/yr							
			256.2	**1326.9**	**2701.9**	**lb/yr**						2000	lb/ton
			17.1	**88.5**	**180.1**	**lb/day**							
			1	**6**	**4**	**TPY**	to occur during 2008 calendar year						
			27	**118**	**180**	**Worst-case lb/day**	*assumes some phases will be conducted concurrently						

Sacramento River East Levee Improvements

*assumes 90% of levee work is in Sutter County and 10% in Sacramento County

	ROG	NOX	PM10	Unit	Quantity	Unit	ROG	NOX	PM10	Unit	Distance (miles/ round-trip)	# of Haul Loads	Total Miles Traveled	Total Miles Traveled/Day	Time frame	Conversion Factor	
[1]Clearing, Grubbing, Stripping, Grading (concurrent with [2,3])					0.0	yd3					0.0	0.0	4.3	4.3	18.0	days	
Mobile Sources												*assumes haul load = 15 y		*assumes haul trucks drive length of levee each day				
Haul Truck(s)	0.70	8.63	0.27	g/mile	4.0		0.0	0.3	0.0	lb/yr						0.002204623	lb/gram
Water Truck(s)	3.60	13.98	0.72	lb/day	1.0		64.8	251.6	13.0	lb/yr							
Scraper(s)	3.64	15.96	0.85	lb/day	4.0		262.2	1149.5	61.2	lb/yr							
Loader(s)	0.92	7.01	0.38	lb/day	2.0		33.2	252.4	13.7	lb/yr							
Grader(s)	1.20	9.73	0.53	lb/day	2.0		43.2	350.3	19.0	lb/yr							
Employee Trips	0.21	0.55	0.04	g/mile	120.0	employees	40.0	104.8	7.6	lb/yr				40.0	per employe	0.002204623	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr							
Travel on paved roads			0.28	lb/VMT	4.0	trucks			4.9	lb/yr							
Material Handling										Tons/yd3 (gravel/sand)		Tons/day					
Total							**443.4**	**2108.8**	**119.4**	**lb/yr**						2000	lb/ton
Total							**24.6**	**117.2**	**6.6**	**lb/day**							
[2]Relocate Canal and Tree Removal (concurrent with [1,3])					0.0	yd3					0.0	0.0	4.3	4.3	24.0	days	
Mobile Sources												*assumes haul load = 15 y		*assumes haul trucks drive length of levee each day				
Excavator(s)	1.84	6.47	0.34	lb/day	2.0		88.3	310.4	16.4	lb/yr							
Haul Truck(s)	0.70	8.63	0.27	g/mile	4.0		0.0	0.3	0.0	lb/yr						0.002204623	lb/gram
Loader(s)	0.92	7.01	0.38	lb/day	2.0		44.2	336.5	18.2	lb/yr							
Employee Trips	0.21	0.55	0.04	g/mile	120.0	employees	53.3	139.7	10.2	lb/yr				40.0	per employe	0.002204623	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr							
Travel on paved roads			0.28	lb/VMT	4.0	trucks			4.9	lb/yr							
Total							**185.9**	**787.0**	**581.9**	**lb/yr**						2000	lb/ton
Total							**7.7**	**32.8**	**24.2**	**lb/day**							
[3]Excavate Stability Berm/Inspection Trech (concurrent with [1,2])				Reusable Onsite Fill	242000.0	yd3					0.1	16133.3	1613.3	67.2	24.0	days	
Mobile Sources												*(assumes haul load = 15 yd3)						
Excavator(s)	1.84	6.47	0.34	lb/day	2.0		88.3	310.4	16.4	lb/yr							
Scraper(s)	3.64	15.96	0.85	lb/day	2.0		174.8	766.3	40.8	lb/yr							
Haul Truck(s)	0.70	8.63	0.27	g/mile	4.0		2.5	30.7	1.0	lb/yr						0.002204623	lb/gram
Employee Trips	0.21	0.55	0.04	g/mile	120.0	employees	53.3	139.7	10.2	lb/yr				40.0	per employe	0.002204623	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr							
Travel on paved roads			0.28	lb/VMT	8.0	trucks			455.6	lb/yr							
Material Handling										Tons/yd3 (gravel/sand)		Tons/day					
Aggregate Storage Piles	-	-	0.002	lb/ton					483.6	lb/yr	1.25	12604.17					
							-	-									
Total							**319.0**	**1247.1**	**1007.4**	**lb/yr**						2000	lb/ton
Total							**13.3**	**52.0**	**42.0**	**lb/day**							
[4]Borrow Excavation, Haul and Place Adjacent Levee Raise & Seepage Berms (concurrent with [5,6])				Random Fill	1307000.0	yd3					3.0	87133.3	261400.0	2420.4	108.0	days	
				Drain Rock	207000.0	yd3					30.0	13800.0	414000.0	3833.3	108.0	days	
Mobile Sources												*(assumes haul load = 15 yd3)						
Water Truck(s)	3.60	13.98	0.72	lb/day	2.0		778.1	3018.9	155.6	lb/yr							
Scraper(s)	3.64	15.96	0.85	lb/day	13.0		5113.5	22414.3	1193.2	lb/yr							
Loader(s)	0.92	7.01	0.38	lb/day	4.0		398.0	3028.7	163.9	lb/yr							
Bulldozers	3.63	21.55	1.12	lb/day	2.0		783.6	4654.6	240.9	lb/yr							
Other Equipment	2.08	9.43	0.52	lb/day	2.0		449.4	2035.8	112.4	lb/yr							
Grader(s)	1.20	9.73	0.53	lb/day	2.0		258.9	2101.7	114.2	lb/yr							
Haul Truck(s)	0.70	8.63	0.27	g/mile	29.0		1042.3	12850.1	402.0	lb/yr						0.002204623	lb/gram
Employee Trips	0.21	0.55	0.04	g/mile	120.0	employees	240.0	628.6	45.7	lb/yr				40.0	per employe	0.002204623	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	30.0	trucks	-	-	202,105.1	lb/yr	*assumes that 1/3 of material hauling along unpaved haul routes						
Travel on paved roads			0.28	lb/VMT	30.0	trucks			127,144.3	lb/yr	*assumes that 2/3 of material hauling is along paved haul routes						
Material Handling										Tons/yd3 (gravel/sand)		Tons/day					
Material loading at borrow			0.04	lb/ton					76,816.4	lb/yr	1.25	17523.15					
Material unloading at levee			0.005	lb/ton					9,935.6	lb/yr	1.25	17523.15					
Bulldozing	-	-	0.41	lb/hr	12.0	hrs/day			532.28	lb/yr							
Total							**9063.8**	**50732.7**	**418961.6**	**lb/yr**						2000	lb/ton
Total							**83.9**	**469.7**	**3879.3**	**lb/day**							
[5]Reconstruct Garden Hwy/Install Surface Drainage (concurrent with [4,6])					0.0	yd3					10.0	0.0	10.0	10.0	27.0	days	
Mobile Sources												*assumes haul load = 15 y		*assumes haul trucks drive 10 miles each day				
Backhoe(s)	0.67	4.54	0.38	lb/day	2.0		36.3	245.4	20.5	lb/yr							
Other Equipment	2.08	9.43	0.52	lb/day	1.0		56.2	254.5	14.0	lb/yr							
Roller(s)	0.59	4.47	0.24	lb/day	1.0		15.8	120.6	6.5	lb/yr							
Paver(s)	0.93	7.08	0.38	lb/day	2.0		50.2	382.2	20.7	lb/yr							
Concrete Truck(s)	3.60	13.98	0.72	lb/day	1.0		97.3	377.4	19.5	lb/yr							
Haul Truck(s)	0.70	8.63	0.27	g/mile	3.0		0.0	0.6	0.0	lb/yr						0.002204623	lb/gram
Employee Trips	0.29	0.61	0.04	g/mile	120.0	employees	81.7	173.7	10.9	lb/yr				40.0	per employe	0.002204623	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr							
Travel on paved roads			0.28	lb/VMT	3.0	trucks			8.5	lb/yr							
Total							**337.6**	**1554.3**	**81.1**	**lb/yr**						2000	lb/ton
Total							**12.5**	**57.6**	**3.0**	**lb/day**							
[6]Construct Relief Wells/Berm/Drainage Canal (concurrent with [4,5])					0.0	yd3					0.0	0.0	0.0	0.0	13.0	days	
Mobile Sources												*(assumes haul load = 15 yd3)						
Off-Highway Truck(s)	3.60	13.98	0.72	lb/day	4.0		187.3	726.8	37.5	lb/yr							
Excavator(s)	1.84	6.47	0.34	lb/day	1.0		23.9	84.1	4.4	lb/yr							
Drill Rig(s)	2.87	5.75	0.43	lb/day	2.0		74.7	149.4	11.2	lb/yr							
Other Equipment	2.08	9.43	0.52	lb/day	1.0		27.0	122.5	6.8	lb/yr							
Employee Trips	0.21	0.55	0.04	g/mile	120.0	employees	28.9	75.7	5.5	lb/yr				40.0	per employe	0.002204623	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	2.0	trucks	-	-	-	lb/yr							
Travel on paved roads	-	-	0.28	lb/VMT	0.0	trucks			-	lb/yr							
Total							**341.9**	**1158.5**	**65.4**	**lb/yr**						2000	lb/ton
Total							**26.3**	**89.1**	**5.0**	**lb/day**							
[7]Site Restoration/Demobilization					0.0	yd3					0.1	0.0	0.0	0.0	26.0	days	
Mobile Sources												*(assumes haul load = 15 yd3)						
Off-Highway Truck(s)	3.60	13.98	0.72	lb/day	4.0		374.6	1453.6	74.9	lb/yr							
Haul Truck(s)	0.70	8.63	0.27	g/mile	2.0		0.0	0.0	0.0	lb/yr						0.002204623	lb/gram
Employee Trips	1.20	9.73	0.53	g/mile	120.0	employees	329.8	2677.1	145.5	lb/yr				40.0	per employe	0.002204623	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr							
Travel on paved roads	-	-	0.28	lb/VMT	0.0	trucks			-	lb/yr							
Total							**704.4**	**4130.7**	**220.4**	**lb/yr**						2000	lb/ton
Total							**27.1**	**158.9**	**8.5**	**lb/day**							
Total from East Levee Project							**5.7**	**30.9**	**210.5**	**TPY**	to occur during 2008 calendar year						
Total from East Levee Project							**122.7**	**616.4**	**3887.3**	**Worst-case lb/day**	*assumes some phases will be conducted concurrently						
Emissions to occur in Sutter County						**90%**	**5.1**	**27.8**	**189.5**	**TPY**	to occur during 2008 calendar year						
Emissions to occur in Sacramento County						**10%**	**0.6**	**3.1**	**21.1**	**TPY**	to occur during 2008 calendar year						
Emissions to occur in Sutter County						**90%**	**110.5**	**554.8**	**3498.6**	**Worst-case lb/day**	*assumes some phases will be conducted concurrently						
Emissions to occur in Sacramento County						**10%**	**12.3**	**61.6**	**388.7**	**Worst-case lb/day**	*assumes some phases will be conducted concurrently						

*These calculations represent worst-case emissions from construction activities associated with East Levee

NCC South Levee Phase 2 Improvements - Cutoff Wall and Levee Raise																	
*All work would occur in Sutter County																	
	ROG	NOX	PM10	Unit	Quantity	Unit	ROG	NOX	PM10	Unit	Distance (miles/round-trip)	# of Haul Loads	Total Miles Traveled	Total Miles Traveled/Day	Time frame	Conversion Factor	
[1]Clearing, Grubbing, Stripping					13500.0	yd3 (export)					10.0	900.0	9000.0	450.0	20.0	days	
Mobile Sources					*(assumes 10 miles to material disposal site)							*(assumes haul load = 15 yd3)					
Haul Truck(s)	0.70	8.63	0.27	g/mile	12.0		166.7	2054.8	64.3	lb/yr						0.002204623	lb/gram
Water Truck(s)	3.60	13.98	0.72	lb/day	1.0		72.0	279.5	14.4	lb/yr							
Scraper(s)	3.64	15.96	0.85	lb/day	3.0		218.5	957.9	51.0	lb/yr							
Loader(s)	0.92	7.01	0.38	lb/day	1.0		18.4	140.2	7.6	lb/yr							
Employee Trips	0.21	0.55	0.04	g/mile	50.0	employees	18.5	48.5	3.5	lb/yr				40.0	per employee	0.002204623	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr							
Travel on paved roads			0.28	lb/VMT	12.0	trucks			2,541.4	lb/yr							
Material Handling											Tons/yd3 (gravel/sand)	Tons/day					
Truck Loading at Levee	-	-	0.04	lb/ton					685.0	lb/yr	1.25	843.75					
Truck Unloading at Off-site Disposal	-	-	0.005	lb/ton			-	-	88.6	lb/yr	1.25	843.75					
Total							**494.2**	**3480.9**	**3455.7**	**lb/yr**						2000	lb/ton
Total							**24.7**	**174.0**	**172.8**	**lb/day**							
[2,4]Levee Degrading & Compaction (lags [1] by 14 days)					0.0	yd3					0.0	0.0	0.0	0.0	50.0	days	
Mobile Sources												*(assumes haul load = 15 yd3)					
Bulldozer(s)	3.63	21.55	1.12	lb/day	3.0		544.2	3232.4	167.3	lb/yr							
Water Truck(s)	3.60	13.98	0.72	lb/day	2.0		360.2	1397.6	72.0	lb/yr							
Scraper(s)	3.64	15.96	0.85	lb/day	2.0		364.2	1596.5	85.0	lb/yr							
Roller(s)	0.59	4.47	0.24	lb/day	2.0		58.7	446.7	24.2	lb/yr							
Loader(s)	0.92	7.01	0.38	lb/day	1.0		46.1	350.5	19.0	lb/yr							
Employee Trips	0.21	0.55	0.04	g/mile	50.0	employees	46.3	121.3	8.8	lb/yr				40.0	per employee	0.002204623	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr							
Travel on paved roads			0.28	lb/VMT	0.0	trucks			-	lb/yr							
Material Handling																	
Bulldozing	-	-	0.41	lb/hr	10.0	hrs/day			205.35	lb/yr							
Total							**1419.7**	**7145.0**	**581.6**	**lb/yr**						2000	lb/ton
Total							**28.4**	**142.9**	**11.6**	**lb/day**							
[3,5]Cutoff Wall Construction & Borrow Site Excavation (lags [2] by 14 days)					44500.0	yd3 (borrow)					10.0	2966.7	29666.7	370.8	80.0	days	
Mobile Sources					*(assumes RD 1001 borrow site)							*(assumes haul load = 15 yd3)					
Excavator(s)	1.84	6.47	0.34	lb/day	3.0		441.7	1552.2	82.0	lb/yr							
Water Truck(s)	3.60	13.98	0.72	lb/day	1.0		288.2	1118.1	57.6	lb/yr							
Other Equipment	2.08	9.43	0.52	lb/day	8.0		1331.6	6032.1	332.9	lb/yr							
Loader(s)	0.92	7.01	0.38	lb/day	3.0		221.1	1682.6	91.0	lb/yr							
Haul Truck(s)	0.70	8.63	0.27	g/mile	8.0		45.8	564.4	17.7	lb/yr						0.002204623	lb/gram
Pick-up Truck(s)	0.21	0.55	0.04	g/mile	3.0		0.1	0.3	0.0	lb/yr						0.002204623	lb/gram
Employee Trips	0.21	0.55	0.04	g/mile	50.0	employees	74.1	194.0	14.1	lb/yr				40.0	per employee	0.002204623	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr							
Travel on paved roads			0.28	lb/VMT	8.0	trucks			8,377.1	lb/yr							
Material Handling											Tons/yd3 (gravel/sand)	Tons/day					
Truck Loading at Borrow	-	-	0.04	lb/ton					2257.8	lb/yr	1.25	695.31					
Truck Unloading at Levee	-	-	0.005	lb/ton			-	-	292.0	lb/yr	1.25	695.31					
Total							**2402.5**	**11143.8**	**11522.4**	**lb/yr**						2000	lb/ton
Total							**30.0**	**139.3**	**144.0**	**lb/day**							
[6]Demobilization/Cleanup					0.0	yd3					0.0	0.0	0.0	0.0	14.0	days	
Mobile Sources												*(assumes haul load = 15 yd3)					
Water Truck(s)	3.60	13.98	0.72	lb/day	3.0		151.3	587.0	30.3	lb/yr							
Haul Truck(s)	0.70	8.63	0.27	g/mile	2.0		0.2	2.7	0.1	lb/yr	*(assumes haul truck drives 5.1 miles/day)					0.002204623	lb/gram
Employee Trips	0.21	0.55	0.04	g/mile	50.0	employees	13.0	34.0	2.5	lb/yr				40.0	per employee	0.002204623	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	2.0	trucks	-	-	128.2	lb/yr	*(assumes haul truck drives 5.1 miles/day)						
Travel on paved roads			0.28	lb/VMT	0.0	trucks			-	lb/yr							
Total							**164.5**	**623.7**	**161.0**	**lb/yr**						2000	lb/ton
Total							**11.7**	**44.5**	**11.5**	**lb/day**							
Levee Raise & Borrow Site Excavation					580000.0	yd3					10.0	38666.7	386666.7	4549.0	85.0	days	
Mobile Sources												*(assumes haul load = 15 yd3)					
Water Truck(s)	3.60	13.98	0.72	lb/day	4.0		1224.7	4752.0	244.9	lb/yr							
Bulldozer(s)	3.63	21.55	1.12	lb/day	2.0		616.8	3663.4	189.6	lb/yr							
Roller(s)	0.59	4.47	0.24	lb/day	4.0		199.6	1518.8	82.2	lb/yr							
Excavator(s)	1.84	6.47	0.34	lb/day	5.0		782.2	2748.8	145.3	lb/yr							
Haul Truck(s)	0.70	8.63	0.27	g/mile	30.0		596.7	7356.7	230.2	lb/yr						0.002204623	lb/gram
Employee Trips	0.29	0.61	0.04	g/mile	65.0	employees	139.3	296.2	18.5	lb/yr				40.0	per employee	0.002204623	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	0.0	trucks	-	-	-	lb/yr							
Travel on paved roads			0.28	lb/VMT	30.0	trucks			109,185.2	lb/yr							
Material Handling											Tons/yd3 (gravel/sand)	Tons/day					
Truck Loading at Borrow	-	-	0.04	lb/ton					29427.7	lb/yr	1.25	8529.41					
Truck Unloading at Levee	-	-	0.005	lb/ton			-	-	3806.3	lb/yr	1.25	8529.41					
Total							**3559.3**	**20335.9**	**143329.8**	**lb/yr**						2000	lb/ton
Total							**41.9**	**239.2**	**1686.2**	**lb/day**							
Finishing Grading					0.0	yd3					0.0	0.0	0.0	0.0	10.0	days	
Mobile Sources												*(assumes haul load = 15 yd3)					
Water Truck(s)	3.60	13.98	0.72	lb/day	2.0		72.0	279.5	14.4	lb/yr							
Grader(s)	1.20	9.73	0.53	lb/day	2.0		24.0	194.6	10.6	lb/yr							
Employee Trips	0.21	0.55	0.04	g/mile	55.0	employees	10.2	26.7	1.9	lb/yr				40.0	per employee	0.002204623	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	2.0	trucks	-	-	-	lb/yr							
Travel on paved roads	-	-	0.28	lb/VMT	0.0	trucks			-	lb/yr							
Total							**106.2**	**500.8**	**26.9**	**lb/yr**						2000	lb/ton
Total							**10.6**	**50.1**	**2.7**	**lb/day**							
Operating Road Construction					5000.0	yd3					0.1	333.3	33.3	3.3	10.0	days	
Mobile Sources												*(assumes haul load = 15 yd3)					
Compactor(s)	2.08	9.43	0.52	lb/day	2.0		41.6	188.5	10.4	lb/yr							
Grader(s)	0.67	4.54	0.38	lb/day	2.0		6.7	45.4	3.8	lb/yr	(*assumes that graders are used for 5 days)						
Haul Truck(s)	0.70	8.63	0.27	g/mile	5.0		0.1	0.6	0.0	lb/yr						0.002204623	lb/gram
Employee Trips	1.20	9.73	0.53	g/mile	55.0	employees	58.1	471.9	25.6	lb/yr				40.0	per employee	0.002204623	lb/gram
Fugitive Sources																	
Travel on unpaved roads	-	-	0.90	lb/VMT	2.0	trucks	-	-	29.9	lb/yr							
Travel on paved roads	-	-	0.28	lb/VMT	0.0	trucks			9.4	lb/yr							
Material Handling											Tons/yd3 (gravel/sand)	Tons/day					
Truck Loading of salvage material	-	-	0.04	lb/ton					253.7	lb/yr	1.25	625.00					
Truck Unloading at road installation	-	-	0.005	lb/ton			-	-	32.8	lb/yr	1.25	625.00					
Total							**106.5**	**706.5**	**365.7**	**lb/yr**						2000	lb/ton
Total							**10.7**	**70.7**	**36.6**	**lb/day**							
Total from NCC Project							**4**	**22**	**80**	**TPY**	to occur during 2008 calendar year						
Total from NCC Project							**58**	**317**	**184**	**Worst-case lb/day**	*assumes some phases will be conducted concurrently						
*These calculations represent worst-case emissions from construction activities associated with the NCC																	

Unmitigated 2008 Emissions

Sutter County	Worst-Case lb/day			Tons/year		
	ROG	NOX	PM10	ROG	NOX	PM10
NCC	58	317	184	4	22	80
East Levee	110	555	3499	5	28	189
TOTAL	168.9	871.7	3683.0	9.3	49.7	269.2

Sacramento County	Worst-Case lb/day			Tons/year		
	ROG	NOX	PM10	ROG	NOX	PM10
East Levee	12	62	389	1	3	21
Elkhorn Canal	27	118	180	1	6	4
TOTAL	39.3	180.0	568.9	1.8	9.2	25.1

Mitigated 2008 Emissions

Sutter County	Worst-Case lb/day			Tons/year		
	ROG	NOX	PM10	ROG	NOX	PM10
% Reduction	5%	20%	75%	5%	20%	75%
TOTAL	160.4	697.4	920.7	8.8	39.8	67.3
Threshold	25	25	80	25	25	-
Significant?	Y	Y	Y	N	Y	-

Sacramento County	Worst-Case lb/day			Tons/year		
	ROG	NOX	PM10	ROG	NOX	PM10
% Reduction	5%	20%	75%	5%	20%	75%
TOTAL	37.3	144.0	142.2	1.7	7.4	6.3
Threshold	-	85	-	25	25	100
Significant?	-	Y	Y*	N	N	N

*PM10 emissions would likely result in or substantially contribute to a violation of the (

Equipment Type	Emission Rates for Year 2008				Assumptions: Emission factors from the Road Construction Emissions Model, Version 5.2 (SMAQMD 2006) for 2008 which assume equipment operates 8hrs/day
	ROG	NOX	PM10	Unit	
Employee Light-Duty Trucks	0.21	0.55	0.04	g/mile	
Haul Trucks	0.70	8.63	0.27	g/mile	
Backhoes	0.67	4.54	0.38	lb/day	
Bore/Drill Rigs	2.87	5.75	0.43	lb/day	
Concrete/Industrial Saws	1.11	7.51	0.63	lb/day	
Cranes	1.44	6.16	0.34	lb/day	
Crawler Tractors	1.09	10.22	0.54	lb/day	
Crushing/Proc. Equipment	1.59	14.91	0.79	lb/day	
Dozer	3.63	21.55	1.12	lb/day	
Excavator	1.84	6.47	0.34	lb/day	
Forklifts, Rough Terrain	0.78	4.59	0.35	lb/day	
Grader	1.20	9.73	0.53	lb/day	
Loaders, Rubber Tired	0.92	7.01	0.38	lb/day	
Off-Highway Trucks	3.60	13.98	0.72	lb/day	
Other Construction Equip.	2.08	9.43	0.52	lb/day	
Pavers	0.93	7.08	0.38	lb/day	
Paving Equipment	0.78	7.28	0.39	lb/day	
Rollers	0.59	4.47	0.24	lb/day	
Scrapper	3.64	15.96	0.85	lb/day	
Signal Boards	0.65	2.37	0.22	lb/day	
Skid Steer Loaders	0.56	2.91	0.17	lb/day	
Surfacing Equipment	3.74	22.19	1.15	lb/day	
Tractors	0.67	4.54	0.38	lb/day	
Trenchers	0.99	5.69	0.41	lb/day	
Water Trucks	0.65	7.23	0.24	g/mile	
Fugitive Dust			10	lb/acre/day	

Travel on Unpaved Haul Roads (Heavy Duty Trucks):

E(lbs/VMT)=(k)(s/12)^a (W/3)^b	*AP-42 12/03, 13.2.2-4 eq 1a	
Where:	**PM10**	
k=Particle Size Multiplier:	1.5	*AP-42 12/03 Table 13.2.2-2; PM10 emissions; industrial roads
s=Silt Content:	4.3	*AP-42 12/03 Table 13.2.2-1, service road
empirical constants		
a	0.9	*AP-42 12/03 Table 13.2.2-2; PM10 emissions; industrial roads
b	0.45	*AP-42 12/03 Table 13.2.2-2; PM10 emissions; industrial roads
W=Vehicle Weight:	11.375	((2+1.25 T/cy*15 cy truck capacity) + 2)/2 (average weight of loaded and unloaded haul truck; assumed empty truck weighs 2 tons)
	1.08	lbs/VMT
E(ext)= E[(365-P)/365]	*AP-42 12/03 12.2.2-4 eq 2	
Where:		
P=# days/yr with >=0.01 in. precip	63	*AP-42 12/03 Figure 13.2.2-1 for Sacramento Co/NOAA Technical Memorandum NWS WR-272; CLIMATE OF SACRAMENTO, CALIFORNIA (June 2005)
	0.90	lbs/VMT

Travel on Paved Haul Roads (Heavy Duty Trucks):

E(lbs/VMT)=(k) (sL/2)^.65 (W/3)^1.5 - C	*AP-42 12/03, 13.2.1-4 eq 1	
Where:	**PM10**	
k=Particle Size Multiplier (lb/VMT)	0.016	*AP-42 12/03 Table 13.2.1-1; PM10 emissions; industrial roads
sL=road surface silt loading (g/m2)	8.2	*AP-42 12/03 Table 13.2.1-4; quarry roads
W=Vehicle Weight:	11.375	((2+1.25 T/cy*15 cy truck capacity) + 2)/2 (average weight of loaded and unloaded haul truck; assumed empty truck weighs 2 tons)
C=exhaust, break, tire wear (lb/VMT)	0.00047	*AP-42 12/03 Table 13.2.1-2; PM10 emissions
	0.30	lbs/VMT
E(ext)= E[1-(P/4N)]	*AP-42 12/03 13.2.1 eq 2	
Where:		
P=# days/yr with >=0.01 in. precip	63	*AP-42 12/03 Figure 13.2.2-1 for Sacramento Co/NOAA Technical Memorandum NWS WR-272; CLIMATE OF SACRAMENTO, CALIFORNIA (June 2005)
N=number of days in averaging period	365	
	0.28	lbs/VMT

Fugitive Dust Source Emissions

	(lb/acre/day)	
Disturbance Area	60.71	

Assumptions: SMAQMD emission factor of 60.71 lbs/acre/day (SMAQMD 1994).

Aggregate Storage Piles

Emissions result from several distinct processes within the stockpiling cycle: 1. loading in of materials through batch or drop operations, 2. equipment traffic in storage area, 3. wind erosion of piles, 4. loadout of material through batch or drop operations (AP-42 12/03, chapt. 13.2.4).

E(lb/ton)=(k)(0.0032)(U/5)^1.3 /(M/2)^1.4	*AP-42 12/03, 13.2.4-3 eq 1	
Where:	**PM10**	
k=Particle Size Multiplier:	0.35	*AP-42 12/03 13.2.4-3; PM10 emissions
U=mean wind speed (mph)	8	*NOAA Western Regional Climate Center, Sacramento International Airport ASOS station, CA RAWS data from 1996-2006 (http://www.wrcc.dri.edu/htmlfiles/westwind.final.html#CALIFORNIA)
M=moisture content (%):	2.4	*AP-42 7/98 Table 11.9-3, haul truck
	0.002	lbs/ton

Batch Loading at Borrow Area

E(TSP<15 um)=(.119/(M^0.9))	*AP-42 7/98, Table 11.9-1	
Where:	**PM10**	
M=moisture content (%):	2.4	*AP-42 7/98 Table 11.9-3, haul truck
	0.05	lb/ton
*E(TSP<10um)=(E(TSP<15 um)*S)*	*AP-42 7/98, Table 11.9-1	
S=scaling factor	0.75	*AP-42 7/98 Table 11.9-3, haul truck
	0.04	lb/ton

Truck Unloading

E(TSP<15 um)	**PM10**		
Where:	**0.007**	lb/ton	*AP-42 7/98 Table 11.9-4, end dump truck unloading (batch drop
*E(TSP<10um)=(E(TSP<15 um)*S)*	*AP-42 7/98, Table 11.9-1		
S=scaling factor	0.75	*AP-42 7/98 Table 11.9-1, haul truck	
	0.005	lb/ton	

Bulldozing

E(TSP<15 um)=(18.6(s)^1.5)/(M^1.4)	*AP-42 7/98, Table 11.9-1	
Where:		
M=moisture content (%):	7.9	*AP-42 7/98 Table 11.9-3, bulldozer
s=silt content (%)	6.9	*AP-42 7/98 Table 11.9-3, bulldozer
	18.67	lb/hr
*E(TSP<10um)=(E(TSP<15 um)*S)*	*AP-42 7/98, Table 11.9-1	
S=scaling factor	0.75	*AP-42 7/98 Table 11.9-1, bulldozer
	14.00	lb/hr

Scraper Unloading

	PM10		
E(TSP<15 um)	**0.04**	lb/ton	*AP-42 7/98 Table 11.9-4, scraper unloading
*E(TSP<10um)=(E(TSP<15 um)*S)*	*AP-42 7/98, Table 11.9-1		
S=scaling factor	0.75	*AP-42 7/98 Table 11.9-1, bulldozer/haul truck	
	0.03	lb/ton	

TIPS FOR USE:

1. For both residential and non-residential acreage entries EXCLUDE ONLY undisturbed (not graded) Open Space
2. Append this calculation sheet to the environmental document.
3. Unmitigated NOx (lbs/day) and duration (days) should be consistent with URBEMIS results.

Construction Emissons Mitigation Fee Calculation

PART 1: PROJECT INFORMATION

Project Name:	SAFCA - 2008 NLIP Emissions within SMAQMD's Jurisdiction		
Control/Application #:			
Single Family Dwelling Units:		*Note: Enter information only in blue bordered cells*	
Multi Family Dwelling Units:		Total Residential Acreage:	
Non-residential Square Feet:		Total Non-residential Acreage:	

PART 2: EMISSIONS INFORMATION

Year	Activity Phase	NOx (lbs/day) unmitigated	NOx (lbs/day) mitigated*	NOx over threshold (lbs/day)	duration (days)	Total significant NOx (lbs)
2008	East Levee/Elkhorn Canal	179.99	143.99	58.99	108	6370.80
	Total project Nox over threshold (lbs)		*6370.80*			
	Total project Nox over threshold (tons)		*3.19*			

PART 3: MITIGATION FEE RESULTS

TOTAL MITIGATION FEE ($14,300/TON) **	***$45,551***
>>>	*Fee is to be paid to the SMAQMD prior to any ground disturbance either in total or on a by acre basis.*

Mitigation Fee ($/acre)	**$45,551.00**

* Assumes a construction mitigation plan which achieves a 20% reduction in NOx from on-site, off-road equipment.

** Or the $/ton of NOx cost-effectiveness value in effect at the time the fee is collected.

APPENDIX D

Noise Modeling Results

Predicted Levee Noise Levels

Appendix D
SAFCA Levee Improvement Project
Clearing and Grubbing/Strippng
NLIP

	Distance to Nearest Receiver in feet	Resulting Cumulative Noise Level (Leq dBA) Mitigated	Unmitigated
	100	63.6	79.3
	200	57.6	73.3
	300	54.0	69.7
	400	51.5	67.2
	500	49.6	65.3
	600	48.0	63.7
	700	46.7	62.4
	800	45.5	61.2
	900	44.5	60.2
	1000	43.6	59.3
	1100	42.8	58.5
	1200	42.0	57.7
	1300	41.3	57.0
	1400	40.7	56.4
	1500	40.1	55.8
	1600	39.5	55.2
	1700	39.0	54.7
	1800	38.5	54.2
Threshold*	900	44.5	60.2

Assumptions:

	Reference Noise Levels (L_{max}) @50 feet		
	Mitigated	Unmitigated	Usage Factor
Scraper	80	88	0.4
Loader	75	79	0.4
Water Truck	75	91	0.4

H_{eff} = 10
G = 0.57

Calculations:	L_{eq} **dBA @ 100 feet**	
	Mitigated	Unmitigated
Scraper	68.3	76.3
Loader	63.3	67.3
Water Truck	63.3	79.3

Cumulative:	L_{eq} **dBA @ 100 feet**	
	Mitigated	Unmitigated
	63.6	79.3

Sources:
Reference noise levels were obtained from the National Cooperative Highway Research Program, Syntesis 218, Table 3, Construction Equipment Noise Emission Levels, page 8.
The equation L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50) is found in the NCHRP, Synthesis 218, page 11 "Noise Impact Assessment."
Notes:
* The threshold specific for this Project.
G = the constant that accounts for topography and ground effects.
H_{eff} = the sum of average path heights on either side of a topographical feature. Utilized to determine the **G** factor.

Appendix D
SAFCA Levee Improvement Project
Levee Degrading
NLIP

	Distance to Nearest Receiver in feet	Resulting Cumulative Noise Level (Leq dBA) Mitigated	Unmitigated
	100	63.8	79.3
	200	57.7	73.3
	300	54.2	69.7
	400	51.7	67.2
	500	49.8	65.3
	600	48.2	63.7
	700	46.9	62.4
	800	45.7	61.2
	900	44.7	60.2
	1000	43.8	59.3
	1100	42.9	58.5
	1200	42.2	57.7
	1300	41.5	57.0
	1400	40.8	56.4
	1500	40.2	55.8
	1600	39.7	55.2
	1700	39.2	54.7
	1800	38.7	54.2
Threshold*	2600	35.5	51.0

Assumptions:	**Reference Noise Levels (L_{max}) @50 feet**		
	Mitigated	Unmitigated	Usage Factor
Scraper	80	88	0.4
Loader	75	79	0.4
Water Truck	75	91	0.4
Dozer	75	80	0.4

H_{eff} = 10
G = 0.57

Calculations:	**L_{eq} dBA @ 100 feet**	
	Mitigated	Unmitigated
Scraper	68.3	76.3
Loader	63.3	67.3
Water Truck	63.3	79.3
Dozer	63.3	68.3

Cumulative:	**L_{eq} dBA @ 100 feet**	
	Mitigated	Unmitigated
	63.8	79.3

Sources:
Reference noise levels were obtained from the National Cooperative Highway Research Program, Syntesis 218, Table 3, Constuction Equipment Noise Emission Levels, page 8.
The equation L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50) is found in the NCHRP, Synthesis 218, page 11 "Noise Impact Assessment."
Notes:
* The threshold specific for this Project.
G = the constant that accounts for topography and ground effects.
H_{eff} = the sum of average path heights on either side of a topographical feature. Utilized to determine the **G** factor.

Appendix D
SAFCA Levee Improvement Project
Demolish Canal and Tree Removal
NLIP

	Distance to Nearest Receiver in feet	Resulting Cumulative Noise Level (Leq dBA) Mitigated	Unmitigated
	100	72.3	79.3
	200	66.3	73.3
	300	62.7	69.7
	400	60.2	67.2
	500	58.3	65.3
	600	56.7	63.7
	700	55.4	62.4
	800	54.2	61.2
	900	53.2	60.2
	1000	52.3	59.3
	1100	51.5	58.5
	1200	50.7	57.7
	1300	50.0	57.0
	1400	49.4	56.4
	1500	48.8	55.8
	1600	48.2	55.2
	1700	47.7	54.7
	1800	47.2	54.2
Threshold*	2300	45.0	52.0

Assumptions:

	Reference Noise Levels (L_{max}) @50 feet Mitigated	Unmitigated	Usage Factor
Excavator	80	85	0.4
Loader	75	79	0.4
Haul Truck	84	91	0.4

H_{eff} = 10
G = 0.57

Calculations:	L_{eq} dBA @ 100 feet Mitigated	Unmitigated
Excavator	68.3	73.3
Loader	63.3	67.3
Haul Truck	72.3	79.3

Cumulative:	L_{eq} dBA @ 100 feet Mitigated	Unmitigated
	72.3	79.3

Sources:
Reference noise levels were obtained from the National Cooperative Highway Research Program, Syntesis 218, Table 3, Constuction Equipment Noise Emission Levels, page 8.
The equation L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50) is found in the NCHRP, Synthesis 218, page 11 "Noise Impact Assessment."
Notes:
* The threshold specific for this Project.
G = the constant that accounts for topography and ground effects.
H_{eff} = the sum of average path heights on either side of a topographical feature. Utilized to determine the **G** factor.

Appendix D
SAFCA Levee Improvement Project
Cutoff Wall Construction
NLIP

		Resulting Cumulative Noise Level (Leq dBA)	
	Distance to Nearest Receiver in feet	**Mitigated**	**Unmitigated**
	100	72.3	79.3
	200	66.3	73.3
	300	62.7	69.7
	400	60.2	67.2
	500	58.3	65.3
	600	56.7	63.7
	700	55.4	62.4
	800	54.2	61.2
	900	53.2	60.2
	1000	52.3	59.3
	1100	51.5	58.5
	1200	50.7	57.7
	1300	50.0	57.0
	1400	49.4	56.4
	1500	48.8	55.8
	1600	48.2	55.2
	1700	47.7	54.7
	1800	47.2	54.2
Threshold*	2300	45.0	52.0

Assumptions:

	Reference Noise Levels (L_{max}) @50 feet		
	Mitigated	Unmitigated	Usage Factor
Generator	75	78	1
Loader	75	79	0.4
Haul Truck	84	91	0.4
Slurry Pump	75	76	0.5
Excavators	80	85	0.4

H_{eff} = 10
G = 0.57

Calculations:	**L_{eq} dBA @ 100 feet**	
	Mitigated	Unmitigated
Generator	67.3	70.3
Loader	63.3	67.3
Haul Truck	72.3	79.3
Slurry Pump	64.3	65.3
Excavators	68.3	73.3

Cumulative:	**L_{eq} dBA @ 100 feet**	
	Mitigated	Unmitigated
	72.3	79.3

Sources:
Reference noise levels were obtained from the National Cooperative Highway Research Program, Syntesis 218, Table 3, Constuction Equipment Noise Emission Levels, page 8.
The equation L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50) is found in the NCHRP, Synthesis 218, page 11 "Noise Impact Assessment."
Notes:
* The threshold specific for this Project.
G = the constant that accounts for topography and ground effects.
H_{eff} = the sum of average path heights on either side of a topographical feature. Utilized to determine the **G** factor.

Appendix D
SAFCA Levee Improvement Project
Borrow Site Excavation
NLIP

	Distance to Nearest Receiver in feet	Resulting Cumulative Noise Level (Leq dBA) Mitigated	Unmitigated
	100	72.3	79.3
	200	66.3	73.3
	300	62.7	69.7
	400	60.2	67.2
	500	58.3	65.3
	600	56.7	63.7
	700	55.4	62.4
	800	54.2	61.2
	900	53.2	60.2
	1000	52.3	59.3
	1100	51.5	58.5
	1200	50.7	57.7
	1300	50.0	57.0
	1400	49.4	56.4
	1500	48.8	55.8
	1600	48.2	55.2
	1700	47.7	54.7
	1800	47.2	54.2
Threshold*	2300	45.0	52.0

Assumptions:

	Reference Noise Levels (L_{max}) @50 feet Mitigated	Unmitigated	Usage Factor
Excavators	80	85	0.4
Loader	75	79	0.4
Haul Truck	84	91	0.4

Heff = 10
G = 0.57

Calculations:	L_{eq} dBA @ 100 feet Mitigated	Unmitigated
Excavators	68.3	73.3
Loader	63.3	67.3
Haul Truck	72.3	79.3

Cumulative:	L_{eq} dBA @ 100 feet Mitigated	Unmitigated
	72.3	79.3

Sources:
Reference noise levels were obtained from the National Cooperative Highway Research Program, Syntesis 218, Table 3, Constuction Equipment Noise Emission Levels, page 8.
The equation L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50) is found in the NCHRP, Synthesis 218, page 11 "Noise Impact Assessment."
Notes:
* The threshold specific for this Project.
G = the constant that accounts for topography and ground effects.
$\mathbf{H_{eff}}$ = the sum of average path heights on either side of a topographical feature. Utilized to determine the **G** factor.

Appendix D
SAFCA Levee Improvement Project
Levee Raising
NLIP

	Distance to Nearest Receiver in feet	Resulting Cumulative Noise Level (Leq dBA) Mitigated	Unmitigated
	100	63.8	79.6
	200	57.7	73.6
	300	54.2	70.0
	400	51.7	67.5
	500	49.8	65.6
	600	48.2	64.0
	700	46.9	62.7
	800	45.7	61.5
	900	44.7	60.5
	1000	43.8	59.6
	1100	42.9	58.8
	1200	42.2	58.0
	1300	41.5	57.3
	1400	40.8	56.7
	1500	40.2	56.1
	1600	39.7	55.5
	1700	39.2	55.0
	1800	38.7	54.5
Threshold*	2600	35.5	51.3

Assumptions:

	Reference Noise Levels (L_{max}) @50 feet Mitigated	Unmitigated	Usage Factor
Roller	74	80	0.5
Haul Truck	75	91	0.4
Water Truck	75	91	0.4
Dozer	75	80	0.4

H_{eff} = 10
G = 0.57

Calculations:	L_{eq} dBA @ 100 feet Mitigated	Unmitigated
Roller	63.3	69.3
Haul Truck	63.3	79.3
Water Truck	63.3	79.3
Dozer	63.3	68.3

Cumulative:	L_{eq} dBA @ 100 feet Mitigated	Unmitigated
	63.8	79.6

Sources:
Reference noise levels were obtained from the National Cooperative Highway Research Program, Syntesis 218, Table 3, Constuction Equipment Noise Emission Levels, page 8.
The equation L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50) is found in the NCHRP, Synthesis 218, page 11 "Noise Impact Assessment."
Notes:
* The threshold specific for this Project.
G = the constant that accounts for topography and ground effects.
H_{eff} = the sum of average path heights on either side of a topographical feature. Utilized to determine the **G** factor.

Appendix D
SAFCA Levee Improvement Project
Surface Drainage Outlets
NLIP

	Distance to Nearest Receiver in feet	Resulting Cumulative Noise Level (Leq dBA) Mitigated	Unmitigated
	100	73.3	79.4
	200	67.3	73.3
	300	63.8	69.8
	400	61.3	67.3
	500	59.3	65.4
	600	57.8	63.8
	700	56.4	62.5
	800	55.3	61.3
	900	54.2	60.3
	1000	53.3	59.4
	1100	52.5	58.5
	1200	51.7	57.8
	1300	51.0	57.1
	1400	50.4	56.4
	1500	49.8	55.8
	1600	49.2	55.3
	1700	48.7	54.8
	1800	48.2	54.3
Threshold*	2600	45.0	51.1

Assumptions:

	Reference Noise Levels (L_{max}) @50 feet		
	Mitigated	Unmitigated	Usage Factor
Backhoe	75	85	0.4
Paver	80	89	0.5
Haul Truck	84	91	0.4
Compactor	80	85	0.2
Concrete Truck	85	90	0.4

Heff = 10
G = 0.57

Calculations:

	L_{eq} dBA @ 100 feet	
	Mitigated	Unmitigated
Backhoe	63.3	73.3
Paver	69.3	78.3
Haul Truck	72.3	79.3
Compactor	65.3	70.3
Concrete Truck	73.3	78.3

Cumulative:

L_{eq} dBA @ 100 feet	
Mitigated	Unmitigated
73.3	79.4

Sources:
Reference noise levels were obtained from the National Cooperative Highway Research Program, Syntesis 218, Table 3, Constuction Equipment Noise Emission Levels, page 8.
The equation L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50) is found in the NCHRP, Synthesis 218, page 11 "Noise Impact Assessment."
Notes:
* The threshold specific for this Project.
G = the constant that accounts for topography and ground effects.
$\mathbf{H_{eff}}$ = the sum of average path heights on either side of a topographical feature. Utilized to determine the **G** factor.

Appendix D
SAFCA Levee Improvement Project
Construct Relief Wells and Drainage Canals
NLIP

	Distance to Nearest Receiver in feet	Resulting Cumulative Noise Level (Leq dBA) Mitigated	Unmitigated
	100	73.3	78.3
	200	67.3	72.3
	300	63.7	68.7
	400	61.2	66.2
	500	59.3	64.3
	600	57.7	62.7
	700	56.4	61.4
	800	55.2	60.2
	900	54.2	59.2
	1000	53.3	58.3
	1100	52.5	57.5
	1200	51.7	56.7
	1300	51.0	56.0
	1400	50.4	55.4
	1500	49.8	54.8
	1600	49.2	54.2
	1700	48.7	53.7
	1800	48.2	53.2
Threshold*	2600	45.0	50.0

Assumptions:

	Reference Noise Levels (L_{max}) @50 feet		
	Mitigated	Unmitigated	Usage Factor
Drill Rig	80	98	0.4
Roller	74	80	0.5
Support Truck	55	65	0.4
Excavator	85	90	0.2
Concrete Truck	85	90	0.4

Heff = 10
G = 0.57

Calculations:	L_{eq} **dBA @ 100 feet**	
	Mitigated	Unmitigated
Drill Rig	68.3	86.3
Roller	63.3	69.3
Support Truck	43.3	53.3
Excavator	70.3	75.3
Concrete Truck	73.3	78.3

Cumulative:	L_{eq} **dBA @ 100 feet**	
	Mitigated	Unmitigated
	73.3	78.3

Sources:
Reference noise levels were obtained from the National Cooperative Highway Research Program, Syntesis 218, Table 3, Constuction Equipment Noise Emission Levels, page 8.
The equation L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50) is found in the NCHRP, Synthesis 218, page 11 "Noise Impact Assessment."
Notes:
* The threshold specific for this Project.
G = the constant that accounts for topography and ground effects.
$\mathbf{H_{eff}}$ = the sum of average path heights on either side of a topographical feature. Utilized to determine the **G** factor.

Appendix D
SAFCA Levee Improvement Project
Site Restoration and Demobilization
NLIP

	Distance to Nearest Receiver in feet	Resulting Cumulative Noise Level (Leq dBA) Mitigated	Unmitigated
	100	68.3	79.3
	200	62.3	73.3
	300	58.7	69.7
	400	56.2	67.2
	500	54.3	65.3
	600	52.7	63.7
	700	51.4	62.4
	800	50.2	61.2
	900	49.2	60.2
	1000	48.3	59.3
	1100	47.5	58.5
	1200	46.7	57.7
	1300	46.0	57.0
	1400	45.4	56.4
	1500	44.8	55.8
	1600	44.2	55.2
	1700	43.7	54.7
	1800	43.2	54.2
Threshold*	1050	47.9	58.9

Assumptions:

	Reference Noise Levels (L_{max}) @50 feet Mitigated	Unmitigated	Usage Factor
Water Truck	75	84	0.4
Haul Truck	75	91	0.4
Hydroseed Truck	80	88	0.4

Heff = 10
G = 0.57

Calculations:	L_{eq} dBA @ 100 feet Mitigated	Unmitigated
Water Truck	63.3	72.3
Haul Truck	63.3	79.3
Hydroseed Truck	68.3	76.3

Cumulative:	L_{eq} dBA @ 100 feet Mitigated	Unmitigated
	68.3	79.3

Sources:
Reference noise levels were obtained from the National Cooperative Highway Research Program, Syntesis 218, Table 3, Constuction Equipment Noise Emission Levels, page 8.
The equation L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50) is found in the NCHRP, Synthesis 218, page 11 "Noise Impact Assessment."
Notes:
* The threshold specific for this Project.
G = the constant that accounts for topography and ground effects.
$\mathbf{H_{eff}}$ = the sum of average path heights on either side of a topographical feature. Utilized to determine the **G** factor.

SAFCA Levee Improvement Project
NLIP
Summary of Predicted Action Noise Levels

	Action	Mitigated	Unmitigated	Distance to Noise Contours in feet 50 dBA Contour	45 dBA Contour
1	Clearing and Grubbing/Strippng	63.6	79.3	477.8	849.7
2	Levee Degrading	63.8	79.3	487.6	867.1
3	Demolish Canal and Tree Removal	72.3	79.3	1300.8	2313.2
4	Cutoff Wall Construction	72.3	79.3	1300.8	2313.2
5	Borrow Site Excavation	72.3	79.3	1300.8	2313.2
6	Levee Raising	63.8	79.6	487.6	867.1
7	Surface Drainage Outlets	73.3	79.4	1466.5	2607.8
8	Construct Relief Wells and Drainage Canals	73.3	78.3	1459.6	2595.5
9	Site Restoration and Demobilization	68.3	79.3	820.7	1459.5

Predicted Canal Noise Levels

Appendix D
SAFCA Canal Improvement Project
Clearing and Grubbing/Strippng
NLIP

		Resulting Cumulative Noise Level (Leq dBA)	
	Distance to Nearest Receiver in feet	**Mitigated**	**Unmitigated**
	100	63.6	79.3
	200	57.6	73.3
	300	54.0	69.7
	400	51.5	67.2
	500	49.6	65.3
	600	48.0	63.7
	700	46.7	62.4
	800	45.5	61.2
	900	44.5	60.2
	1000	43.6	59.3
	1100	42.8	58.5
	1200	42.0	57.7
	1300	41.3	57.0
	1400	40.7	56.4
	1500	40.1	55.8
	1600	39.5	55.2
	1700	39.0	54.7
	1800	38.5	54.2
Threshold*	900	44.5	60.2

Assumptions:

	Reference Noise Levels (L_{max}) @50 feet		
	Mitigated	Unmitigated	Usage Factor
Dozer	75	85	0.4
Loader	75	79	0.4
Water Truck	75	91	0.4

H_{eff} = 10
G = 0.57

Calculations:	L_{eq} **dBA @ 100 feet**	
	Mitigated	Unmitigated
Dozer	63.3	73.3
Loader	63.3	67.3
Water Truck	63.3	79.3

Cumulative:	L_{eq} **dBA @ 100 feet**	
	Mitigated	Unmitigated
	63.6	79.3

Sources:
Reference noise levels were obtained from the National Cooperative Highway Research Program, Syntesis 218, Table 3, Constuction Equipment Noise Emission Levels, page 8.
The equation L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50) is found in the NCHRP, Synthesis 218, page 11 "Noise Impact Assessment."
Notes:
* The threshold specific for this Project.
G = the constant that accounts for topography and ground effects.
H_{eff} = the sum of average path heights on either side of a topographical feature. Utilized to determine the **G** factor.

Appendix D
SAFCA Canal Improvement Project
Dewatering
NLIP

	Distance to Nearest Receiver in feet	Resulting Cumulative Noise Level (Leq dBA) Mitigated	Unmitigated
	100	73.3	79.3
	200	67.3	73.3
	300	63.7	69.7
	400	61.2	67.2
	500	59.3	65.3
	600	57.7	63.7
	700	56.4	62.4
	800	55.2	61.2
	900	54.2	60.2
	1000	53.3	59.3
	1100	52.5	58.5
	1200	51.7	57.7
	1300	51.0	57.0
	1400	50.4	56.4
	1500	49.8	55.8
	1600	49.2	55.2
	1700	48.7	54.7
	1800	48.2	54.2
Threshold*	2600	45.0	51.0

Assumptions:

	Reference Noise Levels (L_{max}) @50 feet Mitigated	Unmitigated	Usage Factor
Crane	75	83	0.16
Loader	75	79	0.4
Pile Driver	95	101	0.04
Generator	75	78	1

H_{eff} = 10
G = 0.57

Calculations:	L_{eq} dBA @ 100 feet Mitigated	Unmitigated
Crane	59.3	67.3
Loader	63.3	67.3
Pile Driver	73.3	79.3
Generator	67.3	70.3

Cumulative:	L_{eq} dBA @ 100 feet Mitigated	Unmitigated
	73.3	79.3

Sources:
Reference noise levels were obtained from the National Cooperative Highway Research Program, Syntesis 218, Table 3, Constuction Equipment Noise Emission Levels, page 8.
The equation L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50) is found in the NCHRP, Synthesis 218, page 11 "Noise Impact Assessment."
Notes:
* The threshold specific for this Project.
G = the constant that accounts for topography and ground effects.
H_{eff} = the sum of average path heights on either side of a topographical feature. Utilized to determine the **G** factor.

Appendix D
SAFCA Canal Improvement Project
Excavation
NLIP

		Resulting Cumulative Noise Level (Leq dBA)	
	Distance to Nearest Receiver in feet	**Mitigated**	**Unmitigated**
	100	63.3	67.3
	200	57.3	61.3
	300	53.7	57.7
	400	51.2	55.2
	500	49.3	53.3
	600	47.7	51.7
	700	46.4	50.4
	800	45.2	49.2
	900	44.2	48.2
	1000	43.3	47.3
	1100	42.5	46.5
	1200	41.7	45.7
	1300	41.0	45.0
	1400	40.4	44.4
	1500	39.8	43.8
	1600	39.2	43.2
	1700	38.7	42.7
	1800	38.2	42.2
Threshold*	2300	36.0	40.0

Assumptions:

	Reference Noise Levels (L_{max}) @50 feet		
	Mitigated	Unmitigated	Usage Factor
Excavator	80	85	0.4
Loader	75	79	0.4

Heff = 10
G = 0.57

Calculations:

	L_{eq} dBA @ 100 feet	
	Mitigated	Unmitigated
Excavator	68.3	73.3
Loader	63.3	67.3

Cumulative:

	L_{eq} dBA @ 100 feet	
	Mitigated	Unmitigated
	63.3	67.3

Sources:
Reference noise levels were obtained from the National Cooperative Highway Research Program, Syntesis 218, Table 3, Constuction Equipment Noise Emission Levels, page 8.
The equation L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50) is found in the NCHRP, Synthesis 218, page 11 "Noise Impact Assessment."
Notes:
* The threshold specific for this Project.
G = the constant that accounts for topography and ground effects.
$\mathbf{H_{eff}}$ = the sum of average path heights on either side of a topographical feature. Utilized to determine the **G** factor.

Appendix D
SAFCA Canal Improvement Project
Foundation Construction
NLIP

		Resulting Cumulative Noise Level (Leq dBA)	
	Distance to Nearest Receiver in feet	**Mitigated**	**Unmitigated**
	100	73.3	79.3
	200	67.3	73.3
	300	63.7	69.7
	400	61.2	67.2
	500	59.3	65.3
	600	57.7	63.7
	700	56.4	62.4
	800	55.2	61.2
	900	54.2	60.2
	1000	53.3	59.3
	1100	52.5	58.5
	1200	51.7	57.7
	1300	51.0	57.0
	1400	50.4	56.4
	1500	49.8	55.8
	1600	49.2	55.2
	1700	48.7	54.7
	1800	48.2	54.2
Threshold*	2600	45.0	51.0

Assumptions:

	Reference Noise Levels (L_{max}) @50 feet		
	Mitigated	Unmitigated	Usage Factor
Generator	78	75	1
Loader	75	79	0.4
Pile Driver	95	101	0.04
Crane	75	83	0.16

Heff = 10
G = 0.57

Calculations:	L_{eq} dBA @ 100 feet	
	Mitigated	Unmitigated
Generator	70.3	67.3
Loader	63.3	67.3
Pile Driver	73.3	79.3
Crane	59.3	67.3

Cumulative:	L_{eq} dBA @ 100 feet	
	Mitigated	Unmitigated
	73.3	79.3

Sources:
Reference noise levels were obtained from the National Cooperative Highway Research Program, Syntesis 218, Table 3, Constuction Equipment Noise Emission Levels, page 8.
The equation L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50) is found in the NCHRP, Synthesis 218, page 11 "Noise Impact Assessment."
Notes:
* The threshold specific for this Project.
G = the constant that accounts for topography and ground effects.
$\mathbf{H_{eff}}$ = the sum of average path heights on either side of a topographical feature. Utilized to determine the **G** factor.

Appendix D
SAFCA Canal Improvement Project
Concrete Construction
NLIP

	Distance to Nearest Receiver in feet	Resulting Cumulative Noise Level (Leq dBA) Mitigated	Unmitigated
	100	67.3	70.6
	200	61.2	64.6
	300	57.7	61.0
	400	55.2	58.5
	500	53.3	56.6
	600	51.7	55.0
	700	50.4	53.7
	800	49.2	52.5
	900	48.2	51.5
	1000	47.3	50.6
	1100	46.4	49.7
	1200	45.7	49.0
	1300	45.0	48.3
	1400	44.3	47.7
	1500	43.7	47.1
	1600	43.2	46.5
	1700	42.7	46.0
	1800	42.2	45.5
Threshold*	2300	40.0	43.3

Assumptions:

	Reference Noise Levels (L_{max}) @50 feet Mitigated	Unmitigated	Usage Factor
Boom Truck	80	85	0.4
Generator	75	78	1
Concrete Pump	75	82	0.4

Heff = 10
G = 0.57

Calculations:	L_{eq} dBA @ 100 feet Mitigated	Unmitigated
Boom Truck	68.3	73.3
Generator	67.3	70.3
Concrete Pump	63.3	70.3

Cumulative:	L_{eq} dBA @ 100 feet Mitigated	Unmitigated
	67.3	70.6

Sources:
Reference noise levels were obtained from the National Cooperative Highway Research Program, Syntesis 218, Table 3, Constuction Equipment Noise Emission Levels, page 8.
The equation L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50) is found in the NCHRP, Synthesis 218, page 11 "Noise Impact Assessment."
Notes:
* The threshold specific for this Project.
G = the constant that accounts for topography and ground effects.
$\mathbf{H_{eff}}$ = the sum of average path heights on either side of a topographical feature. Utilized to determine the **G** factor.

Appendix D
SAFCA Canal Improvement Project
Pipeline Construction
NLIP

	Distance to Nearest Receiver in feet	Resulting Cumulative Noise Level (Leq dBA) Mitigated	Unmitigated
	100	65.3	79.3
	200	59.3	73.3
	300	55.7	69.7
	400	53.2	67.2
	500	51.3	65.3
	600	49.7	63.7
	700	48.4	62.4
	800	47.2	61.2
	900	46.2	60.2
	1000	45.3	59.3
	1100	44.5	58.5
	1200	43.7	57.7
	1300	43.0	57.0
	1400	42.4	56.4
	1500	41.8	55.8
	1600	41.2	55.2
	1700	40.7	54.7
	1800	40.2	54.2
Threshold*	2300	38.0	52.0

Assumptions:

	Reference Noise Levels (L_{max}) @50 feet		
	Mitigated	Unmitigated	Usage Factor
Excavator	75	85	0.4
Welder	73	75	0.4
Water Truck	75	91	0.4
Compactor	80	85	0.2
Crane	75	83	0.16
Loader	75	79	0.4
			Heff = 10

Calculations:

	L_{eq} dBA @ 100 feet	
	Mitigated	Unmitigated
Excavator	63.3	73.3
Welder	61.3	63.3
Water Truck	63.3	79.3
Compactor	65.3	70.3
Crane	59.3	67.3
Loader	63.3	67.3

Cumulative:

	L_{eq} dBA @ 100 feet	
	Mitigated	Unmitigated
	65.3	79.3

G = 0.57

Sources:

Reference noise levels were obtained from the National Cooperative Highway Research Program, Syntesis 218, Table 3, Constuction Equipment Noise Emission Levels, page 8.

The equation L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50) is found in the NCHRP, Synthesis 218, page 11 "Noise Impact Assessment."

Notes:

* The threshold specific for this Project.

G = the constant that accounts for topography and ground effects.

$\mathbf{H_{eff}}$ = the sum of average path heights on either side of a topographical feature. Utilized to determine the **G** factor.

Appendix D
SAFCA Canal Improvement Project
Backfill and Finish Grading
NLIP

	Distance to Nearest Receiver in feet	Resulting Cumulative Noise Level (Leq dBA) Mitigated	Unmitigated
	100	65.3	79.3
	200	59.3	73.3
	300	55.7	69.7
	400	53.2	67.2
	500	51.3	65.3
	600	49.7	63.7
	700	48.4	62.4
	800	47.2	61.2
	900	46.2	60.2
	1000	45.3	59.3
	1100	44.5	58.5
	1200	43.7	57.7
	1300	43.0	57.0
	1400	42.4	56.4
	1500	41.8	55.8
	1600	41.2	55.2
	1700	40.7	54.7
	1800	40.2	54.2
Threshold*	1050	44.9	58.9

Assumptions:

	Reference Noise Levels (L_{max}) @50 feet		
	Mitigated	Unmitigated	Usage Factor
Loader	75	85	0.4
Dozer	74	80	0.4
Water Truck	75	91	0.4
Compactor	80	85	0.2
Grader	75	85	0.08

Heff = 10
G = 0.57

Calculations:

	L_{eq} dBA @ 100 feet	
	Mitigated	Unmitigated
Loader	63.3	73.3
Dozer	62.3	68.3
Water Truck	63.3	79.3
Compactor	65.3	70.3
Grader	56.3	66.3

Cumulative:

	L_{eq} dBA @ 100 feet	
	Mitigated	Unmitigated
	65.3	79.3

Sources:
Reference noise levels were obtained from the National Cooperative Highway Research Program, Syntesis 218, Table 3, Constuction Equipment Noise Emission Levels, page 8.
The equation L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50) is found in the NCHRP, Synthesis 218, page 11 "Noise Impact Assessment."
Notes:
* The threshold specific for this Project.
G = the constant that accounts for topography and ground effects.
$\mathbf{H_{eff}}$ = the sum of average path heights on either side of a topographical feature. Utilized to determine the **G** factor.

Appendix D
SAFCA Canal Improvement Project
Electrical and Mechanical Equipment Installation
NLIP

		Resulting Cumulative Noise Level (Leq dBA)	
	Distance to Nearest Receiver in feet	**Mitigated**	**Unmitigated**
	100	59.3	67.3
	200	53.3	61.3
	300	49.8	57.8
	400	47.3	55.3
	500	45.3	53.3
	600	43.7	51.7
	700	42.4	50.4
	800	41.2	49.2
	900	40.2	48.2
	1000	39.3	47.3
	1100	38.5	46.5
	1200	37.7	45.7
	1300	37.0	45.0
	1400	36.4	44.4
	1500	35.8	43.8
	1600	35.2	43.2
	1700	34.7	42.7
	1800	34.2	42.2
Threshold*	1050	38.9	46.9

Assumptions:

	Reference Noise Levels (L_{max}) @50 feet		
	Mitigated	Unmitigated	Usage Factor
Crane	75	83	0.16

Heff = 10
G = 0.57

Calculations:

	L_{eq} dBA @ 100 feet	
	Mitigated	Unmitigated
Crane	59.3	67.3

Cumulative:

L_{eq} dBA @ 100 feet	
Mitigated	Unmitigated
59.3	67.3

Sources:
Reference noise levels were obtained from the National Cooperative Highway Research Program, Syntesis 218, Table 3, Constuction Equipment Noise Emission Levels, page 8.
The equation L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50) is found in the NCHRP, Synthesis 218, page 11 "Noise Impact Assessment."
Notes:
* The threshold specific for this Project.
G = the constant that accounts for topography and ground effects.
$\mathbf{H_{eff}}$ = the sum of average path heights on either side of a topographical feature. Utilized to determine the **G** factor.

Appendix D
SAFCA Canal Improvement Project
Erosion Control
NLIP

	Distance to Nearest Receiver in feet	Resulting Cumulative Noise Level (Leq dBA) Mitigated	Unmitigated
	100	63.3	72.3
	200	57.3	66.3
	300	53.7	62.7
	400	51.2	60.2
	500	49.3	58.3
	600	47.7	56.7
	700	46.4	55.4
	800	45.2	54.2
	900	44.2	53.2
	1000	43.3	52.3
	1100	42.5	51.5
	1200	41.7	50.7
	1300	41.0	50.0
	1400	40.4	49.4
	1500	39.8	48.8
	1600	39.2	48.2
	1700	38.7	47.7
	1800	38.2	47.2
Threshold*	2300	36.0	45.0

Assumptions:

	Reference Noise Levels (L_{max}) @50 feet		
	Mitigated	Unmitigated	Usage Factor
Hydroseed Truck	80	88	0.4
Water Truck	75	84	0.4

Heff = 10
G = 0.57

Calculations:

	L_{eq} dBA @ 100 feet	
	Mitigated	Unmitigated
Hydroseed Truck	68.3	76.3
Water Truck	63.3	72.3

Cumulative:

	L_{eq} dBA @ 100 feet	
	Mitigated	Unmitigated
	63.3	72.3

Sources:
Reference noise levels were obtained from the National Cooperative Highway Research Program, Syntesis 218, Table 3, Constuction Equipment Noise Emission Levels, page 8.
The equation L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50) is found in the NCHRP, Synthesis 218, page 11 "Noise Impact Assessment."
Notes:
* The threshold specific for this Project.
G = the constant that accounts for topography and ground effects.
$\mathbf{H_{eff}}$ = the sum of average path heights on either side of a topographical feature. Utilized to determine the **G** factor.

Appendix D
SAFCA Canal Improvement Project
Demobilization and Clean Up
NLIP

		Resulting Cumulative Noise Level (Leq dBA)	
	Distance to Nearest Receiver in feet	**Mitigated**	**Unmitigated**
	100	63.3	67.3
	200	57.3	61.3
	300	53.7	57.7
	400	51.2	55.2
	500	49.3	53.3
	600	47.7	51.7
	700	46.4	50.4
	800	45.2	49.2
	900	44.2	48.2
	1000	43.3	47.3
	1100	42.5	46.5
	1200	41.7	45.7
	1300	41.0	45.0
	1400	40.4	44.4
	1500	39.8	43.8
	1600	39.2	43.2
	1700	38.7	42.7
	1800	38.2	42.2
Threshold*	2300	36.0	40.0

Assumptions:

	Reference Noise Levels (L_{max}) @50 feet		
	Mitigated	Unmitigated	Usage Factor
Trucks	75	91	0.4
Loader	75	79	0.4

Heff = 10
G = 0.57

Calculations:

	L_{eq} dBA @ 100 feet	
	Mitigated	Unmitigated
Trucks	63.3	79.3
Loader	63.3	67.3

Cumulative:

L_{eq} dBA @ 100 feet	
Mitigated	Unmitigated
63.3	67.3

Sources:
Reference noise levels were obtained from the National Cooperative Highway Research Program, Syntesis 218, Table 3, Constuction Equipment Noise Emission Levels, page 8.
The equation L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50) is found in the NCHRP, Synthesis 218, page 11 "Noise Impact Assessment."
Notes:
* The threshold specific for this Project.
G = the constant that accounts for topography and ground effects.
$\mathbf{H_{eff}}$ = the sum of average path heights on either side of a topographical feature. Utilized to determine the **G** factor.

SAFCA Canal Improvement Project
NLIP
Summary of Predicted Action Noise Levels

				Distance to Noise Contours in feet	
	Action	**Mitigated**	**Unmitigated**	**50 dBA Contour**	**45 dBA Contour**
1	Clearing and Grubbing/Strippng	63.6	79.3	477.8	849.7
2	Dewatering	73.3	79.3	1459.5	2595.4
3	Excavation	63.3	67.3	461.5	820.7
4	Foundation Construction	73.3	79.3	1459.5	2595.4
5	Concrete Construction	67.3	70.6	729.8	1297.7
6	Pipeline Construction	65.3	79.3	580.9	1033.1
7	Backfill and Finish Grading	65.3	79.3	580.7	1032.6
8	Electrical and Mechanical Equipment Installation	59.3	67.3	291.9	519.1
9	Erosion Control	63.3	72.3	461.5	820.7
10	Demobilization and Clean Up	63.3	67.3	461.5	820.7

Haul Truck Trip Noise

Truck Hauling Noise on Area Roads

Construction Site	Amount of Extraction Material (cubic yards)	Truck Loads	One-Way Truck Trips	# of Haul Days	Hauling Hours per Day	Trips/Day	Trips/Hour	Day Peak Leq (dBA) 50 ft. from c.l.
Natomas Cross Canal	580,000	38,667	77,334	85	10	910	91	67.9
Sac River East Levee	1,307,000	87,134	174,268	108	20	1,614	81	70.4
Canal Relocation/Construction	26,800	1,787	3,574	37	10	97	10	58.2

cubic yards per truck	15
speed of travel (mph)	15
Active Half Width (ft.)	6

Contour 6 Traffic Noise Modeling

NATOMAS CROSS CANAL – HAUL TRUCKS

RUN NAME: HAUL TRUCKS RUN DATE: 22 AUGUST 2007

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	1.00	1.00	1.00
M-TRUCKS	1.00	1.00	1.00
H-TRUCKS	92.00	1.00	1.00

ADT: 910 DAY PEAK: 54.59999847412109 NITE PEAK: 81.9000091
SPEED: 35 ACTIVE HALF WIDTH (FT): 6
SITE CHARACTERISTICS: SOFT GRADE (PERCENT): .5

BARRIER TYPE:NONE
DAY PEAK LEQ AT 50 FT FROM CL WITHOUT BARRIER: 67.90521240234375

NITE PEAK LEQ AT 50 FT FROM CL WITHOUT BARRIER: 69.66521453857422

SACRAMENTO RIVER EAST LEVEE – HAUL TRUCKS

RUN NAME: HAUL TRUCKS RUN DATE: 22 AUGUST 2007

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	1.00	1.00	1.00
M-TRUCKS	1.00	1.00	1.00
H-TRUCKS	92.00	1.00	1.00

ADT: 1614 DAY PEAK: 96.83999633789062 NITE PEAK: 145.26001614
SPEED: 35 ACTIVE HALF WIDTH (FT): 6
SITE CHARACTERISTICS: SOFT GRADE (PERCENT): .5

BARRIER TYPE:NONE
DAY PEAK LEQ AT 50 FT FROM CL WITHOUT BARRIER: 70.39376831054688

NITE PEAK LEQ AT 50 FT FROM CL WITHOUT BARRIER: 72.15377044677734

CANAL RELOCATION/CONSTRUCTION – HAUL TRUCKS

RUN NAME: HAUL TRUCKS RUN DATE: 22 AUGUST 2007

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	1.00	1.00	1.00
M-TRUCKS	1.00	1.00	1.00
H-TRUCKS	92.00	1.00	1.00

ADT: 97 DAY PEAK: 5.820000171661377 NITE PEAK: 8.730000970000001
SPEED: 35 ACTIVE HALF WIDTH (FT): 6
SITE CHARACTERISTICS: SOFT GRADE (PERCENT): .5

BARRIER TYPE:NONE
DAY PEAK LEQ AT 50 FT FROM CL WITHOUT BARRIER: 58.18282318115234

NITE PEAK LEQ AT 50 FT FROM CL WITHOUT BARRIER: 59.94282150268555