

Draft Environmental Impact Report on
**Local Funding Mechanisms for Comprehensive Flood
Control Improvements for the Sacramento Area**



**Volume II: Project-Level Evaluation of Natomas Cross
Canal South Levee Phase 1 Improvements**

November 2006

EDAW | **AECOM**

Volume II

Table of Contents

Chapter/Section	Page
Acronyms and Abbreviations	iv
1 Introduction	1-1
1.1 Purpose of Volume II	1-1
1.2 Relationship to Volume I	1-2
1.3 Scope of the Project-Level Analysis in Volume II.....	1-2
1.4 Agency Roles and Responsibilities	1-2
1.5 Organization of Volume II	1-3
1.6 Standard Terminology Used in Volume II	1-4
2 Project Description.....	2-1
2.1 Project Objectives and Project Need	2-1
2.2 Project Location and Description of the Project Site	2-2
2.3 Description of the Proposed Project.....	2-6
3 Environmental Setting, Impacts, and Mitigation	3.1-1
3.1 Approach to the Environmental Analysis.....	3.1-1
3.2 Agriculture and Land Use	3.2-1
3.3 Geology and Soils	3.3-1
3.4 Water Resources.....	3.4-1
3.5 Fisheries and Aquatic Resources.....	3.5-1
3.6 Terrestrial Biological Resources	3.6-1
3.7 Cultural Resources	3.7-1
3.8 Paleontological Resources.....	3.8-1
3.9 Transportation and Circulation.....	3.9-1
3.10 Air Quality.....	3.10-1
3.11 Noise.....	3.11-1
3.12 Recreation.....	3.12-1
3.13 Visual Resources	3.13-1
3.14 Utilities and Service Systems	3.14-1
3.15 Hazards and Hazardous Materials	3.15-1
4 Other CEQA-Required Sections.....	4-1
4.1 Cumulative Impacts.....	4-1
4.2 Growth-Inducing Effects	4-2
4.3 Significant and Unavoidable Environmental Impacts	4-2
4.4 Significant Irreversible Environmental Impacts.....	4-2
5 Alternatives	5-1
5.1 Alternatives Development.....	5-1
5.2 Alternatives Carried Forward for Evaluation in the EIR.....	5-3
5.3 Comparison of the Environmental Effects of the Alternatives.....	5-6
5.4 Environmentally Superior Alternative	5-10

Volume II

Table of Contents

Chapter/Section	Page
6 References	6-1
Appendices	
A Air Quality Modeling Analyses	

Volume II

List of Exhibits and Tables

Page

Exhibits

2-1	Regional Setting	2-3
2-2	Local Setting.....	2-4
2-3	Surrounding Features in the Vicinity of the Project Site.....	2-5
2-4	RD 1001 Borrow Site and Potential Haul Routes	2-7
2-5	Typical Cutoff Wall.....	2-8
3.2-1	Project Area Farmland Designations.....	3.2-2
3.6-1	Habitats On and Adjacent to the Project Site	3.6-3
3.8-1	Rock Formations in the Project Area	3.8-3

Tables

2-1	Estimated Construction Equipment Requirements for the Proposed Project	2-11
2-2	Hauling Requirements for the Proposed Project	2-12
3.3-1	Active Faults in the Project Area.....	3.3-2
3.3-2	Project Site and RD 1001 Borrow Site Soil Types.....	3.3-4
3.4-1	Summary of Conventional Water Quality Constituents in the Sacramento River at Verona, 1996–1998.....	3.4-3
3.5-1	Fishes Present in the Natomas Cross Canal and/or Lower Sacramento River	3.5-2
3.5-2	Special-Status Fish Species Potentially Occurring in the Natomas Cross Canal and/or Lower Sacramento River	3.5-3
3.6-1	Special-status Plant Species with Potential to Occur in the Vicinity of the Project Site.....	3.6-6
3.6-2	Special-status Wildlife Species with Potential to Occur in the Vicinity of the Project Site.....	3.6-9
3.10-1	Summary of Annual Air Quality Data from the Yuba City–Almond Street Monitoring Station.....	3.10-5
3.10-2	Summary of Maximum Daily Average Construction Emissions for the Proposed Project.....	3.10-9
3.10-3	Summary of Maximum Daily Average Construction Emissions with Mitigation Incorporated	3.10-12
3.11-1	Noise Level Standards for New Non-Transportation Sources	3.11-1
3.11-2	Typical Construction Equipment Noise Levels.....	3.11-4
3.11-3	Representative Vibration Source Levels for Construction Equipment.....	3.11-5
3.12-1	Marinas in the Vicinity of the Project Site	3.12-1
5-1	Seepage/Stability Berm Alternative Characteristics.....	5-4
5-2	Estimated Construction Equipment Requirements for the Seepage/Stability Berm Alternative.....	5-5
5-3	Comparison of the Environmental Effects of the Alternatives.....	5-10

Volume II

Acronyms and Abbreviations

µg/L	micrograms per liter
µg/L	micrograms per liter
µS/cm	microsiemens per centimeter
ACTM	Airborne Toxics Control Measure
ADT	average daily traffic
APCO	Air Pollution Control Officer
AQAP	air quality attainment plan
AQMD	Air Quality Management District
ARB	California Air Resources Board
BACT	best available control technology
BMP	best management practice
CAA	Clean Air Act
CAAA	Clean Air Act Amendments of 1990
CAAQS	California ambient air quality standards
CaCO ₃	calcium carbonate
Caltrans	California Department of Transportation
CCAA	California Clean Air Act
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CNEL	Community Noise Equivalent Level
CNPS	California Native Plant Society
CO	carbon monoxide
CTR	California Toxics Rule
CVP	Central Valley Project
dB	decibel
dBA	A-weighted decibel
DFG	California Department of Fish and Game
DO	dissolved oxygen
DSM	deep soil mixing
DWR	California Department of Water Resources
EC	electrical conductivity
EIR	environmental impact report
EPA	U.S. Environmental Protection Agency
ESA	federal Endangered Species Act
FMMP	Farmland Mapping and Monitoring Program
FRAQMD	Feather River Air Quality Management District

Volume II

Acronyms and Abbreviations

HDPE	high-density polyethelene
ITE	Institute of Transportation Engineers
lb/day	pounds per day
L _{dn}	Day-Night Noise Level
L _{eq}	Equivalent Noise Level
L _{max}	Maximum Noise Level
L _{min}	Minimum Noise Level
LOS	level of service
maf	million acre feet
mg/L	milligrams per liter
MLD	Most Likely Descendant
mph	miles per hour
MRL	method reporting limit
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
NEIC	Northeast Information Center
NEMDC	Natomas East Main Drainage Canal
ng/L	nanograms per liter
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NMWC	Natomas Central Mutual Water Company
NO ₂	nitrogen dioxide
NO ₃	nitrogen trioxide
NO _x	oxides of nitrogen
NPDES	National Pollutant Discharge Elimination System
NSVAB	Northern Sacramento Valley Air Basin
OEHHA	Office of Environmental Health Hazard Assessment
OHWM	ordinary high-water mark
PG&E	Pacific Gas and Electric Company
PGCC	Pleasant Grove Creek Canal
PM	particulate matter
PM ₁₀	respirable particulate matter
PM _{2.5}	fine particulate matter
PPV	peak particle velocity

Volume II

Acronyms and Abbreviations

PRC	Public Resources Code
RD 1000	Reclamation District 1000
RD 1001	Reclamation District 1001
ROG	reactive organic gases
RWQCB	Regional Water Quality Control Board
Sacramento	Sacramento metropolitan area
SAFCA	Sacramento Area Flood Control Agency
SB	soil-bentonite
SCB	soil-cement-bentonite
SMARA	Surface Mining and Reclamation Act
SO ₂	sulfur dioxide
SR	State Route
SRFCP	Sacramento River Flood Control Project
Statistical Descriptor	L _x
SWP	State Water Project
SWPPP	stormwater pollution prevention plan
TAC	toxic air contaminant
T-BACT	best available control technology for toxic air contaminants
TDS	total dissolved solids
The Reclamation Board	California Reclamation Board
TNBC	The Natomas Basin Conservancy
TRD	trench remixing deep
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

1 INTRODUCTION

1.1 PURPOSE OF VOLUME II

As described in Volume I, Chapter 1, “Introduction,” of this EIR, the Sacramento Area Flood Control Agency (SAFCA) is proposing to create new funding mechanisms for the local share of the cost of constructing and maintaining flood control improvements and related environmental mitigation and habitat enhancements along the lower American and Sacramento Rivers and their tributaries in the Sacramento metropolitan area (Sacramento). The specific projects objectives are to (1) complete the projects necessary to provide 100-year flood protection for developed areas in Sacramento’s major floodplains as quickly as possible; (2) provide urban-standard (“200-year”) flood protection for developed areas in Sacramento’s major floodplains over time; and (3) ensure that new development in the undeveloped areas of Sacramento’s major floodplains does not substantially increase the expected damage of an uncontrolled flood.

Volume I of this EIR presents a program-level analysis of the significant environmental effects of the activities that would be funded by the proposed new funding mechanisms. SAFCA is also proposing construction of the initial project that would be funded using the new funding mechanisms, the Natomas Cross Canal South Levee Phase 1 Improvements (NCC Phase 1 Improvements).

The overall objective of the proposed NCC Phase 1 Improvements is to improve a strategic reach of the Natomas levee system, the westernmost portion of the Natomas Cross Canal (NCC) south levee, to reduce the risk of flooding in a significant portion of the Sacramento metropolitan area. The specific project objectives are to:

- ▶ address through-seepage and underseepage potential in the westernmost 12,500 feet of the NCC, and
- ▶ initiate the first phase of the improvements in 2007, before the start of the next flood season.

The need for the project and the project objectives are based on the evidence of through-seepage and underseepage conditions in this levee segment.

This project would involve constructing a cutoff wall in the westerly 12,500 feet of the NCC south levee to remediate through-seepage and underseepage conditions. The proposed NCC Phase 1 Improvements will be considered for approval by SAFCA concurrently with consideration of approval of the proposed funding mechanisms.

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. SAFCA has determined that the proposed NCC Phase 1 Improvements may have significant effects on the environment. As the lead agency for complying with CEQA, SAFCA has directed the preparation of Volume II of this EIR to analyze at a project-specific level the significant environmental effects of the proposed NCC Phase 1 Improvements.

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 NCC Phase 1 Improvements. The information in the EIR may also be used by CEQA responsible and trustee agencies and by federal agencies with jurisdiction over resources that could be affected by project implementation, when these agencies are deciding whether to approve, fund or partially fund, or permit the project (see Section 1.4, “Agency Roles and Responsibilities,” below). The EIR process is described in Volume I, Section 1.9, “Public Participation and the EIR Process.”

1.2 RELATIONSHIP TO VOLUME I

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. These subsequent CEQA documents incorporate by reference and rely on the general discussions, program-wide 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 (State CEQA Guidelines Section 15168).

The program-level analysis in Volume I broadly examines the significant environmental effects that could result from creating the proposed new funding mechanisms, specifically the physical effects associated with the program of flood control improvements and related environmental mitigation and habitat enhancements that these mechanisms would be used to finance. The analysis in Volume II of this EIR is the project-level analysis of one of the individual improvements that would be funded in part by the new funding mechanisms, the NCC Phase 1 Improvements. The analysis in Volume II relies on the documentation provided in the program-level analysis in Volume I for general discussions and the analysis of broader impact topics, such as cumulative impacts and growth-inducing effects, and focuses on the site-specific impacts of the NCC Phase 1 Improvements.

1.3 SCOPE OF THE PROJECT-LEVEL ANALYSIS IN VOLUME II

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 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 are not significant. Based on the scoping process conducted with the public and governmental agencies, and based on review of available information, it was determined that the proposed funding mechanisms and subsequent implementation of the projects that receive funding through these mechanisms would not result in significant environmental effects related to mineral resources and population and housing. These issues are not discussed further in this EIR.

Volume II evaluates potential impacts on the following resource areas:

- ▶ Agriculture and Land Use
- ▶ Geology and Soils
- ▶ Water Resources
- ▶ Fisheries and Aquatic Resources
- ▶ Terrestrial Biological Resources
- ▶ Cultural Resources
- ▶ Paleontological Resources
- ▶ Transportation and Circulation
- ▶ Air Quality
- ▶ Noise
- ▶ Recreation
- ▶ Visual Resources
- ▶ Utilities and Service Systems
- ▶ Hazards and Hazardous Materials

1.4 AGENCY ROLES AND RESPONSIBILITIES

SAFCA is the CEQA lead agency for the NCC Phase 1 Improvements and has primary authority for approval of this project. This EIR will be used by SAFCA and CEQA responsible agencies to fulfill the requirements of CEQA. It may also be used as an informational document by federal agencies that could have permitting or

approval authority for aspects of the project and by other local and state agencies, including CEQA trustee agencies, that may have an interest in resources that could be affected by the proposed 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 following is a list of the agencies that may have responsibility for or jurisdiction over aspects of the NCC Phase 1 Improvements and the permits or authorizations that may apply to this project:

- ▶ U.S. Army Corps of Engineers (USACE): permitting under Section 404 of the Clean Water Act, approval of federal project levee modifications, and approval of federal cost-sharing agreements.
- ▶ U.S. Fish and Wildlife Service (USFWS): Endangered Species Act (ESA) consultation and incidental take authorization.
- ▶ National Marine Fisheries Service (NMFS): ESA consultation.
- ▶ California Regional Water Quality Control Board (RWQCB), Central Valley Region (Region 5): National Pollutant Discharge Elimination System (NPDES) permitting pursuant to Clean Water Act Section 402, and Clean Water Act Section 401 certification if permitting under Section 404 of the Clean Water Act is required.
- ▶ California Department of Fish and Game (DFG): compliance with the California Endangered Species Act (CESA) and Fish and Game Code Section 1602 (Streambed Alteration).
- ▶ California Reclamation Board and Reclamation District 1000 (RD 1000): encroachment permit and approval of state cost-sharing agreements.
- ▶ California State Office of Historic Preservation: National Historic Preservation Act Section 106 compliance in association with federal permits/approvals.
- ▶ Sutter County: permit for compliance with the State's Surface Mining and Reclamation Act (SMARA), and other possible construction authorizations/encroachment permits.
- ▶ Feather River Air Quality Management District (AQMD): review of effects on air quality and permit to construct/permit to operate.

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, which has jurisdiction over fish and wildlife resources in California, is the only trustee agency with jurisdiction over resources potentially affected by the NCC Phase 1 Improvements.

1.5 ORGANIZATION OF VOLUME II

Volume II is organized as follows:

- ▶ **Chapter 1, "Introduction,"** describes the purpose, context, and organization of Volume II of the DEIR and the relationship to the analysis presented in Volume I.
- ▶ **Chapter 2, "Project Description,"** describes the location, objectives, components, and construction of the proposed project.

- ▶ **Chapter 3, “Environmental Setting, Impacts, and Mitigation,”** describes, by environmental issue area, the existing environmental setting; discusses the significant environmental impacts associated with the alternative improvements under consideration for the NCC Phase 1 Improvements; and identifies feasible mitigation measures to reduce or eliminate significant environmental effects where possible.
- ▶ **Chapter 4, “Other CEQA-Required Sections,”** discusses the project’s contributions to cumulative impacts, growth-inducing effects, significant and unavoidable impacts, and significant irreversible environmental changes.
- ▶ **Chapter 5, “Alternatives,”** describes alternatives to the proposed project, analyzes their significant environmental effects in comparison to the proposed project, and identifies the environmentally superior alternative.
- ▶ **Chapter 6, “References,”** contains a comprehensive listing of all sources of information used in the preparation of Volume II, including agencies and individuals consulted.

1.6 STANDARD TERMINOLOGY USED IN VOLUME II

The following are standard terms as used in Volume II:

Proposed project—The proposed cutoff wall construction and associated activities.

Project alternatives—The No-Project Alternative and the Seepage/Stability Berm Alternative.

Project site—The portion of the NCC south levee where proposed improvements would be implemented, including any immediately adjacent areas used for construction staging or ongoing levee maintenance.

Project area—The vicinity of the project site.

Levels of impact significance:

- ▶ **No impact**—No change from existing conditions.
- ▶ **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. Where available, feasible mitigation is identified that would avoid or reduce a significant impact to a less-than-significant level.
- ▶ **Less-than-significant impact**—A physical effect on the environment that does not exceed the defined significance thresholds.
- ▶ **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.

2 PROJECT DESCRIPTION

2.1 PROJECT OBJECTIVES AND PROJECT NEED

2.1.1 PROJECT OBJECTIVES

The overall objective of the Natomas Cross Canal South Levee Phase 1 Improvements (NCC Phase 1 Improvements) is to improve a strategic reach of the Natomas levee system, the westernmost portion of the Natomas Cross Canal (NCC) south levee, to reduce the risk of flooding in a significant portion of the Sacramento metropolitan area. The specific project objectives are to:

- ▶ address through-seepage and underseepage potential in the westernmost 12,500 feet of the NCC, and
- ▶ initiate the first phase of the improvements in 2007, before the start of the next flood season.

The need for the project and the project objectives are based on the evidence of through-seepage and underseepage conditions in this levee segment. The next section describes the threat to levee integrity and flood control security posed by these conditions.

2.1.2 NEED FOR THE PROJECT: LEVEE DEFICIENCIES AND CORRECTIVE MEASURES

A portion of the NCC Phase 1 Improvements levee segment is subject to through-seepage, and the entire length of the project levee segment exhibits underseepage potential. 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 compromised. Through-seepage can be corrected by constructing cutoff walls or stability berms.

Underseepage can occur where a levee is constructed on low-permeability foundation soil (silt and clay) underlain by a higher-permeability layer (sand and gravel), which makes the levee susceptible to failure during periods of high river stage. Under these conditions, underseepage 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 on the bottom of the blanket, or by piping (internal erosion) caused by water flowing under high vertical gradients through the erodable blanket. Underseepage failure conditions can exist with as little as one order of magnitude difference between the permeabilities of the blanket layer and the underlying more pervious layer. Excessive underseepage gradients can be corrected by constructing cutoff walls, seepage berms, combination seepage/stability berms, or relief wells. The choice of levee improvement 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.

2.1.3 PROPOSED IMPROVEMENTS

To achieve the project objectives stated above, SAFCA considered the various alternative levee treatments and determined that some could be effective in remediating seepage potential in the NCC Phase 1 Improvements levee segment while others would be ineffective because of site-specific conditions identified during preliminary geotechnical investigations (Kleinfelder 2006). The alternatives development process is described in Chapter 5, “Alternatives.” Based on the results of these preliminary geotechnical investigations performed by Kleinfelder on behalf of SAFCA and a preliminary comparison of costs and environmental constraints conducted by Wood Rodgers with assistance from EDAW (Wood Rodgers 2006), SAFCA is proposing to address through-seepage

and underseepage in the NCC Phase 1 Improvements levee segment through the construction of a cutoff wall. The proposed project is described in Section 2.3.

2.2 PROJECT LOCATION AND DESCRIPTION OF THE PROJECT SITE

The project site for the proposed NCC Phase 1 Improvements consists of the westernmost 12,500 feet of the south levee of the NCC and adjacent land in the Sutter County portion of Natomas, northwest of the City of Sacramento. The NCC begins at the Pleasant Grove Creek Canal (PGCC) and East Side Canal on the east and extends southwest to its confluence with the Sacramento River near the Sankey Road/Garden Highway intersection, and forms the northern boundary of Natomas and of SAFCA's jurisdiction. Exhibit 2-1 shows the regional setting of the project site, and Exhibit 2-2 shows the local setting. For engineering purposes, the project levee segment is divided into three reaches, as shown in Exhibit 2-2.

The project site and vicinity are generally rural in character. Land uses in the project vicinity include a county roadway and the Garden Highway, which is located on the crown of the Sacramento River east bank levee; agricultural lands; and Verona Village Resort, a small trailer campground, marina, restaurant, and store on the west side of the Garden Highway, approximately 660 feet southwest of the project site. The nearest houses are located about 700 feet (or 0.1 mile) west (on the north side of the NCC), 3,700 feet (or 0.7 mile) north, and 5,000 feet (or approximately 1 mile) south of the NCC. Exhibit 2-3 shows the vicinity of the project site.

The RD 1001 borrow site is also located in a rural setting, northeast of the project site.

The following sections describe conditions along the three project reaches and at the RD 1001 borrow site for construction material.

2.2.1 REACH 1

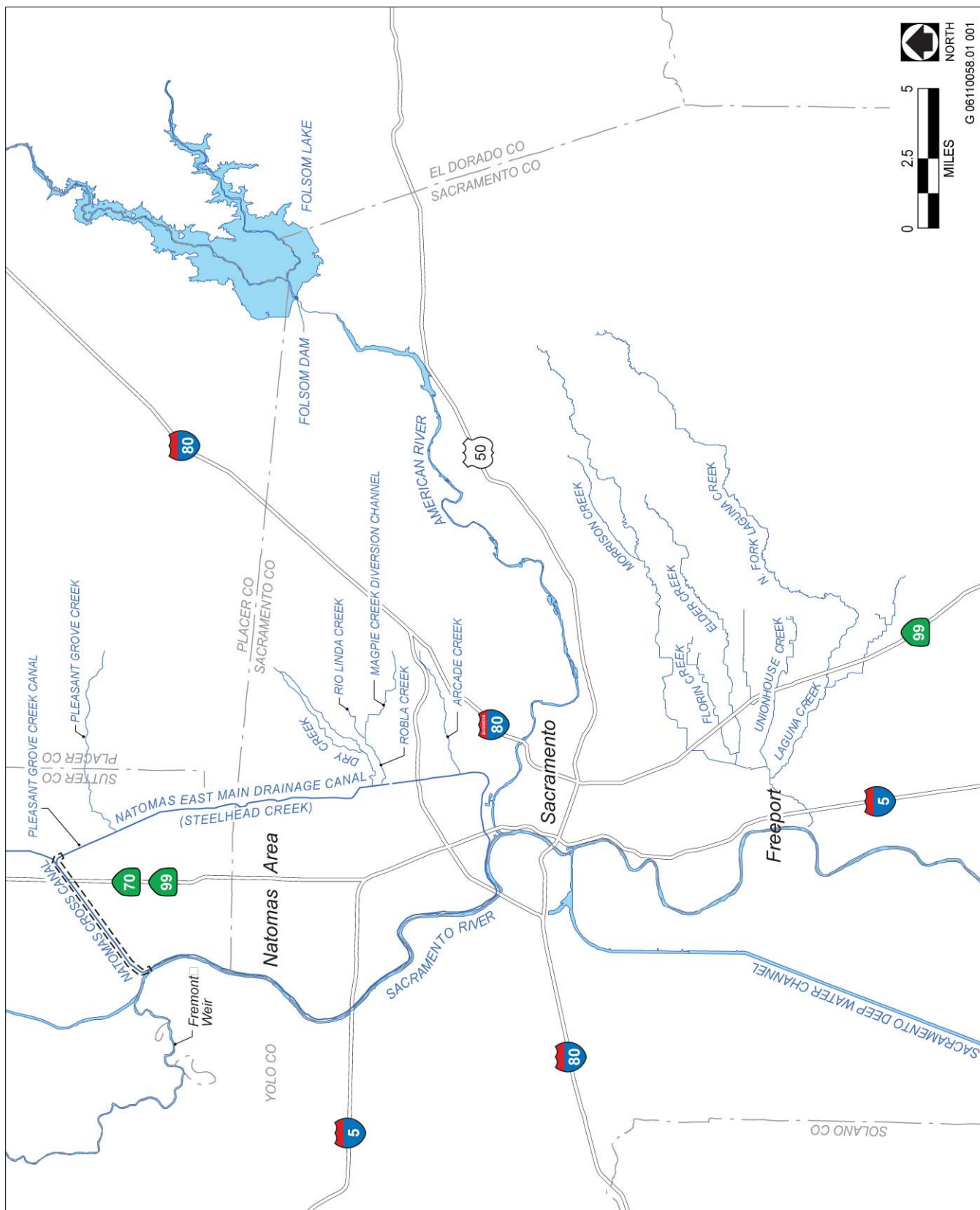
Reach 1 begins at Station 0+00 for the NCC levee and the Sacramento River levee (centerline of the Garden Highway) and extends for 570 feet northeast to the station where stability berm construction began in 1996. Significant seepage was observed near the landside levee toe in 1997 and 2006, and a small boil was observed at Station 3+00. A sandbag ring was constructed at this location. There is a bench on the land side of the levee through this reach; however, it is not an engineered stability berm and is not adequate for addressing levee through-seepage. An irrigation ditch conveys water from approximately Station 4+20 southwest along the top of this existing bench.

A corrugated metal pipe pump discharge line, owned and operated by Odysseus Farms, penetrates the south levee of the NCC at Station 4+20. During design of a later phase of NCC improvements and prior to levee certification, verification that this pipeline complies with the criteria of the U.S. Army Corps of Engineers (USACE) and California Reclamation Board (The Reclamation Board) criteria for pipe penetrations through flood control levees will need to be performed. If the criteria are not met, relocation in a later phase of NCC improvements would be required.

A cutoff wall has been identified as the preferred treatment for addressing through-seepage and underseepage problems at Reach 1. A potential alternative treatment for this reach, discussed in Chapter 5, "Alternatives," is a combined seepage/stability berm.

2.2.2 REACH 2

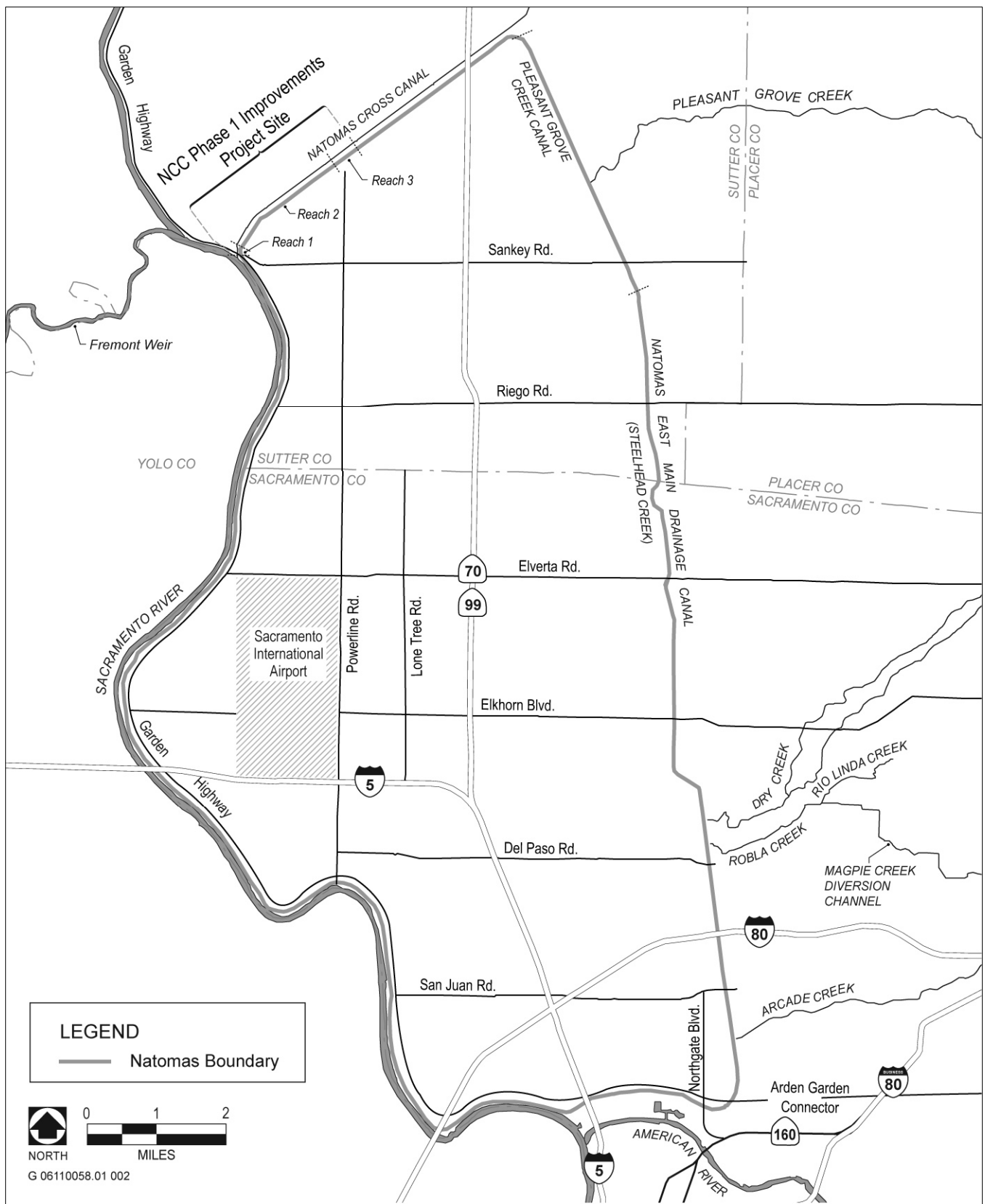
Reach 2 begins approximately 555 feet from the eastern edge of the Garden Highway pavement and extends approximately 700 feet east of Reclamation District (RD) 1000's Pumping Plant No. 4. The total length of



Source: CaSil; EDAW 2006

Regional Setting

Exhibit 2-1



Source: CaSil; EDAW 2006

Local Setting

Exhibit 2-2



Source: Kleinfelder Inc. 2006; Psomas 2006; EDAW 2006

Surrounding Features in the Vicinity of the Project Site

Exhibit 2-3

Reach 2 is 9,930 feet. A drainage canal, referred to as the Vestal Drain, runs parallel to the levee approximately 100 feet from the levee toe through most of this reach. Natomas Central Mutual Water Company's (NMWC's) Bennett Pumping Plant is located about midway through this reach (Station 58+75). The Lucich North Habitat Preserve, maintained by The Natomas Basin Conservancy (TNBC), begins just east of Pumping Plant No. 4 and continues throughout the remaining eastern portion of the reach. A stability berm was previously constructed throughout most of this reach (with the exception of the locations of the existing pumping plants). The depth of the Vestal Drain and its proximity to the NCC south levee in Reach 2 results in exit gradients in the bottom of the drain exceeding USACE guidelines for underseepage. In addition, recent geotechnical investigations have shown that the blanket layer along this reach is subject to gradients above acceptable levels.

A cutoff wall has been identified as the preferred treatment for addressing underseepage problems through Reach 2. A potential alternative, discussed in Chapter 5, "Alternatives," is a 300-foot-wide seepage berm, which would require relocation of the Vestal Drain.

2.2.3 REACH 3

Reach 3 is 1,500 feet long. Reach 3 begins 700 feet east of RD 1000's Pumping Plant No. 4 and ends just west of NMWC's Northern Pumping Plant. Similar to the discharge of other NCC pumping plants, the discharge pipes for this pumping plant would require an evaluation to verify that the discharge pipes meet USACE and The Reclamation Board criteria. The Lucich North Habitat Preserve is located along the entire length of Reach 3. Overhead power lines are located parallel to the landside levee toe in this reach, approximately 30 feet from the levee toe. This reach exhibits susceptibility to underseepage.

A cutoff wall has been identified as the preferred treatment for addressing underseepage problems at Reach 3. A potential alternative for this reach, discussed in Chapter 5, "Alternatives," is a 100-foot-wide seepage berm.

2.2.4 RD 1001 BORROW SITE

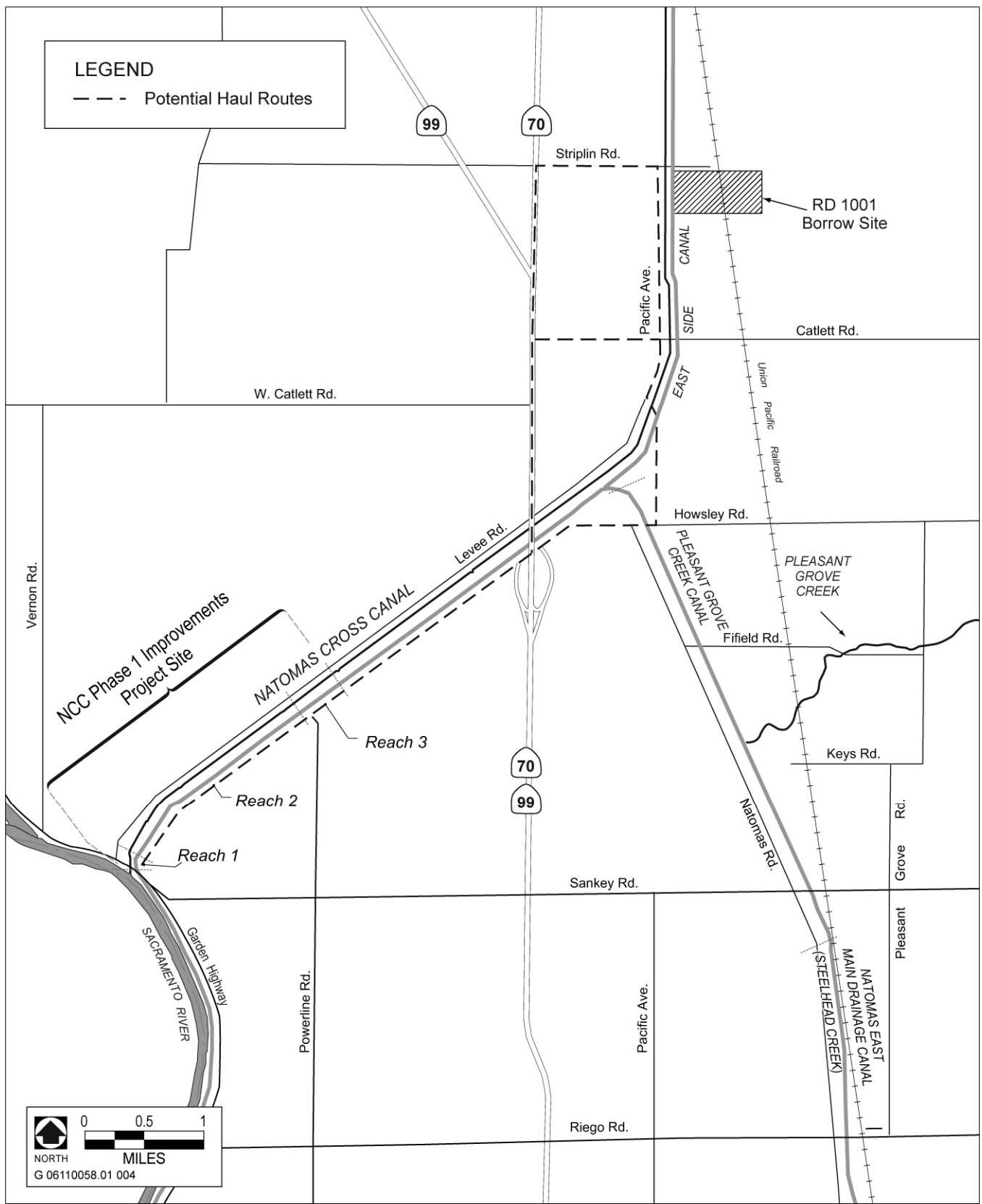
Borrow sites are areas from which native materials (i.e., soil and rock) would be excavated and removed to obtain embankment and riprap for construction activities. The proposed cutoff wall construction could require approximately 100,000 cubic yards of select embankment material. A potential borrow site for this material has been identified about 5 miles northeast of the project site, along Pacific Avenue, on RD 1001 land. The site has an existing Surface Mining and Reclamation Act (SMARA) permit and was used during previous SAFCA levee work as part of the North Area Local Project. Exhibit 2-4 shows the RD 1001 borrow site, along with the anticipated haul routes.

Due to the uncertainty of whether the existing levee material would meet USACE criteria, it is assumed that all material for reconstruction of the levee embankment after construction of the proposed cutoff wall would be imported to the project site. Therefore, for this analysis, it is assumed that 100,000 cubic yards of select borrow material would be obtained from the RD 1001 borrow site.

2.3 DESCRIPTION OF THE PROPOSED PROJECT

2.3.1 CUTOFF WALLS

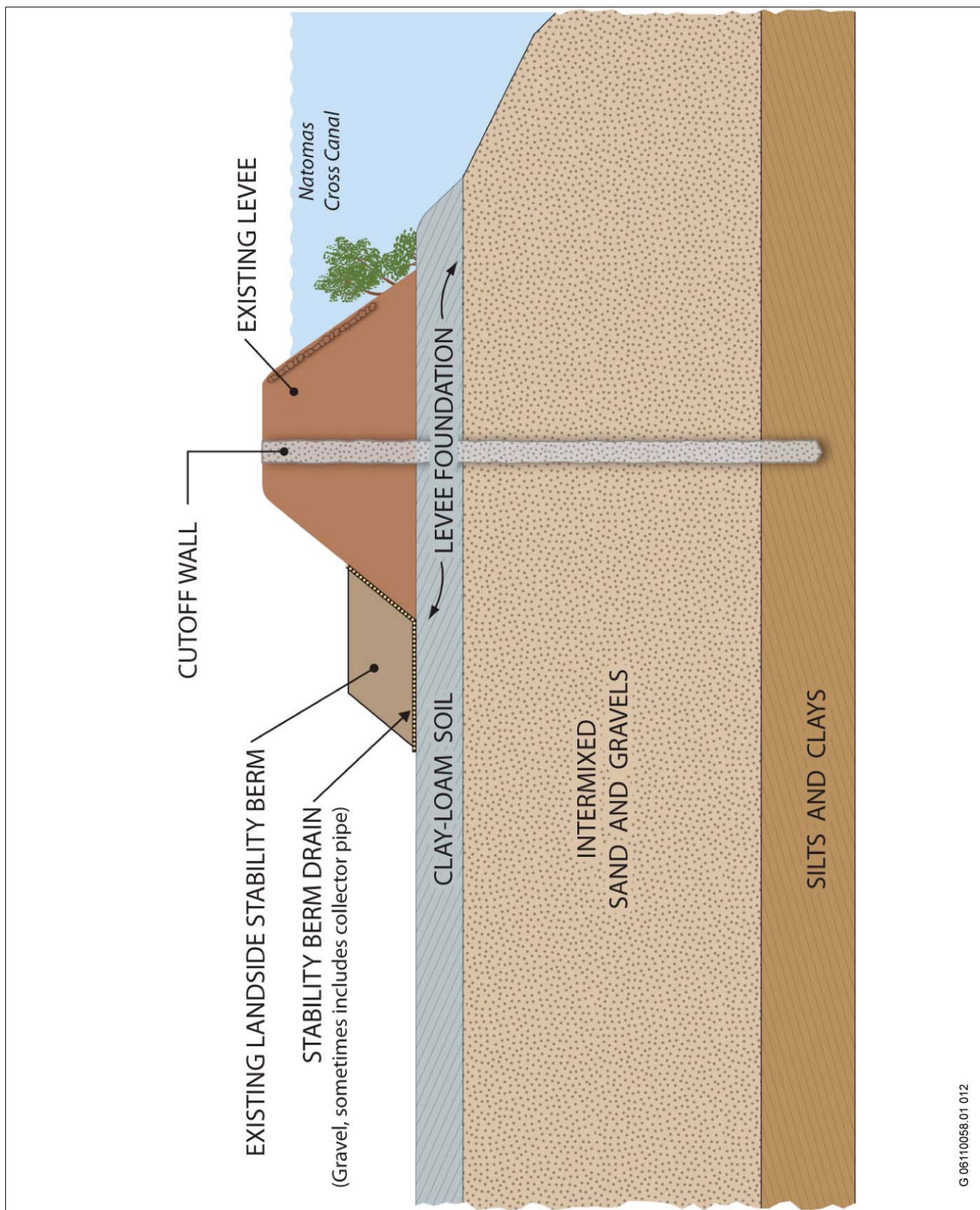
Exhibit 2-5 is a schematic representation of a typical cutoff wall through the levee crown. Cutoff walls reduce levee through-seepage and underseepage by providing a barrier of low-permeability material through the levee and levee foundation where sandy or gravelly soils of higher permeability can transmit seepage during high water stages. Cutoff walls are installed to depths sufficient to minimize seepage both through the levee and beneath it. The depths for cutoff walls necessary to limit underseepage at the design water surface elevation to the maximum gradients specified by the USACE are determined by geotechnical analysis. Cutoff walls for underseepage are



Source: CaSil; EDAW 2006

RD 1001 Borrow Site and Potential Haul Routes

Exhibit 2-4



Source: Jones & Stokes Associates 2006

Typical Cutoff Wall

Exhibit 2-5

generally placed 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 (SB) mix using conventional trench methods, deep soil mixing (DSM) or trench remixing deep (TRD), and interlocking steel sheet piles. Additionally, cutoff walls can be constructed at either the levee centerline or the levee waterside toe. For either method, the available working area generally must be about 30 feet wide.

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. The top of the levee must then be reconstructed using suitable material.

Existing levee excavation and reconstruction quantities are higher with a waterside cutoff wall than with centerline installation; however, the square footage of cutoff wall is lower. Construction on the water side of the levee may require the removal of sensitive plant species or vegetation that contributes to wildlife or fish habitat or may entail work below the ordinary high-water mark (OHWM) of the waterway, which would require additional permitting. That permitting process would be expected to extend the timeframe of the project approval process, which could delay the start of construction.

A review of each of the three project reaches was performed to determine their suitability for a waterside cutoff wall. To meet the project objective of constructing the proposed improvements in 2007, it was considered necessary for each reach of the levee to have a bench above the OHWM that is relatively free of large oak trees and other plant species with habitat value for native species. A visual survey of the project site was conducted, and none of the project reaches was observed to meet these criteria. While a bench of limited width is present on the water side of the existing levee, enlarging this bench would require cutting away the waterside levee slope above the level of the bench and reconstructing the waterside of the levee following cutoff wall construction. This would require removing the existing riparian vegetation. A waterside cutoff wall was therefore rejected as infeasible because of increased environmental impacts, additional time needed to conduct environmental permitting, and increased cost. SCB cutoff walls through the levee crown were determined to be a feasible seepage remediation method for all three project reaches.

2.3.2 GENERAL CHARACTERISTICS OF THE PROPOSED PROJECT

The proposed project would involve constructing a cutoff wall to a depth of approximately 70 to 80 feet along the levee centerline in all three reaches. The cutoff wall would overlap the Sacramento River east levee by about 200 feet.

The “project site” for the proposed project would consist of the area of potential temporary ground surface disturbance during project construction. This area would include the upper 10 feet of the waterside slope of the NCC south levee in Reaches 1, 2, and 3; the levee crown area; the landside levee slope; the maintenance corridor along the landside levee toe; and any adjacent area used for construction staging and equipment storage.

2.3.3 GENERAL CONSTRUCTION PLAN

Project construction would begin in June 2007 and would continue over a 6-month period through November 2007. The anticipated construction labor force would consist of 45–55 people working on two headings simultaneously, working 10-14 hour shifts, 6 days per week. A smaller crew would perform maintenance activities on Sundays.

The following sections describe the construction activities for the proposed project. Equipment quantities and durations of use are provided in Section 2.3.4, and material sources and quantities are provided in Section 2.3.5. It is assumed that the entire area along the landside levee toe between the levee and canal would be used for construction staging needs.

2.3.3.1 CLEARING AND GRUBBING/STRIPPING

Preparation for degrading the upper 6–8 feet of the levee crown would entail 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 (see Section 2.3.3.5, “Demobilization/Cleanup” below).

2.3.3.2 LEVEE CROWN DEGRADING

Construction of a conventional slurry cutoff wall would require that the existing levee be degraded to prevent hydraulic fracturing. The upper approximately 1/3 of the levee (6–8 feet) would be degraded by scrapers and a bulldozer. Some of the material that is removed may be suitable for later use in reconstructing the levee crown, as described in the next section. The excess material would be stockpiled along the levee toe and eventually used in later phases of SAFCA’s program of Natomas levee improvements (see 2.3.3.5, “Demobilization/Cleanup” below).

2.3.3.3 CUTOFF WALL CONSTRUCTION

A cutoff wall would be constructed to a depth of approximately 70 to 80 feet along the levee centerline in all three reaches. Conventional slurry cutoff walls are typically constructed using an excavator with a long-reach boom capable of digging a trench to a maximum depth of approximately 80 feet. A bentonite and water slurry is placed in the trench during trench excavation to prevent caving until the SCB backfill material is mixed and placed in the trench. To make the SCB backfill, select soil is mixed with cement and bentonite clay to achieve the required cutoff wall strength and permeability. This material is then backfilled into the trench. A portion of the material removed from the levee crown may be suitable for this use, with the remainder imported from the borrow site. However, for purposes of this analysis, it is assumed that all of this material would be imported from a borrow source early in the cutoff wall construction phase.

Cutoff wall construction requires temporary establishment of an on-site slurry batch plant that would occupy about 1 to 2 acres that may be moved during the construction process due to limitations on the distance that the slurry material can be pumped. The batch plant site would likely contain tanks for water storage, bulk bag supplies of bentonite, bentonite and cement storage silos, a cyclone mixer, pumps, and two generators that meet air quality requirements. The site would also include slurry tanks to store the blended slurries temporarily until they are pumped to the work sites. Slurry ingredients 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. The batch plant would produce two different slurry mixes, one for trench stabilization and one for the soil backfill mix, as described above. Therefore, two slurry pipes or hoses, typically 4- or 6-inch high-density polyethylene (HDPE) pipes, would be laid on the ground and would extend to all work sites. An additional pipe may be used to supply water to the work sites.

2.3.3.4 LEVEE CROWN RECONSTRUCTION AND FINISH GRADING

Levee reconstruction would be required to restore the degraded levee to its pre-construction height. Material would be imported from the RD 1001 borrow site and mixed with degraded levee crown material to complete the levee reconstruction. Two motor graders would shape the levee to its finished grade as sheepsfoot compactors compact the material. Following levee reconstruction, new road surfacing material would be delivered to the

project site and compacted to place 2 inches of new road surfacing on top of at least 2 inches of previously salvaged material from the levee crown to reconstruct the levee patrol road (located on top of the levee).

2.3.3.5 DEMOBILIZATION/CLEANUP

Cutoff wall construction would result in the generation of excess spoil material, which would require off-site hauling and disposal in an authorized landfill or through a concrete recycler. Following the completion of construction activities, all disturbed areas, such as the batch plant site, would be restored to preconstruction conditions, and the levee slopes and any previously vegetated areas disturbed during construction would be seeded with a grass mix. This phase would also entail general clean up and hauling off of unused and waste materials. All construction equipment would be loaded onto trailers and taken off-site.

2.3.4 CONSTRUCTION EQUIPMENT

Table 2-1 lists the construction equipment anticipated to be needed during the construction period.

Table 2-1 Estimated Construction Equipment Requirements for the Proposed Project		
Construction Phase	Number of Each Equipment Type	Duration of Use
Clearing and grubbing/stripping	3 scrapers	10 days
	1 water truck	10 days
	1 front end loader	10 days
	2 haul trucks	10 days
Levee degrading	1 bulldozer	30 days
	2 scrapers	30 days
	1 loader	30 days
	1 water truck	30 days
Cutoff wall construction	2 long reach hydraulic excavators	80 days
	2 hydraulic excavators	80 days
	2 front-end loaders	80 days
	1 extended boom pallet loader	80 days
	2 300-kW generators	80 days
	3 slurry pumps	80 days
	5 pickup trucks	80 days
	2 haul trucks (15 cubic yards)	80 days
Levee crown reconstruction and finish grading	2 bulldozers	30 days
	3 loaders	30 days
	2 sheepsfoot rollers	30 days
	18 haul trucks	30 days
	2 smooth drum rollers	30 days
	2 motor graders	30 days
Borrow site excavation	Equipment is included in the above phases for cutoff wall construction and levee crown reconstruction	110
Demobilization/cleanup	2 water trucks	10 days
	1 hydroseeding truck	10 days
	2 haul trucks	10 days
Source: Kors, pers. comm., 2006		

2.3.5 MATERIAL SOURCES AND HAULING

Select material would need to be imported for cutoff wall construction and levee crown reconstruction, and commercial aggregate base material would be needed for resurfacing of the levee patrol road. Table 2-2 lists the material sources, estimated quantities, and estimated hauling requirements and the waste quantities and hauling requirements.

Table 2-2 Hauling Requirements for the Proposed Project						
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	1,300	5	20	5
Levee Crown Degrade	Project	Stockpile	60,500	Scraper to Stockpile		
Cutoff Wall	--	--	--	--	--	--
Soils Export	Cutoff Wall	Waste	19,800	10	40	33
Select Import	Borrow Site	Cutoff Wall	4,500	10	40	8
Levee Crown Reconstruction	Borrow Site	Levee Crown	95,500	30	240	27
Finish Grading	Aggregate Base Commercial Source	Levee Patrol Road; Levee Crown	1,800	5	40	3
Notes: ¹ Truck capacity is assumed to be 15 cubic yards						

Following removal of borrow, the RD 1001 borrow site would be treated in accordance with the conditions of the SMARA permit (Sutter County 1990).

2.3.6 CONSTRUCTION-RELATED TRAFFIC AND ROADWAY USE

Personnel, equipment, and imported construction materials would reach the project site via State Route (SR) 70/99, Sankey Road, Riego Road, Howsley Road, and Garden Highway. The potential haul routes between the RD 1001 borrow site and the project site are shown in Exhibit 2-4.

The location of the landfill used for disposal of spoil material would be determined by the construction contractor at the time of construction activity based on capacity, type of waste, and other factors. For purposes of this EIR analysis, it is assumed that Kiefer Landfill, owned and operated by Sacramento County, would be used. This assumption provides for a conservative estimate of hauling distance needed for off-site waste disposal.

Construction of the proposed project would require temporary closure of Garden Highway while a section of the new cutoff wall is installed along the Sacramento River east levee. Garden Highway traffic would be detoured to West Catlett Road and Riego Road during this 2-month period.

2.3.7 OPERATIONS AND MAINTENANCE

Maintenance would be consistent with RD 1000's current routine maintenance practices.

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, “Other CEQA-Required Sections.”

Section 3.1 discusses the general approach to the environmental impact analysis, including the relationship of this EIR to previously prepared environmental analyses. The remainder of the chapter, Sections 3.2 through 3.15, describes by resource topic the regulatory and environmental setting, impact mechanisms and impact analysis conclusions, 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. There would be no operational effects of the proposed project except the beneficial effect of remediation of levee seepage conditions. Therefore, the analysis in this chapter focuses on construction impacts.

3.1.1 SECTION CONTENTS AND DEFINITION OF TERMS

Chapter 3 addresses the following resource topics:

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

Sections 3.2 through 3.15 follow the same general format:

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

“Environmental Setting” provides 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” identifies the direct and indirect impacts of the proposed project on the environment, in accordance with State CEQA Guidelines Sections 15125 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.

“Mitigation Measures” describes the measures proposed to avoid, minimize, rectify, reduce, or compensate for significant impacts of the project, in accordance with the State CEQA Guidelines (Section 15126.4). Each identified mitigation measure is labeled numerically to correspond with the number of the impact that would be mitigated by the measure. The EIR must describe any feasible measures that could minimize 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 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 the proposed project as they relate to consistency with existing land uses in the project area and with policies intended to express the planning goals of applicable jurisdictions, including policies and goals related to agricultural land uses.

3.2.1 REGULATORY SETTING

See Volume I, Section 4.2, “Agriculture and Land Use,” for a discussion of the relevant federal and state regulatory setting; relevant Sutter County General Plan components; and the Natomas Basin Habitat Conservation Plan (NBHCP).

3.2.2 ENVIRONMENTAL SETTING

3.2.2.1 REGIONAL SETTING

The project site is in the Sutter County portion of Natomas, northwest of the City of Sacramento. The RD 1001 borrow site is also located in Sutter County. Sutter County is located in the Sacramento Valley of Northern California, approximately 20 miles north of downtown Sacramento. State Route (SR) 99 extends in a north-south direction through the county and is defined as the principal transportation corridor connecting the county to the region.

Sutter County covers an area of about 607 square miles (388,359 acres), and is bordered by Yolo and Colusa Counties to the west, Butte County to the north, Yuba and Placer Counties to the east, and Sacramento County to the south. Sutter County includes two incorporated cities, the City of Yuba City and the City of Live Oak, and the unincorporated rural communities of Meridian, Nicolaus, East Nicolaus, Rio Oso, Robbins, Sutter, and Trowbridge. The majority of the land in the county is used for agricultural purposes.

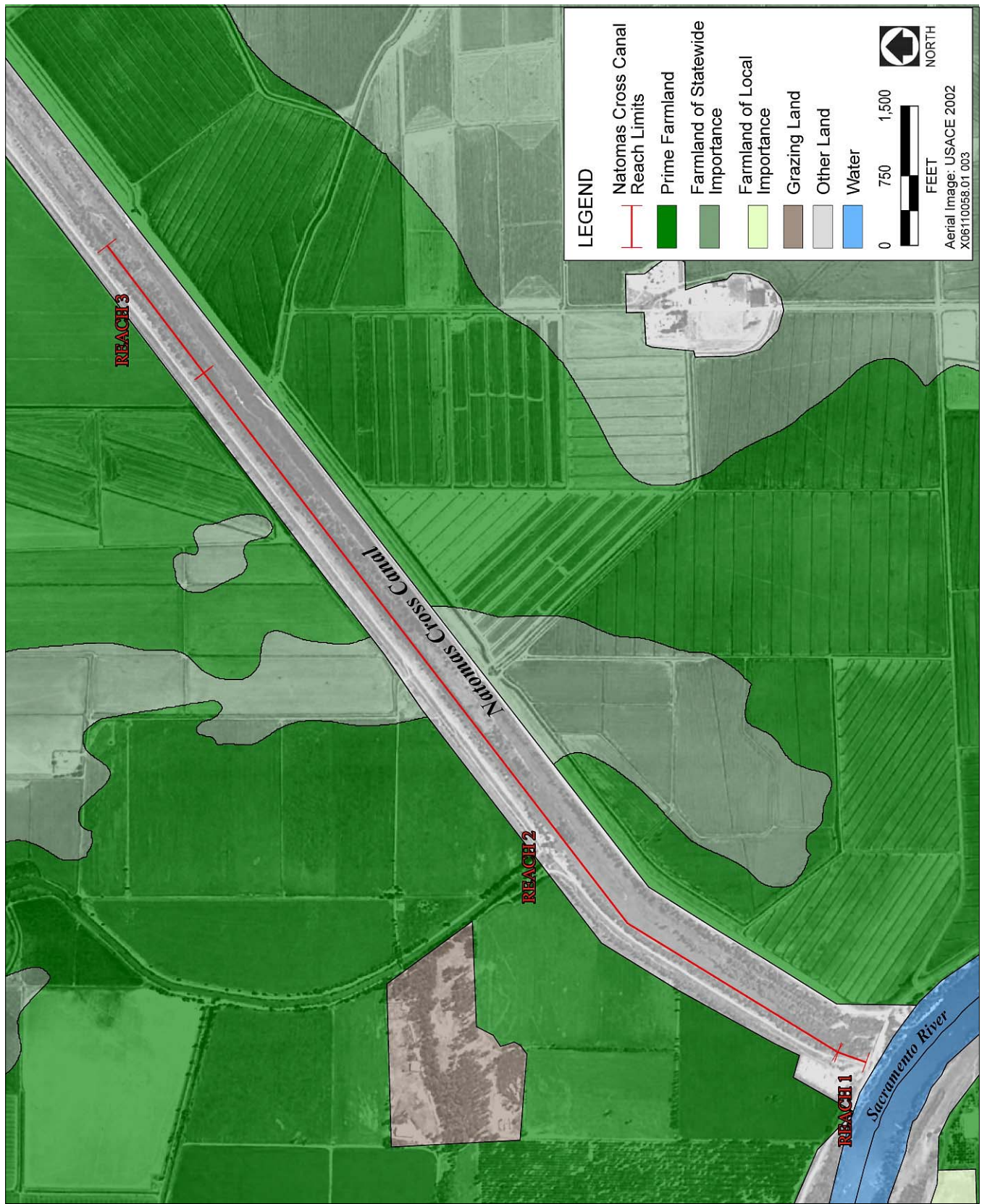
3.2.2.2 AGRICULTURAL LAND USE

Lands in the project area are particularly suited for agriculture. As of 2004, there were approximately 344,063 acres of agricultural land in Sutter County. These lands were classified by the California Department of Conservation’s Farmland Mapping and Monitoring Program (FMMP) as 166,203 acres of Prime Farmland, 107,743 acres of Farmland of Statewide Importance, 19,480 acres of Unique Farmland, and 50,637 acres of Grazing Land (California Department of Conservation 2006). FMMP’s mapping of Important Farmland in the project area is shown in Exhibit 3.2-1. The project area includes Prime Farmland, Farmland of Statewide Importance, and Farmland of Local Importance, as well as Grazing Land and Other Land as classified by the California Department of Conservation.

3.2.2.3 PROJECT AREA

The project site consists of the westernmost 12,500 feet of the south levee of the Natomas Cross Canal (NCC) and adjacent land. The NCC begins at the Pleasant Grove Creek Canal and the East Side Canal on the east and extends southwest to its confluence with the Sacramento River near the Sankey Road/Garden Highway intersection, and forms the northern boundary of the Natomas area and of SAFCA’s jurisdiction.

The project site is in a rural setting. Land uses in the project vicinity include Garden Highway, a county roadway located on the crown of the Sacramento River east bank levee; agricultural lands; and Verona Village Resort, a small trailer campground, marina, restaurant, and store on the west side of the Garden Highway, approximately 660 feet southwest of the project site. Additionally, there are a few scattered residents.



Source: FMMP 2004

Project Area Farmland Designations

Exhibit 3.2-1

The RD 1001 borrow site is also located in a rural agricultural setting, northeast of the project site. Portions of the RD 1001 borrow site are currently used for agriculture (rice).

3.2.2.4 LAND USE DESIGNATIONS AND ZONING

The general plan land use designation for the project site and the RD 1001 borrow site is Agriculture (Sutter County 2006a). The Agriculture land use designation identifies land for crop cultivation, including areas of prime agricultural soils, and other productive and potentially productive lands where commercial agricultural uses can exist without creating conflicts with other land uses, or where potential conflicts can be mitigated. Lands designated as Agriculture typically have soils with characteristics that are particularly suited for crops as defined or described in the U.S. Department of Agriculture (USDA) Soil Survey for Sutter County. Typical uses allowed under this land use designation include crop production, orchards, grazing, pasture and rangeland, resource extraction activities, facilities that directly support agricultural operations such as agricultural products processing, and necessary public utility and safety facilities.

The project site and RD 1001 borrow site are zoned General Agricultural District (Sutter County 2006a). The General Agricultural District was established “to provide areas for general farming, open spaces, and by use permit, limited retail service uses which in the opinion of the planning commission support the local agricultural industry” (Sutter County 2006b).

3.2.3 ENVIRONMENTAL IMPACTS

The focus of this land use analysis is on land use and agricultural resources impacts that could potentially result from construction and implementation of the proposed project. Evaluation of potential land use impacts is based on a review of the California Department of Conservation Important Farmland Map for Sutter County and of the planning documents pertaining to the project area, including the Land Use Element and Agricultural Resources Element of the *Sutter County General Plan* (1996a), the *Sutter County General Plan Background Report* (1996b), the Sutter County Zoning Code (Sutter County 2006a), the Sutter County Zoning and General Plan Map (Sutter County 2006b), and the NBHCP.

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 not develop infrastructure that would physically separate an identified community or residential cluster. Therefore, no impacts related to the physical division of communities would result from project implementation, and this issue is not discussed further.

The project would not conflict with land use planning and policies. Project construction would not alter the levee footprint or result in changes to the floodway. The current land use designation for the project area in the *Sutter County General Plan* is Agriculture, and the area is zoned General Agricultural District. This land use designation and zoning are intended to support Agricultural Resources Goal 6.A of the general plan, which promotes preservation of high-quality agricultural land for agricultural purposes. There would be no change in permitted uses under the existing general plan land use and zoning designations for the project area. No agricultural land would be removed from production, and current agricultural uses could continue once construction is completed. Project activities at the RD 1001 borrow site may involve taking agricultural land out of production; however, use of the RD 1001 borrow site has been addressed by Sutter County in the *Reclamation Plan for Surface Mining Operation in Nicolaus, Sutter County* (Sutter County 1990). Because there would be no permanent changes to the project footprint or existing land uses at the project site, consistency with land use plans and policies is not discussed further.

There are no lands under Williamson Act contracts in the project area. Therefore, no impacts related to conflicts with existing zoning for Williamson Act contracts would result from project implementation, and this issue is not discussed further.

See Section 3.6, “Terrestrial Biological Resources,” for the analysis of consistency of the proposed project with the NBHCP. That analysis concludes that, with mitigation described in Section 3.6, no inconsistency would result from implementation of the proposed project.

3.2.3.2 IMPACT ANALYSIS

IMPACT 3.2-a *Conversion of Farmland to Nonagricultural Uses Resulting from Project Construction. Project construction would not alter the levee footprint or result in changes to the floodway. Additional lands required for construction staging areas, haul routes, and a borrow site would not be permanently converted to nonagricultural uses. Therefore, this impact would be less than significant.*

Construction of the cutoff wall would occur along the existing levee centerline and would not alter the levee footprint or result in changes to the floodway. Therefore, there would be no permanent conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to nonagricultural uses and no agricultural land would be permanently removed from production.

During the construction period, approximately 1 acre along the landside levee toe between the levee and canal would be used for construction staging, including storage for construction equipment and other vehicles. Cutoff wall construction would require the temporary establishment of an on-site batch plant that would occupy about 1 to 2 acres. To the extent feasible, the construction staging area and the temporary batch plant would be sited on land that is not cultivated, between the levee toe and actively farmed fields. Where construction activity would encroach on an agricultural field, the encroachment would be temporary and the land would be farmable following the end of construction activity. The potential haul routes are located on previously disturbed land and established roadways and access roads. Therefore, no impacts to Prime Farmland, Unique Farmland, or Farmland of Statewide Importance would occur.

Because the project would not permanently result in the conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to nonagricultural uses, this impact would be less than significant.

3.2.4 MITIGATION MEASURES

No mitigation is required.

3.3 GEOLOGY AND SOILS

This section addresses issues related to geologic hazards, specifically soil erosion. Water quality effects of erosion are discussed in Section 3.4, “Water Resources.” Paleontological resources are addressed in Section 3.8, “Paleontological Resources.”

3.3.1 REGULATORY SETTING

See Volume I, Section 4.3, “Geology and Soils,” for a discussion of the relevant federal and state regulatory setting. Sutter County does not have a grading or erosion control ordinance.

3.3.2 ENVIRONMENTAL SETTING

3.3.2.1 GEOLOGY

The project site lies in the Sacramento Valley portion of the Great Valley Geomorphic Province of California, a large valley trending northwest-southeast that is bounded by the Sierra Nevada to the east and south, the Coast Ranges to the west and the Klamath Mountains to the north. This geomorphic province is filled with a thick sequence of sediments from Jurassic (180 million years ago) to recent age. The Sacramento Valley has been a depositional basin throughout most of the late Mesozoic and Cenozoic time. A thick sequence of sedimentary rock units form the bedrock units now deeply buried in the mid-basin areas of the valley. Late Pleistocene and Holocene (Recent) alluvial deposits cover the area, consisting of reworked fan and stream materials that were deposited by streams prior to the construction of the existing flood control systems.

The project site is within the historical floodplain of the Sacramento River, which is very wide in this area because the land is relatively flat (Wagner et al. 1987).

Flanking the recent alluvial deposits in the project area are late Pleistocene alluvial fan and terrace deposits of the Modesto and Riverbank Formations (Helley and Harwood 1985). Stream terrace deposits, mapped as the Modesto Formation, are higher in elevation and older than floodplain sediments. Before the construction of the existing levees, these stream terraces were occasionally flooded, but only small amounts of sediment were deposited during flood events. The lower fan terraces of the Riverbank Formation are higher in elevation and older than stream terraces and were only rarely flooded.

The project area also includes channel and river deposits of Holocene age. River deposits crop out along the major rivers and streams of the Sacramento Valley and include channel and floodplain deposits. River deposits are still accumulating, except where human activity intervenes, such as channelization by use of a levee. Channel deposits, which consist chiefly of sand and gravel, range in width from a few feet to nearly 1,000 feet. Because soil development and topography are the criteria considered in mapping river deposits, subsurface contact with underlying deposits is poorly defined. River deposits in the Sacramento area have been described as predominantly coarse-grained at relatively shallow depths that appear to be hydraulically continuous with the present stream channels, floodplains, and natural levees.

See Volume I, Section 4.3.2.1, “Geology,” for a more detailed description of the project area geology.

3.3.2.2 SEISMICITY

The project site lies in north central California, an area that has experienced relatively low seismic activity in the past. The site is not located in an Alquist-Priolo Earthquake Fault Zone (California Geological Survey 1999; Hart and Bryant 1999). See Volume I, Section 4.3.2.2, “Seismicity,” for a more detailed description of regional seismic conditions.

The closest active faults in 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 Activity¹	Distance from Project Site	Fault Class²	Maximum Moment Magnitude³
Dunnigan Hills	Holocene	20 miles	n/a	n/a
Coast Range Fault Zone	Historic	40 miles	n/a	6.5
Green Valley	Historic	50 miles	B	6.9
Prairie Creek	Historic	60 miles	n/a	6.5
Swain Ravine	Historic	60 miles	n/a	6.5
Cleveland Hills	Historic	60 miles	n/a	6.5
Hayward-Rodgers Creek	Historic	60 miles	A	7.0
San Andreas	Historic	75 miles	A	7.9
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 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. Source: Jennings 1994; Petersen et al. 1996; DWR 1979				

The California Building Standards Code specifies more stringent design guidelines where a project would be located adjacent to a Class "A" or "B" fault as designated by the California Probabilistic Seismic Hazard Maps. The nearest Class A or B fault is the Green Valley fault, which is located approximately 50 miles from the project site.

Potential seismic hazards resulting from a nearby moderate to major earthquake can generally be classified as primary and secondary. The primary effect is fault ground rupture, also called surface faulting. Because there are no active faults mapped across the project site by the California Geological Survey or the U.S. Geological Survey (USGS) and the project site is not located within an Alquist-Priolo Earthquake Fault Zone, fault ground rupture is unlikely. Common secondary seismic hazards include ground shaking, liquefaction, subsidence, and seiches. These hazards are described in Volume I, Section 4.3.2.2, "Seismicity."

3.3.2.3 SOILS

A review of the Sutter County Soil Survey (Natural Resources Conservation Service [NRCS] 1983) indicates that the following soil map units are present along Reaches 1, 2, and 3 of the south levee of the Natomas Cross Canal (NCC):

- ▶ Capay silty clay, 0 to 2% slopes;
- ▶ Columbia fine sandy loam, 0 to 2% slopes; and
- ▶ Yuvas loam, 0 to 2% slopes.

The following soil map units are present at the RD 1001 borrow site:

- ▶ Capay silty clay, 0 to 2% slopes;
- ▶ Capay silty clay, occasionally flooded, 0 to 2% slopes; and
- ▶ San Joaquin sandy loam, 0 to 2% slopes.

Table 3.3-2 summarizes the characteristics of these soils.

3.3.3 ENVIRONMENTAL IMPACTS

Published geologic maps and reports covering the geology of the project site and surrounding area were reviewed to determine the exposed rock units and to delineate their respective aerial distributions in the project area. In addition, the relevant NRCS soil survey data for Sutter County was reviewed.

Effects associated with geology and soils that could result from project activities were evaluated based on expected construction practices, materials, locations, and duration of project construction and related activities, as well as 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 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 that is unstable, or that would become unstable as a result of the proposed project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse;
- ▶ locate project facilities on expansive soil, creating substantial risks to property; or
- ▶ have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of wastewater.

The project would not expose people or structures to potential substantial adverse impacts through the rupture of a known earthquake fault, strong seismic shaking, seismic-related ground failure, soil liquefaction, or landslides. The project would not be located on a geologic unit that is unstable, or that would become unstable as a result of the proposed project, potentially resulting in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse. The project would not be located on expansive soil, creating substantial risks to property. Therefore, these issues are not discussed further.

Because the 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, this issue is not discussed further.

Table 3.3-2 Project Site and RD 1001 Borrow Site Soil Types										
Map ¹	Soil Series Name	USDA Soil Texture	Shrink-Swell Potential	Permeability	Drainage	Runoff Potential	T Erosion Factor ²	pH	% Clay	Limitations
Natomas Cross Canal Reaches 1–3 South Levee Soils										
104	Capay	0–36 inches, silty clay	High	Slow	Moderately well drained	Very slow	5	6.6–8.4	40–60	Severe limitation for local roads and streets (low soil strength, shrink-swell potential)
		36–60 inches, silty clay loam, clay loam	High					7.9–8.4	35–40	Severe limitation for shallow excavations (cutbanks cave) Moderate limitation for embankments, dikes and levees (hard to pack)
117	Columbia	0–14 inches, fine sandy loam	Low	Moderately rapid	Somewhat poorly drained	Very slow	5	6.6–7.8	8–18	Moderate limitation for local roads and streets (flooding)
		14–16 inches, fine sandy loam, very fine sandy loam	Low					6.6–7.8	10–18	Severe limitation for shallow excavations (cutbanks cave)
175	Yuvas	0–16 inches, loam	Low	Moderate to very slow	Moderately well drained	Very slow	2	6.1–7.3	18–27	Severe limitation for local roads and streets (low soil strength, shrink-swell potential)
		16–24 inches, clay	High					7.4–8.4	40–60	Severe limitation for shallow excavations (cemented hardpan)
		24–38 inches, indurated	--						--	Severe limitation for embankments, dikes and levees (thin layer)
		38 inches, weathered bedrock	--						--	

Table 3.3-2

Map ¹	Soil Series Name	USDA Soil Texture	Shrink-Swell Potential	Permeability	Drainage	Runoff Potential	T Erosion Factor ²	pH	% Clay	Limitations
RD 1001 Borrow Site Soils										
104	Capay	0–36 inches, silty clay	High	Slow	Moderately well drained	Very slow	5	6.6–8.4	40–60	Severe limitation for local roads and streets (low soil strength, shrink-swell potential)
		36–60 inches, silty clay loam, clay loam	High					7.9–8.4	35–40	Severe limitation for shallow excavations (cutbanks cave) Moderate limitation for embankments, dikes and levees (hard to pack)
105	Capay	0–36 inches, silty clay	High	Slow	Moderately well drained	Very slow	5	6.6–8.4	40–60	Severe limitation for local roads and streets (low soil strength, flooding, shrink-swell potential)
		36–60 inches, silty clay loam, clay loam	High					7.9–8.4	35–40	Severe limitation for shallow excavations (cutbanks cave) Moderate limitation for embankments, dikes and levees (hard to pack)
158	San Joaquin	0–16 inches, sandy loam	Low	Moderate	Well drained	Very slow	2	5.6–6.5	10–20	Severe limitation for local roads and streets (low soil strength, flooding, shrink-swell potential)
		16–27 inches, clay loam, clay	High					5.6–7.8	35–45	Severe limitation for shallow excavations (cemented hardpan)
		27–31 inches, indurated	--					--	--	Severe limitation for embankments, dikes and levees (thin layer)
		31–60 stratified sandy loam to loam	Low					6.1–7.8	10–25	

¹ Soil map numbers refer to numbers shown in the *Soil Survey of Sutter County* (NRCS 1988)

² T represents soil loss tolerance, which is defined as the maximum rate of soil erosion (wind and water) without reducing crop production or environmental quality. Values range from 1 to 5 tons of soil loss per acre per year, with 5 representing soils less sensitive to erosion.

Source: NRCS 1988

3.3.3.2 IMPACT ANALYSIS

IMPACT 3.3-a	Potential Temporary, Short-Term Construction-Related Erosion. <i>Project construction would involve extensive grading and earthmoving, which could expose soils to substantial erosion and result in the loss of topsoil. This potential impact would be significant.</i>
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Project construction would involve clearing and grubbing/stripping, levee crown degrading, cutoff wall construction, levee crown reconstruction and finish grading, and demobilization/cleanup. The construction period could extend for 6 months. Construction activities would result in the temporary disturbance of soil and would expose disturbed areas to 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 loss of topsoil because of wind erosion. For these reasons, this potential impact would be significant.

3.3.4 MITIGATION MEASURES

Mitigation Measure 3.3-a for Potential Temporary, Short-Term Construction-Related Erosion: 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.

SAFCA and its primary contractors for engineering design and construction shall ensure that the following measures are implemented to avoid and minimize potential effects of construction activities on water quality.

Implement Mitigation Measure 3.4-a, which requires filing a notice of intent with the Central Valley regional water quality control board (RWQCB); implementing standard erosion, siltation, and BMP measures; preparing a SWPPP; and complying with the conditions of the NPDES general stormwater permit for construction activity.

Implementing this mitigation measure would reduce potential soil erosion impacts to a less-than-significant level.

3.4 WATER RESOURCES

3.4.1 REGULATORY SETTING

See Volume I, Section 4.4, “Hydrology and Water Quality,” and Section 4.5, “Water Quality,” for a discussion of the relevant regulatory setting.

3.4.2 ENVIRONMENTAL SETTING

3.4.2.1 HYDROLOGY

As characterized by CalWater, the official California watershed map, the project site is situated within the Pleasant Grove hydrologic sub-area (HSA 519.22) of approximately 340 square miles in area, located within the Valley-American hydrologic unit in the Sacramento Basin (CalWater 2006). The average rainfall in the sub-area is 18.8 inches (California State University, Sacramento 2006). The eastern portion of HSA 519.22 is characterized by low rolling uplands. The western portion, which includes the Natomas area, is a nearly flat historic flood basin for the Bear, Feather, Sacramento and American Rivers, and several small east side tributaries. The general direction of drainage is west-southwest at an average grade of about 5%. (California Department of Water Resources [DWR] 2006). The Natomas area is bounded by the Sacramento River on the west and south, the Natomas East Main Drainage Canal (NEMDC)/Steelhead Creek on the south and east, and the NCC on the northwest (see Exhibits 2-1 and 2-2).

The Sacramento Basin, covering approximately 27,200 square miles, is the main water supply for much of California’s urban and agricultural areas. Annual runoff in the basin averages about 22.4 million acre feet (maf), which is nearly one-third of the state’s total natural runoff. Major water supplies in the region are provided through surface storage reservoirs. The two largest surface water projects in the region are Shasta Lake, a key component of the Central Valley Project (CVP), on the upper Sacramento River, and Lake Oroville, part of the State Water Project (SWP), on the Feather River. In all, there are more than 40 major surface water reservoirs in the region (DWR 2005). The primary tributary to the Sacramento River upstream of the Natomas area is the Feather River. The confluence is located approximately 1 mile upstream of the northwest corner of the Natomas area. The Sacramento River joins the San Joaquin River approximately 40 miles south of the Natomas area, near Pittsburg in Contra Costa County. The combined waters from these two river systems flow into Suisun Bay, through the Carquinez Strait, and into San Pablo Bay, San Francisco Bay, and the Pacific Ocean.

3.4.2.2 WATER QUALITY

Surface water quality in the hydrologic region is generally good, although 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 [USGS] 2000; DWR 2005). The portion of the Sacramento River that is the receiving water for the NCC is part of a segment from Knights Landing to the Delta that is on the 303(d) list for diazinon from agricultural sources, mercury from abandoned mines, and toxicity from unknown sources (Central Valley Regional Water Quality Control Board [RWQCB] 2002).

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, downstream of the project area, as defined by the Basin Plan (Central Valley RWQCB 2004) include:

- ▶ municipal, industrial, and agricultural supply;
- ▶ irrigation;
- ▶ contact and noncontact recreation;
- ▶ coldwater fish habitat, migration, and spawning;

- ▶ warmwater fish habitat, migration, and spawning;
- ▶ wildlife habitat;
- ▶ power generation; and
- ▶ navigation.

Table 3.4-1 shows a summary of average concentrations from monthly water samples for conventional physical and inorganic chemical constituents measured in the Sacramento River at Verona, the nearest upstream site from the Natomas area, from February 1996 through April 1998, as part of an overall analysis of conditions in the Sacramento River watershed (USGS 2000). The evaluation indicated that the Sacramento River generally has excellent water quality that is very low in contaminants. Measurements of electrical conductivity (EC), total hardness, and specific cations and anions indicate that the site is low in total dissolved solids (TDS). Measurements of pH, moderate alkalinity, and dissolved oxygen (DO) levels are better than the established water quality objectives. The site is also generally low in nutrients (nitrogen and phosphorus), and trace metal concentrations are better than the established water quality objectives. Although mercury is routinely detected, the concentrations have been better than ambient California Toxics Rule (CTR) criteria. Although pesticides have been detected in the Sacramento River, with the exception of the drinking water standard for carbofuran, there are no applicable regulatory criteria.

3.4.2.3 GROUNDWATER QUALITY

The North American sub-basin (5-21.64) lies in the eastern central portion of the Sacramento 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. The water-bearing materials of the sub-basin are composed mostly of Late Tertiary and Quaternary age unconsolidated continental deposits, including Miocene and Pliocene volcanic formations, older alluvium, and younger alluvium. The alluvium constitutes the upper aquifer system, and occupies the upper 200 to 300 feet below ground surface. The lower aquifer system generally occurs deeper than 300 feet towards the west side of the sub-basin, and consists of the Mehrten and older geologic units. The cumulative thickness of these deposits increases from a few hundred feet near the Sierra Nevada foothills on the east to over 2,000 feet along the western margin of the sub-basin. Most of the groundwater is produced in the northern portion of the sub-basin (DWR 2006).

Although there are many areas of good quality groundwater in the North American sub-basin, some areas within the sub-basin have shown elevated levels of TDS, chloride, sodium, bicarbonate, boron, fluoride, nitrate, iron manganese, and arsenic, based on applicable water quality standards and guidelines for domestic and irrigation uses. In an area along the Sacramento River extending from the Sacramento International Airport northward to the Bear River there are high levels of TDS, chloride, sodium, bicarbonate, manganese, and arsenic. The highest levels of TDS were found in an area north of the Natomas area, extending just south of Nicolaus to Verona, between RD 1001 and the Sutter Bypass, with some wells in the area showing TDS concentrations exceeding 1,000 milligrams per liter (mg/L) (DWR 2006).

3.4.3 ENVIRONMENTAL IMPACTS

Water quality impacts that could result from project construction activities were evaluated based on the construction practices and materials to be used, the location and duration of the activities, and the potential for water quality or beneficial use degradation of project area waterways.

Table 3.4-1 Summary of Conventional Water Quality Constituents in the Sacramento River at Verona, 1996–1998		
Constituent	Water Quality Objective	Average Measurement
Conventional Physical and Chemical Constituents		
Temperature	<2.5°F ^a	15.4°C
Flow (cfs)		29,934
EC (µS/cm)		131
DO (mg/L)	7.0 ^b	9.8
DO Saturation (%)	85 ^b	97
pH (standard units)	6.5 to 8.5 ^c	7.8
Alkalinity (mg/L CaCO ₃)		52
Total Hardness (mg/L CaCO ₃)		31
Suspended Sediment (mg/L)		50
Calcium (mg/L)	narrative ^d	11.2
Magnesium (mg/L)		5.7
Sodium (mg/L)		6.9
Potassium (mg/L)		1.2
Chloride (mg/L)	500 ^e	4.7
Sulfate (mg/L)	500 ^e	5.6
Silica (mg/L)		17.4
NO ₂ +NO ₃ (mg/L N)	NO ₃ <10 ^f	0.136
Total Phosphorus (mg/L P)		0.587
Trace Metals		
Arsenic (µg/L)	50 ^g	1.0
Chromium (µg/L)	180 ^g	1.0
Copper (µg/L)	5.1 ^g	1.6
Mercury (µg/L)	0.050 ^h	0.0089
Nickel (µg/L)	52 ^g	1.1
Zinc (µg/L)	120 ^g	1.3
Organic Pesticides		
Molinate (ng/L)	13,000 ⁱ	<122.9
Simazine (ng/L)	3,400 ^j	<21.4
Carbofuran (ng/L)	40,000 ^e , 500 ⁱ	<28.9
Diazinon (ng/L)	51 ^k	<28.9
Carbaryl (ng/L)	700 ^j	<41.9
Thiobencarb (ng/L)	1,000 ^a	41
Chlorpyrifos (ng/L)	14 ^k	<25
Methidathion (ng/L)		<38.1
Notes: CaCO ₃ = calcium carbonate mg/L = milligrams per liter µg/L = micrograms per liter MRL = method reporting limit ^a RWQCB Basin Plan water quality objective for allowable change from controllable factors ^b RWQCB Basin Plan water quality objective ^c RWQCB Basin Plan water quality objective; <0.5 allowable change from controllable factors ^d RWQCB Basin Plan narrative objective: water shall not contain constituent in concentrations that would cause nuisance or adversely affect beneficial uses ^e Secondary drinking water maximum contaminant level (MCL) µS/cm = microsiemens per centimeter ng/L = nanograms per liter NO ₂ = nitrogen dioxide (nitrate) NO ₃ = nitrogen trioxide (nitrite) ^f Primary drinking water maximum contaminant level (MCL) ^g California Toxics Rule aquatic life criteria for four-day average dissolved concentration ^h California Toxics Rule human health maximum criteria total recoverable concentration ⁱ California Department of Fish and Game (DFG) hazard assessment value ^j U.S. Environmental Protection Agency (EPA) Integrated Risk Information System reference dose for drinking water quality ^k California DFG aquatic life guidance value for four-day average concentration		
Source: Constituent measurements from U.S. Geological Survey 2000		

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. The proposed project was determined to result in a significant effect on water resources if it would:

- ▶ violate any water quality standards or waste discharge requirements or otherwise substantially degrade water quality;
- ▶ substantially alter the existing drainage pattern of a site or area;
- ▶ substantially increase the rate or amount of surface runoff;
- ▶ result in increased exposure of persons or private property to flood hazards;
- ▶ substantially reduce water supply; or
- ▶ alter regional or local hydrology, resulting in oversteepening and/or destabilization of stream or river banks, accelerated erosion, or sedimentation.

SAFCA also uses an additional set of specific criteria for analyzing the hydraulic impacts of projects. The proposed project would entail constructing a cutoff wall in a portion of the NCC south levee. Neither the height nor prism of the levee would be altered. Therefore, the project would have no effect on hydrology or hydraulics.

3.4.3.2 IMPACT ANALYSIS

IMPACT 3.4-a	Temporary Water Quality Effects from Stormwater Runoff, Erosion, and Spills Associated with Construction. <i>Ground-disturbing activities associated with project construction 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, this potential impact would be significant.</i>
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Project construction activities would include clearing and grubbing/stripping, levee crown degrading, cutoff wall construction, levee crown reconstruction and finish grading, and demobilization/cleanup. These activities have the potential to temporarily impair water quality due to the discharge into receiving waters of disturbed and eroded soil, petroleum products, and other construction-related wastes (e.g., concrete, solvents). 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 water quality effects 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 as related to the rainy season, proximity to receiving water bodies, and sensitivity of those water bodies to contaminants of concern. Planned construction activities would coincide with part of the rainy season.

Slurry that would be used for construction of the new cutoff wall 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 as well. 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.

3.4.4 MITIGATION MEASURES

Mitigation Measure 3.4-a for Temporary Water Quality Effects from Stormwater Runoff, Erosion, and Spills Associated with Construction: Implement Standard BMPs, Prepare and Implement a SWPPP, and Comply with NPDES Permit Conditions.

SAFCA and its primary contractors for engineering design and construction shall ensure that the following measures are implemented to avoid and minimize potential soil erosion effects of construction activities.

SAFCA shall file a notice of intent 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 contaminated stormwater discharges into waterways, and inspection and monitoring activities that shall be conducted. Construction and post-construction monitoring shall be conducted to ensure that all erosion-control efforts are performing as designed.

Construction and post-construction monitoring shall be conducted to ensure that all erosion-control efforts are performing as designed. BMPs shall include pollution prevention measures (erosion and sediment control measures and measures to control nonstormwater discharges and hazardous spills), demonstration of compliance with all applicable RWQCB and other applicable water quality standards, local and regional erosion and sediment control standards, identification of responsible parties, detailed construction timelines, and a BMP monitoring and maintenance schedule. BMPs are applied to meet the maximum extent practicable and best conventional technology/best available technology requirements and to address compliance with water quality standards. A construction and post-construction monitoring program shall be implemented to ensure compliance and effectiveness of BMPs.

Implementing this mitigation measure would reduce the potential impact on water quality to a less-than-significant level.

3.5 FISHERIES AND AQUATIC RESOURCES

This section addresses the project's potential impacts to common and sensitive fisheries and aquatic resources found in the Natomas Cross Canal (NCC) and the lower Sacramento River. Water quality is addressed in Section 3.4, "Water Resources." Terrestrial biological resources (e.g., plants and wildlife) are addressed in Section 3.6, "Terrestrial Biological Resources."

3.5.1 REGULATORY SETTING

See Volume I, Section 4.6, "Fisheries and Aquatic Resources," for a discussion of the relevant regulatory setting.

3.5.2 ENVIRONMENTAL SETTING

The NCC is a tributary to the lower Sacramento River. Implementation of the proposed project could potentially affect aquatic resources within the NCC and the lower Sacramento River immediately downstream of the NCC. The NCC and Sacramento River provide important habitat for native anadromous and resident Central Valley fishes, including species that are listed under the federal Endangered Species Act (ESA) and the California Endangered Species Act (CESA). Because the two waterways support many of the same fish species, they are discussed together in this section.

Information on existing conditions was derived from other environmental documents prepared for projects in 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.

3.5.2.1 FISHERIES AND AQUATIC RESOURCES

Important Fish Species Found in the Natomas Cross Canal and Lower Sacramento River

The NCC and lower Sacramento River provide vital fish spawning, rearing, and/or migratory habitat for a diverse assemblage of native and nonnative species (Table 3.5-1). 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 (*Oncorhynchus 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 (*Micropterus 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 (*Lepomis cyanellus*), and golden shiner (*Notemigonus crysoleucas*).

Table 3.5-1 Fishes Present in the Natomas Cross Canal and/or Lower Sacramento River		
Common Name	Scientific Name	Native (N) or Introduced (I)
Sacramento River winter-run chinook salmon	<i>Oncorhynchus tshawytscha</i>	N
Central Valley spring-run chinook salmon	<i>Oncorhynchus tshawytscha</i>	N
Central Valley fall-/late fall-run chinook salmon	<i>Oncorhynchus tshawytscha</i>	N
Central Valley steelhead/rainbow trout	<i>Oncorhynchus mykiss</i>	N
Green sturgeon	<i>Acipenser medirostris</i>	N
White sturgeon	<i>Acipenser transmontanus</i>	N
Pacific lamprey	<i>Lampetra tridentata</i>	N
Sacramento pikeminnow	<i>Ptychocheilus grandis</i>	N
Sacramento splittail	<i>Pogonichthys macrolepidotus</i>	N
Sacramento sucker	<i>Catostomus occidentalis</i>	N
Hardhead	<i>Mylopharodon conocephalus</i>	N
California roach	<i>Lavinia symmetricus</i>	N
Striped bass	<i>Morone saxatilis</i>	I
American shad	<i>Alosa sapidissima</i>	I
Largemouth bass	<i>Micropterus salmoides</i>	I
Smallmouth bass	<i>Micropterus dolomieu</i>	I
White crappie	<i>Pomoxis annularis</i>	I
Black crappie	<i>Pomoxis nigromaculatus</i>	I
Channel catfish	<i>Ictalurus punctatus</i>	I
White catfish	<i>Ameiurus catus</i>	I
Brown bullhead	<i>Ictalurus nebulosus</i>	I
Bluegill	<i>Lepomis macrochirus</i>	I
Green sunfish	<i>Lepomis cyanellus</i>	I
Golden shiner	<i>Notemigonus crysaleucas</i>	I
Sources: Moyle 2002		

The use of different areas of the NCC and lower Sacramento River 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 the NCC and Sacramento River have reduced available shaded aquatic riverine (SRA) habitat, sediment transport, channel migration and avulsion, and large woody debris (LWD) 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 and Sacramento River. 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 LWD 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.

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 the U.S. Fish and Wildlife Service (USFWS), the National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS), or the California Department of Fish and Game (DFG) as species of special concern; and
- ▶ species fully protected in California under the California Fish and Game Code.

A total of nine special-status fish species have the potential to occur in the NCC and/or lower Sacramento River, as described below (Table 3.5-2). Of the nine 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. 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 species of special concern by DFG because of concerns about specific risk factors. The three remaining species (Pacific lamprey, California roach, and hardhead) are considered species of special concern by DFG and/or federal species of concern by NMFS or USFWS. 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.

Table 3.5-2 Special-Status Fish Species Potentially Occurring in the Natomas Cross Canal and/or Lower Sacramento River				
Species	Status ¹		Habitat	Potential to Occur in the NCC and/or Lower Sacramento River
	USFWS/ NMFS	DFG		
Central Valley fall/late fall-run chinook salmon <i>Oncorhynchus tshawytscha</i>	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 and lower Sacramento River
Sacramento River winter-run chinook salmon ESU <i>Oncorhynchus tshawytscha</i>	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 and tributaries; adults and juveniles may stray into the NCC
Central Valley spring-run chinook salmon ESU <i>Oncorhynchus tshawytscha</i>	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 tributaries; adults and juveniles may stray into the NCC

Table 3.5-2 Special-Status Fish Species Potentially Occurring in the Natomas Cross Canal and/or Lower Sacramento River				
Species	Status ¹		Habitat	Potential to Occur in the NCC and/or Lower Sacramento River
	USFWS/ NMFS	DFG		
Central Valley steelhead ESU <i>Oncorhynchus mykiss</i>	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 and lower Sacramento River
Green sturgeon <i>Acipenser medirostris</i>	T	--	Requires cold, freshwater streams with suitable gravel for spawning; rears seasonally inundated floodplains, rivers, tributaries, and Delta	Occurs in the lower Sacramento River; may occur in the NCC
Sacramento splittail <i>Pogonichthys macrolepidotus</i>	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
Pacific lamprey <i>Lampetra tridentata</i>	SC	--	Requires cool, freshwater streams with suitable gravel for spawning	Occurs in the lower Sacramento River; may also occur in the NCC
California roach <i>Lavinia symmetricus</i> sp.	--	SSC	Spawning occurs in pools and side pools of rivers and creeks; juveniles rear in pools of rivers and creeks	Occurs in the lower Sacramento River; may also occur in the NCC
Hardhead <i>Mylopharodon conocephalus</i>	--	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; may also occur in the NCC
Notes: DFG = California Department of Fish and Game; ESU = Evolutionarily Significant Unit; NMFS = National Marine Fisheries Service; 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 2006				

Species Descriptions

See Volume I, Section 4.5.2.2, “Special-Status Species,” for descriptions of these special-status species supported by the NCC and lower Sacramento River. See Volume I, Section 4.5.2.3, “Other Important Native Fish Species Supported by the Lower Sacramento and American Rivers, the NCC, and the NEMDC/Steelhead Creek,” for descriptions of Sacramento sucker and Sacramento pikeminnow. See Volume I, Section 4.5.2.4, “Important

Nonnative Fish Species Supported by the Lower Sacramento and American Rivers, the NCC, and the NEMDC/Steelhead Creek,” for descriptions of striped bass and American shad.

3.5.2.2 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 the Clean Water Act (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 essential fish habitat (EFH) by the Pacific Fishery Management Council (PFMC) 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 has 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.

3.5.3 ENVIRONMENTAL IMPACTS

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 to aquatic habitats adjacent to the project area and/or the fish community that may be occupying these habitats.

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 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; or
- ▶ interfere substantially with the movement of any native resident or migratory fish species.

The first threshold may be met if the project would substantially reduce or degrade the habitat of a state or federal 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.

Because no riparian vegetation that could provide overhead cover and/or instream woody material would be removed as part of project construction, there would be no loss of SRA habitat that is important to fish. Therefore, this issue is not discussed further.

3.5.3.2 IMPACT ANALYSIS

Project operation would not result in adverse effects to fisheries and aquatic species. Therefore, this impact analysis focuses on construction-related effects and on temporary or permanent habitat modifications that could result from the proposed project.

IMPACT 3.5-a *Loss of Fish Habitat Through Increased Sedimentation and Turbidity. 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. This potential impact would be significant.*

Construction of a new cutoff wall would require degradation and subsequent reconstruction of 6–8 feet of the levee crown. Any resulting erosion could temporarily increase turbidity and sedimentation downstream of the construction site if soils enter the NCC, the Sacramento River, or drainages on the land side of the levee and are transported in river flows or stormwater runoff.

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 and adversely affect fish habitat and fish populations, this potential impact would be significant.

3.5.4 MITIGATION MEASURES

Mitigation Measure 3.5-a for Loss of Fish Habitat Through Increased Sedimentation and Turbidity: 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.

- (a) Implement Mitigation Measure 3.4-a, which requires filing a notice of intent with the Central Valley regional water quality control board (RWQCB); implementing standard erosion, siltation, and BMP measures;

preparing a SWPPP; and complying with the conditions of the NPDES general stormwater permit for construction activity.

- (b) Also, 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 waterside 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 3.6-a un Section 3.6, “Terrestrial Biological Resources”).

Implementing these mitigation measures would reduce the potential temporary impact on fish habitat immediately adjacent to and downstream of project construction activities to a less-than-significant level.

3.6 TERRESTRIAL BIOLOGICAL RESOURCES

This section addresses terrestrial biological resources that could be affected by construction and implementation of the proposed project. The information presented is based on multiple reconnaissance-level and focused biological surveys of the project area conducted by EDAW biologists in 2005 and 2006 as part of project planning efforts. Existing documentation reviewed for preparation of this section includes the Natomas Basin Habitat Conservation Plan (NBHCP) (City of Sacramento, Sutter County, and The Natomas Basin Conservancy [TNBC] 2003) and Annual Monitoring Reports of TNBC.

3.6.1 REGULATORY SETTING

3.6.1.1 FEDERAL AND STATE REQUIREMENTS

See Volume I, Section 4.7, “Terrestrial Biological Resources,” for a discussion of the relevant federal and state regulatory setting.

3.6.1.2 NATOMAS BASIN HABITAT CONSERVATION PLAN

The NBHCP was developed to promote biological conservation in conjunction with economic and urban development in the Natomas area. The NBHCP establishes a multi-species 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. The U.S. Fish and Wildlife Service (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.

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 within the Natomas area occurs, 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).

3.6.2 ENVIRONMENTAL SETTING

3.6.2.1 VEGETATION

The project site includes the existing Natomas Cross Canal (NCC) south levee and adjacent landside maintenance zone. Agricultural lands and TNBC reserves border the site on the south, and the NCC borders it on the north. Vegetation associated with on-site and adjacent land uses is discussed in the sections below and depicted in Exhibit 3.6-1.

The RD 1001 borrow site, which is located about 5 miles to the northeast of the project site, is a primarily upland site. Much of the upland portion of the site is already graded or disced, and most of the remainder is covered with weedy ruderal vegetation similar to that described below. Several patches of riparian woodland are present on the site, which have likely developed after prior removal of borrow material, and the eastern portion is in active rice cultivation.

Developed and Ruderal

The existing NCC levee includes a gravel road lacking vegetation on the top, and levee slopes that support ruderal weedy grasses and forbs, such as wild oats, perennial pepperweed, Johnson grass, prickly lettuce, yellow starthistle, and mustard. This ruderal vegetation grows above the ordinary high water mark (OHWM) on the waterside slope of the levee, on the landside slope of the levee, in the levee maintenance zone, and other areas south of the levee (e.g., between rice fields and within TNBC reserves).

Natomas Cross Canal

The waterside slope of the levee and south bank of the NCC support relatively dense patches of riparian and oak woodland in Reach 1 and the western portion of Reach 2. Trees commonly found in these wooded areas on the south side of the NCC include valley oak, Oregon ash, black willow, and Fremont cottonwood. Species that comprise the understory of wooded areas and are the dominant vegetation in more open reaches include cocklebur, white sweet clover, saltgrass, common tule, California blackberry, California grape, California rose, poison oak, sandbar willow, button brush, and annual sunflower.

TNBC Reserves

The TNBC reserves south of the NCC primarily consist of constructed freshwater marsh wetlands. In general, they consist of meandering open water channels bordered by extensive stands of narrow-leaf cattail and common tule. Open water areas are occasionally dominated by water primrose and a variety of floating aquatic plants such as duckweed. Scattered upland areas, created as basking and overwintering habitat for giant garter snake are present within the marsh.

Seasonal Wetlands

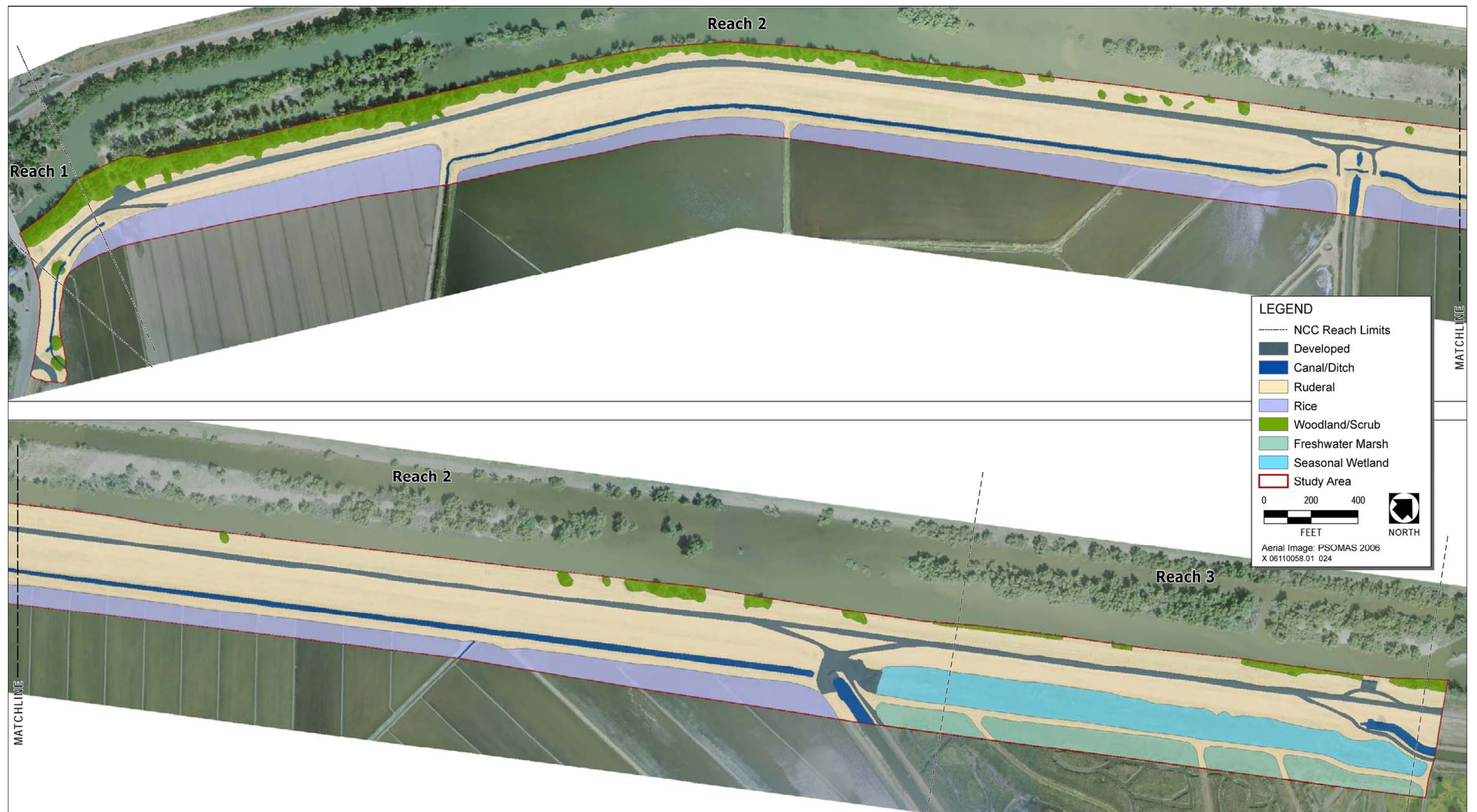
The area between the levee maintenance road at the TNBC Lucich North reserve adjacent to Reaches 2 and 3 supports a large seasonal wetland area of nearly 7 acres. Dominant grasses and herbs in this wetland include bristly ox-tongue, Mediterranean barley, dallis grass, tall nutsedge, purpletop vervain, and saltgrass. This wetland area may be at least partially sustained by its location adjacent to the reserve, in which the marsh habitats are inundated throughout the year, allowing water to seep out onto the adjacent maintenance area.

Agricultural Land and Irrigation/Drainage Ditches

Areas south of the project site that are not occupied by TNBC reserves consist of actively-cultivated rice lands. The Vestal Drain, a large drainage canal, extends along most of Reach 2, immediately north of the rice fields. Several additional drainage and/or irrigation ditches and canals traverse the lands south of the project site. Most of these flow intermittently during the rainy season when they serve drainage purposes and/or the summer months when irrigation water is conveyed to rice fields and freshwater marshes.

3.6.2.2 WILDLIFE

The levee and adjacent maintenance corridor and ruderal areas provide relatively low-quality wildlife habitat overall, and support a low diversity of wildlife species. However, the levee slopes and ruderal areas adjacent to ditches and other aquatic habitats can be utilized by giant garter snake. Ruderal vegetation can also support small mammal populations and provide suitable foraging habitat for raptors, including Swainson's hawk. The TNBC reserves, NCC, and other ditches and canals support a variety of aquatic species, as well as birds that forage in these habitats. The rice fields can also support aquatic species when they are flooded and provide important foraging habitat for a variety of birds, including egrets, heron, and ibis in the summer, and waterfowl in the winter. Trees along the NCC provide suitable nest sites for several species of woodland-nesting birds, including raptors.



Source: EDAW 2006

Habitats On and Adjacent to the Project Site

Exhibit 3.6-1

3.6.2.3 SENSITIVE BIOLOGICAL RESOURCES

Sensitive biological resources addressed below include those that are afforded special protection through CEQA, the California Fish and Game Code (including the California Endangered Species Act [CESA]), the federal Endangered Species Act (ESA), and the Clean Water Act (CWA).

Special-Status Species

For the purpose of this evaluation, special-status species are plants and animals that are legally protected or that are otherwise considered sensitive by federal, state, or local resource conservation agencies and organizations, including:

- ▶ plant and wildlife species that are listed by 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 the California Department of Fish and Game (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.

The term “California Species of Special Concern” is applied by DFG to animals that are not listed under the ESA or CESA but are nonetheless declining at a rate that could result in listing, or that historically occurred in low numbers and currently face known threats to their persistence. CNPS designations are used by both USFWS and DFG when considering formal species protection under the ESA and CESA.

The CNDDB (2006) and NBHCP (City of Sacramento et al. 2003) were used as the primary sources to identify previously reported occurrences of special-status species in the vicinity of the project site. 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

A total of nine special-status plant species have potential to occur in the vicinity of the project site. The regulatory status and habitat association are summarized for each species in Table 3.6-1. All of these special-status plants, except rose-mallow, are covered in the NBHCP, and all are on either the CNPS List 1B (considered rare, threatened, or endangered in California) or List 2 (considered rare, threatened, or endangered in California but more common elsewhere). In addition, four of the species are state and/or federally listed as threatened or endangered.

Five of the species listed in Table 3.6-1 are restricted to vernal pool habitats, which do not occur on the project site and are generally restricted to the eastern portion of the Natomas area. The seasonal wetland in Reaches 2 and 3 is not characteristic of a vernal pool and does not provide suitable habitat for these plants. Therefore, these five special-status plant species are unlikely to occur on the project site or be affected by the proposed project and are not discussed further in this section. The remaining four special-status plants could occur in freshwater marsh habitat provided by the NCC, irrigation/drainage ditches, and restored marsh in the TNBC reserves adjacent to the project site. These four species are discussed below.

Table 3.6-1 Special-status Plant Species with Potential to Occur in the Vicinity of the Project Site			
Common Name	Scientific Name	Status	Habitat
Dwarf downingia	<i>Downingia pusilla</i>	CNPS: 2	Vernal pools and lakes
Bogg's Lake hedge-hyssop	<i>Gratiola heterosepala</i>	CA: Endangered CNPS: 1B NBHCP: covered	Freshwater marshes and swamps; vernal pools
Rose mallow	<i>Hibiscus lasiocarpus</i>	CNPS: 2	Freshwater marshes and swamps
Delta tule pea	<i>Lathyrus jepsonii jepsonii</i>	CNPS: 1B NBHCP: covered	Freshwater and brackish marshes and sloughs
Legenere	<i>Legenere limosa</i>	CNPS: 1B NBHCP: covered	Vernal pools
Colusa grass	<i>Neostapfia colusana</i>	Federal: Threatened CA: Endangered CNPS: 1B NBHCP: covered	Vernal pools
Slender orcutt grass	<i>Orcuttia tenuis</i>	Federal: Threatened CA: Endangered CNPS: 1B NBHCP: covered	Vernal pools
Sacramento orcutt grass	<i>Orcuttia viscida</i>	Federal: Endangered CA: Endangered CNPS: 1B NBHCP: covered	Vernal pools
Sanford's arrowhead	<i>Sagittaria sanfordii</i>	CNPS: 1B NBHCP: covered	Freshwater ponds, marshes and ditches
California Native Plant Society (CNPS) 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 NBCHCP = Natomas Basin Habitat Conservation Plan Sources: CNPS 2006; CNDDDB 2006; City of Sacramento et al. 2003; USFWS 2005			

Bogg's Lake hedge-hyssop is state-listed as an endangered species and is a CNPS List IB plant. It is an annual herb that grows in marshes and swamps, along lake and reservoir margins, in vernal pools, and in artificial habitats such as borrow pits and cattle ponds (USFWS 2005). Bogg's Lake hedge-hyssop occurs throughout much of northern California, including Sacramento County, and in southern Oregon. Its primary concentration is in the Modoc Plateau, with secondary concentrations in the northeastern and southeastern Sacramento Valley.

Rose mallow is a CNPS List 2 plant but is not covered by the NBHCP. It is an emergent perennial herb that grows in freshwater marshes and swamps. Rose mallow occurs in the central and southeastern United States and in California's Central Valley, including Sacramento and Sutter Counties.

Delta tule pea is a CNPS List 1B plant. It is a perennial herb that grows in freshwater and brackish marshes and swamps. It is endemic to California, and most populations are small. Delta tule pea primarily occurs in the Delta region of the Central Valley and in the San Francisco Bay Region.

Sanford's arrowhead is a CNPS List 1B plant. It is an emergent herb endemic to marshes and swamps, vegetated drainage ditches, and other shallow freshwater habitats in California. Sanford's arrowhead has been extirpated from southern California and is known only from a small number of occurrences in the Central Valley.

Special-Status Wildlife

A total of 20 special-status wildlife species have potential to occur in the vicinity of the project site. The regulatory status, habitat association, and potential for each to occur on or adjacent to the project site are summarized in Table 3.6-2. Species that are likely to occur on or adjacent to the project site and could be affected by project construction are discussed further below.

Species that are unlikely to occur on or adjacent to the project site are not discussed further because the proposed project would be unlikely to affect them. These include aquatic species, such as vernal pool invertebrates and amphibians, which require seasonally ponded pools. Ponded water was never observed in the wetland between the levee and TNBC reserve during multiple surveys conducted by EDAW biologists at the appropriate time of year. Therefore, this wetland does not provide suitable habitat for these species. Although the project site supports ruderal habitat that could be suitable for burrowing owls, no suitable burrows or owls have been observed during the many EDAW surveys conducted over the past two years. Therefore, burrowing owls are considered unlikely to occur on or adjacent to the project site.

Table 3.6-2 Special-status Wildlife Species with Potential to Occur in the Vicinity of the Project Site				
Common Name	Scientific Name	Status	Habitat	Potential for Occurrence
Invertebrates				
Valley elderberry longhorn beetle	<i>Desmocerus californicus dimorphus</i>	Fed: Threatened NBHCP: covered	Elderberry shrubs, typically in riparian habitats	No elderberry shrubs are present on or adjacent to the project site
California linderiella	<i>Linderiella occidentalis</i>	Fed: Endangered NBHCP: covered	Vernal pools and other seasonal wetlands	No suitable habitat is present on or adjacent to the project site
Vernal pool tadpole shrimp	<i>Lepidurus packardii</i>	Fed: Endangered NBHCP: covered	Vernal pools and swales	No suitable habitat is present on or adjacent to the project site
Midvalley fairy shrimp	<i>Branchinecta meso Vallensis</i>	NBHCP: covered	Vernal pools	No suitable habitat is present on or adjacent to the project site
Vernal pool fairy shrimp	<i>Branchinecta lynchi</i>	Fed: Threatened NBHCP: covered	Vernal pools and other seasonal wetlands	No suitable habitat is present on or adjacent to the project site
Amphibians				
California tiger salamander	<i>Ambystoma californiense</i>	Fed: Threatened CA: Species of Special Concern NBHCP: covered	Vernal pools and seasonal wetlands in upland with burrows and other below-ground refuge	No suitable habitat is present on or adjacent to the project site, and the species is not thought to occur in the region

Table 3.6-2 Special-status Wildlife Species with Potential to Occur in the Vicinity of the Project Site				
Common Name	Scientific Name	Status	Habitat	Potential for Occurrence
(USFWS 2004)				
Western spadefoot	<i>Spea hammondi</i>	CA: Species of Special Concern NBHCP: covered	Vernal pools	No suitable habitat is present on or adjacent to the project site, and no recent occurrences have been documented in the vicinity
Reptiles				
Giant garter snake	<i>Thamnophis gigas</i>	Fed: Threatened CA: Threatened NBHCP: covered	Streams, sloughs, ponds, and irrigation/ drainage ditches	Known to occur in ditches and canals and TNBC reserves in the vicinity of the project site
Northwestern pond turtle	<i>Emys marmorata marmorata</i>	CA: Species of Special Concern NBHCP: covered	Ponds, marshes, rivers, streams, sloughs	Likely to occur in the NCC, ditches and canals, and TNBC reserves in the vicinity of the project site
Birds				
White-faced ibis	<i>Plegadis chihi</i>	CA: Species of Special Concern NBHCP: covered	Forage and roost in shallow water and flooded fields; nest in freshwater marshes	Known to forage in adjacent rice fields, but no nesting colonies are present nearby
Aleutian Canada goose	<i>Branta canadensis leucopareia</i>	NBHCP: covered	Forage in agricultural fields and roost in aquatic habitats	May be a winter visitor to the Natomas area, but no recent documented occurrences
White-tailed kite	<i>Elanus leucurus</i>	CA: Fully Protected	Forage in grasslands and agricultural fields; nest in isolated trees or small woodland patches	Could nest in trees along the NCC and forage on and adjacent to the project site
Northern harrier	<i>Circus cyaneus</i>	CA: Species of Special Concern	Forage and nest in grassland, agricultural fields, and marshes	Likely to forage on and adjacent to the project site, but no suitable nesting habitat is present
Cooper's hawk	<i>Accipiter cooperii</i>	CA: Species of Special Concern	Forage and nest in open woodlands and woodland margins	Could forage and nest in woodland along the NCC
Swainson's hawk	<i>Buteo swainsoni</i>	CA: Threatened NBHCP: covered	Forage in grasslands and agricultural fields; nest in open woodland or scattered trees	Known to nest along the NCC and forage on and adjacent to the project site
American peregrine falcon	<i>Falco peregrinus anatum</i>	CA: Endangered and fully protected NBHCP: covered	Forage in a variety of open habitats, particularly marshes	Could occasionally forage on the project site but does not nest on the Valley

Table 3.6-2 Special-status Wildlife Species with Potential to Occur in the Vicinity of the Project Site				
Common Name	Scientific Name	Status	Habitat	Potential for Occurrence
			and other wetlands	floor
Burrowing owl	<i>Athene cunicularia</i>	CA: Species of Special Concern NBHCP: covered	Grasslands and agricultural fields	Unlikely to occur on or adjacent to the project site; potentially suitable habitat is present, but no individuals have been observed during extensive surveys
Bank swallow	<i>Riparia riparia</i>	CA: Threatened NBHCP: covered	Forage in various habitats; nest in banks or bluffs, typically adjacent to water	Could forage over the project site, but nearest potential nesting habitat is along the Sacramento River
Loggerhead shrike	<i>Lanius ludovicianus</i>	CA: Species of Special Concern NBHCP: covered	Forage in grasslands and agricultural fields; nest in scattered shrubs and trees	Could nest along the NCC and forage on and adjacent to the project site
Tricolored blackbird	<i>Agelaius tricolor</i>	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	Could nest and forage in adjacent TNBC reserves; could also forage in adjacent agricultural fields
NBHCP = Natomas Basin Habitat Conservation Plan Sources: CNDDB 2006; City of Sacramento et al. 2003				

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, from Buena Vista Lake near Bakersfield in Kern County north to the vicinity of Chico in Glenn and Butte Counties (Hansen and Brode 1980). Giant garter snakes appear to have been extirpated from the San Joaquin Valley south of Mendota in Fresno County (Hansen and Brode 1980, USFWS 1999) and have suffered serious declines in other parts of their former range. The primary cause of decline, aquatic habitat loss or degradation 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. The elements and cycle of the rice field ecosystem coincides fairly closely with the biological needs of the giant garter snake. During the summer, giant garter snakes use the flooded rice fields as long as their prey is present in sufficient densities. During the late summer, rice fields provide important nursery areas for newborn giant garter snakes. 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 prior to 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 over-winter 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 habitat year-round, and habitat elements to meet all of the giant garter snakes daily and seasonal needs, such as dense cover, basking sites, and refugia. In the Natomas area, managed marshes have been designed to provide habitat elements throughout the marsh, as opposed to the limited availability of the same elements in rice fields that contribute 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). The USFWS considers 200 feet as the width of upland vegetation needed to provide adequate habitat along the borders of aquatic habitat for giant garter snake (USFWS 1997).

Giant garter snakes have potential to occur in ditches and canals and TNBC reserves south of the project site and to utilize uplands adjacent to these aquatic habitats, including ruderal habitats on the project site.

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 area provide potential habitat for northwestern pond turtle. Potential breeding habitat is very limited because of the predominance of agriculture and development, but 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 Natomas area. Surveys conducted in 2004 for the Natomas Basin Conservancy documented six northwestern pond turtle occurrences in the Natomas area (Natomas Basin Conservancy 2004). Pond turtles could occur in the NCC, TNBC reserves, and ditches and canals adjacent to the project site. Uplands on the project site do not provide suitable nesting habitat.

Swainson's Hawk

Swainson's hawk is state listed as threatened and is a primary covered species under the NBHCP. Historically, Swainson's hawks nested throughout lowland California. 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 through September) and winter in Mexico and South America, although a small number of individuals have been wintering in the San Francisco Bay-Delta for several years (City of Sacramento et al. 2003). 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 large 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 et al. 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 one-mile radius of each nest (City of Sacramento et al. 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 area, the area required for Swainson's hawk foraging habitat depends on time of season, crop cycle, crop type, and discing/harvesting schedule, as these factors affect the abundance and availability of prey (City of Sacramento et al. 2003).

The most recent survey published by TNBC (2005) documented 89 nest sites in or adjacent to the Natomas area in 2004, of which 59 were active. Most nests sites are located in the western portion of the Natomas area along the Sacramento River where large trees are available. Two nest sites have been documented on the northern side of the NCC across from Reaches 1-3. Swainson's hawks are likely to nest in woodland along the NCC, just north of the project site and forage in ruderal habitats on and adjacent to the site.

Other Nesting Birds

Nearly all of the bird species identified in Table 3.6-2 have potential to forage on or adjacent to the project site, and several could also nest there. Species associated with riparian and other woodland habitats (e.g., white-tailed kite) could nest along the NCC. Potential nesting habitat for tricolored blackbird is provided by marsh habitat within the TNBC reserves and marsh and other dense low-growing vegetation in the NCC. Loggerhead shrikes could also nest in small trees and shrubs along the NCC.

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.

Sensitive habitats on or adjacent on the project site include riparian woodland and scrub along the NCC, marsh habitat in the TNBC reserves, the area of seasonal wetland, and the ditches and canals. These areas are anticipated to be considered waters of the United States and subject to regulation under CWA Section 404. A preliminary wetland delineation report (EDAW 2006) identifying potential jurisdictional habitats within the project site and remaining reaches of the NCC has been submitted to the USACE for verification. Potential jurisdictional habitats are also anticipated to qualify as waters of the state and regulation under the Porter-Cologne Water Quality Control Act. The NCC and ditches and canals could be subject to regulation under Section 1600 et seq. of the California Fish and Game Code.

3.6.3 ENVIRONMENTAL IMPACTS

The following impact analysis is based on information collected during multiple surveys conducted by EDAW biologists in 2005 and 2006, including a wetland delineation, pre-construction nesting bird and giant garter snake surveys prior to geotechnical investigations, and additional reconnaissance level surveys to aid project planning. Results of these surveys were considered in relation to the proposed project activities to identify potential impacts to biological resources that could result. It was assumed that there would be no active fill of any aquatic habitats

beyond the existing levee and adjacent maintenance corridor, including canals and ditches, seasonal wetlands, the NCC, and TNBC reserves. There could, however, be some incidental and/or temporary impact to the NCC, ditches, and seasonal wetlands, which are considered to be waters of the United States for purposes of this analysis. These are more specifically described below. It was also assumed that borrow extraction would be limited to upland areas and would affect any potential wetlands or other sensitive habitats, including rice lands, on the RD 1001 borrow site.

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. The proposed project was determined to result in a significant effect on 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.

3.6.3.2 IMPACT ANALYSIS

IMPACT	Effects on Sensitive Habitats. <i>Implementation of the proposed project could result in adverse effects to sensitive habitats, including waters of the United States, and riparian habitat. This potential impact would be significant.</i>
3.6-a	

Sensitive habitats on or adjacent to the project site include wetland, riparian, and open-water habitats that qualify for Corps jurisdiction and are protected under Section 404 of the CWA, subject to DFG jurisdiction under Section 1600 of the California Fish and Game Code, and/or considered sensitive natural communities by DFG. No portions of the adjacent TNBC reserves would be affected, and the project is not anticipated to result in any permanent effects to the NCC or ditches and canals, because no direct fill of these features would occur. There is however, some potential for incidental fallback of material into the NCC to occur during levee improvement activities. The seasonal wetland between the levee and TNBC reserve could be affected by movement of construction equipment and staging activities to support improvements along the adjacent levee reach. Levee improvements are also anticipated to require removal of a limited amount of trees near the top of the waterside of the levee to accommodate removal of the top of the levee for slurry wall construction. Because these resources have a very limited local distribution, such effects could have a substantial adverse effect on a local scale. These impacts would be significant.

IMPACT **Effects on Special-status Plants.** *Implementation of the proposed project would not affect aquatic habitats that could be occupied by special-status plant populations. This impact would be less than significant.*

3.6-b

Four special-status plant species have potential to occur adjacent to the project site in freshwater marsh habitat within the NCC, TNBC reserves, and ditches and canals. However, these aquatic habitats would not be affected by project construction. Therefore special-status plants that could occur in these areas would not be affected by the proposed project. This impact would be less than significant.

IMPACT **Effects on Giant Garter Snake.** *Implementation of the proposed project would not affect aquatic habitat but would result in disturbance and temporary loss of upland habitat for giant garter snake. Project activities also have potential to result in direct take of individuals. This potential impact would be significant.*

3.6-c

Ditches and canals, rice fields, and managed marsh adjacent to the project site provide important aquatic habitat for giant garter snakes. Suitable upland adjacent to these aquatic habitats is very limited, and, in some areas, is almost exclusively provided by levee slopes and maintenance corridors. Project implementation would not affect any portion of the TNBC reserves or ditches and canals adjacent to the project site. Therefore, there would be no disturbance or loss of aquatic habitat. Construction activity would, however, occur in uplands within 200 feet of these aquatic habitats, resulting in temporary disturbance of potential basking and overwintering habitat for the snake. Construction activities could also result in direct disturbance and loss of individual giant garter snakes. Loss of individual giant garter snakes would represent a reduction in the number of an endangered, rare, or threatened species. This potential impact would be significant.

IMPACT **Effects on Northwestern Pond Turtle.** *Implementation of the proposed project would not affect aquatic habitat or suitable nesting habitat for pond turtles. This impact would be less than significant.*

3.6-d

Aquatic habitats on and adjacent to the project site function as potential feeding, breeding, and rearing habitat for northwestern pond turtles. None of these aquatic habitats would be affected by project construction. Upland habitat in which project activity would occur is not suitable for nesting pond turtles. Therefore potential impacts to turtle habitat would be minimal, and direct effects to individual turtles are unlikely to occur. This impact would be less than significant.

IMPACT **Effects on Swainson's Hawk.** *Implementation of the proposed project could result in loss of active nests for Swainson's hawk. Loss of potential nesting habitat and temporary disturbance of suitable foraging habitat could also occur. This potential impact would be significant.*

3.6-e

The project site is within a densely populated and critical component of the Central Valley Swainson's hawk population. Nesting pairs in the Natomas area may represent as much as 10% of the Swainson's hawks that occur in the Valley. Suitable foraging habitat provided by ruderal vegetation along the levee slope and adjacent landside corridor would be disturbed during project construction. However, these effects would be temporary in nature and restricted to a relatively small area. No documented nest trees would be removed, because none are present on the south side of the NCC in these reaches. A small number of trees that could provide suitable nest sites may require removal to accommodate removal of the top of the levee for cutoff wall construction. These effects to foraging habitat and a small number of potential nest trees are unlikely to have a substantial adverse effect on Swainson's hawks. Construction activities could, however, result in disturbance of nesting Swainson's hawks, potentially resulting in nest abandonment and loss of active nests. This could result in a reduction in the number of this threatened species. This would be a significant impact.

IMPACT 3.6-f *Effects on Special-Status and Other Nesting 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 active nests of special-status birds and common birds that are protected under the Migratory Bird Treaty Act (MBTA) and the Fish and Game Code. This potential impact would be significant.*

The project site and adjacent areas provide foraging and/or nesting habitat for a variety of special-status bird species. Implementation of the proposed project would result in temporary disturbance of foraging habitat and relatively limited loss of potential nesting habitat. Because effects to foraging habitat would be temporary in nature and loss of nesting habitat would be limited to a minimal amount of vegetation removed from the upper levee slope, this impact is unlikely to have a substantial adverse effect on any special-status birds. However, removal and/or disturbance of active nests of special-status and common nesting birds that are protected under the MBTA and the Fish and Game Code could also result from implementation of project-related activities. Disturbance of nesting pairs could result in nest abandonment and loss of active nests. Loss of active nests of special-status birds could result in a substantial adverse effect to local populations of the affected species. Loss of active nests of common species would be inconsistent with the MBTA and a violation of Fish and Game Code but would not constitute a significant impact under CEQA, because it would not cause the population of a species to drop below self-sustaining levels or threaten to eliminate an animal community. Impacts to special-status nesting birds would be significant.

IMPACT 3.6-g *Effects on Wildlife Corridors. Implementation of the proposed project would result in temporary disturbance of habitat along the NCC. This is not anticipated to substantially interfere with its use as a wildlife corridor. This impact would be less than significant.*

The NCC and ditches and canals adjacent to the project site serve as a corridor for wildlife movement within the Natomas area and to and from adjacent areas of habitat. The project would result in disturbance of areas adjacent to ditches and canals and the southern side of the NCC. This disturbance is unlikely to affect use of the ditches and canals and would have relatively minimal effect on use of the NCC, because wildlife would be able to move through less disturbed portions of the corridor. Therefore, project construction is not anticipated to substantially interfere with use of wildlife corridors adjacent to the project site. This impact would be less than significant.

IMPACT 3.6-h *Consistency with the NBHCP. Implementation of the proposed project could have substantial adverse effects on species covered in the NBHCP. These effects could, in turn, adversely affect successful implementation of the NBHCP. This potential impact would be significant.*

The proposed project could affect habitat for and individuals of several species covered in the NBHCP (refer to Impacts 3.6-b through 3.6-f). As a result, project implementation could result in inconsistency with avoidance, minimization, and mitigation measures of the NBHCP, threaten viability of populations of covered species using the Natomas area, reduce effectiveness of the NBHCP's conservation strategy, and adversely affect attainment of the goals and objectives of the NBHCP.

Implementation of the proposed project would not threaten the population viability for most species covered by the NBHCP, because a relatively small amount of habitat for them would be affected, only foraging habitat would be affected, and/or effects would be largely limited to one construction season. However, potential effects to giant garter snake and Swainson's hawk could include loss of individuals and a reduction in reproductive success, which could, in turn, affect the viability of these populations within the Natomas area.

The NBHCP describes key components of the conservation strategy and how the components provide effective mitigation. These components are: 0.5 to 1 mitigation ratio of developed habitat to replacement habitat, site-specific management plans for reserve lands, buffers within reserve lands, connectivity, foraging habitat, and minimum habitat block size requirements for reserve lands. Implementation of the proposed project would not encroach on existing reserves or buffers. Therefore, it would not affect the size of the reserves, jeopardize meeting

the minimum size and mitigation ratio requirements, or require revision of existing management plans. The proposed project could affect foraging habitat for NBHCP-covered species, but these effects would be temporary. Aquatic habitat that provides connectivity between reserves themselves and between the reserves and agricultural lands would not be affected by the project.

The potential for project implementation to be inconsistent with avoidance, minimization, and mitigation measures of the NBHCP, and threaten viability of giant garter snake and Swainson's hawk populations could adversely affect attainment of the overall goals and objectives of the NBHCP. This would be a significant impact.

3.6.4 MITIGATION MEASURES

No mitigation is required for Impact 3.6-b (special-status plants), Impact 3.6-d (northwestern pond turtle), or Impact 3.6-g (wildlife corridors). Mitigation is provided below for Impact 3.6-a (sensitive habitats), Impact 3.6-c (giant garter snake), Impact 3.6-e (Swainson's hawk), Impact 3.6-f (special-status and other nesting birds), and Impact 3.6-h (HCP consistency).

Mitigation Measure 3.6-a for Effects on Sensitive Habitats: Avoid Sensitive Habitats to the Extent Feasible, Comply with Section 404 and Section 1602 Permit Processes as Needed, and Mitigate on a No-Net-Loss Basis.

SAFCA and its primary contractors for engineering design and construction shall ensure that the following measures are implemented to avoid, minimize, and mitigate potential project effects on sensitive habitats.

The primary engineering and construction contractors shall ensure, through coordination with a qualified biologist retained by SAFCA, that construction zones, staging areas, and access routes are designed to minimize disturbance of sensitive habitats to the extent feasible and practicable. All sensitive habitat that can be avoided shall be protected during construction by temporary fencing, as appropriate. A protective barrier shall be installed below the construction zone on the water side of the NCC south levee to minimize potential for incidental fallback of material into the NCC during project construction. Construction activity within the seasonal wetland shall be minimized to the maximum extent feasible and practical. Qualified biologists shall regularly monitor construction to ensure these impact avoidance and minimization measures are properly implemented.

SAFCA shall consult with the USACE to determine whether the potential for incidental fallback of material into the NCC and/or disturbance of the seasonal wetland during project construction can be adequately avoided to preclude the need for USACE authorization. If such authorization would be required, the Section 404 permitting process shall be completed and the acreage of affected jurisdictional habitat shall be rehabilitated. Habitat rehabilitation shall be by feasible methods agreeable to the USACE. SAFCA shall implement minimization and rehabilitation measures adopted through the permitting process.

SAFCA shall also consult with DFG regarding impacts to the NCC levee and unavoidable effects to riparian habitat. A streambed alteration agreement shall be obtained, if necessary, and affected woodland shall be replaced and/or rehabilitated in accordance with DFG regulations and as specified in the streambed alteration agreement, if warranted. Habitat restoration, rehabilitation, and/or replacement shall be conducted in a manner that ensures there is no net loss of riparian habitat functions and values and shall be at a location and by methods agreeable to DFG. SAFCA shall implement minimization and compensation measures adopted through the permitting process.

Implementing this mitigation measure would reduce the impact on sensitive habitats to a less-than-significant level.

Mitigation Measure 3.6-c for Effects on Giant Garter Snake: Identify Habitat, Minimize Potential Impacts, and Mitigate in Consultation with USFWS and DFG as Needed.

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 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 uplands adjacent to aquatic habitat for giant garter snake to the extent feasible and practicable. All aquatic habitat, and adjacent upland habitat that can be avoided, shall be protected during construction by temporary fencing, as appropriate. Qualified biologists shall regularly monitor construction to ensure that project activity is excluded from these areas.

Additional measures consistent with the goals and objectives of the NBHCP shall be implemented to minimize potential for degradation of upland habitat and avoid direct injury or mortality of individual giant garter snakes during project construction. Such measures shall be developed 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, conducting pre-construction surveys, biological monitoring, and restoring disturbed uplands to conditions equal to or better than pre-project conditions.

SAFCA shall obtain authorization for take of giant garter snake under ESA and CESA if it is determined that project implementation is likely to result in take, despite implementation of avoidance and minimization measures. SAFCA shall implement all measures developed through informal consultation with USFWS and DFG, as well as any additional measures adopted through a formal permitting process, if applicable.

Implementing this mitigation measure would reduce the potential impact on giant garter snake to a less-than-significant level.

Mitigation Measure 3.6-e for Effects on Swainson's Hawk: Identify Habitat and Nest Locations, Minimize Potential Impacts, Monitor Active Nests during Construction, and Mitigate in Consultation with DFG as Needed.

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 Swainson's hawk.

The primary engineering and construction contractors shall ensure, through coordination with a qualified biologist retained by SAFCA, that construction zones, staging areas, and access routes are designed to minimize disturbance and removal of woodland vegetation that currently, or could in the future, provide suitable Swainson's hawk nest sites and suitable foraging habitat to the extent feasible and practicable.

To avoid potential impacts to active Swainson's hawk nest, preconstruction surveys shall be conducted and buffers implemented. A qualified biologist shall conduct preconstruction surveys to identify active nests along the NCC, within ½ mile of construction areas. 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 to minimize impacts and maintain consistency with the goals and objectives of the NBHCP shall be determined by a qualified biologist. 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 upon it. The size of the buffer may vary, depending on the nest location, nest stage, and construction activity. Monitoring shall be conducted by a qualified biologist to ensure project activity does not result in detectable adverse effects to the nesting pair or their young.

SAFCA shall consult with DFG regarding measures to avoid and minimize disturbance of active nests and shall obtain authorization for take of Swainson's hawk under CESA if it is determined that project implementation is likely to result in take, despite implementation of avoidance and minimization measures. SAFCA shall implement

all measures developed through informal consultation with DFG, as well as any additional measures adopted through a formal permitting process, if applicable.

Implementing this mitigation measure would reduce the impact on Swainson's hawk to a less-than-significant level.

Mitigation Measure 3.6-f for Effects on Special-status Nesting Birds: Identify Habitat and Nest Locations, Minimize Potential Impacts, Monitor Active Nests during Construction, and Mitigate in Consultation with USFWS and DFG as Needed.

SAFCA and its primary contractors for engineering design and construction shall ensure that the following measures are implemented to minimize potential project effects on special-status and other nesting birds.

The primary engineering and construction contractors shall ensure, through coordination with a qualified biologist retained by SAFCA, that construction zones, staging areas, and access routes are designed to minimize disturbance and removal of nesting habitat for special-status nesting birds to the extent feasible and practicable. Nesting habitat that cannot be avoided shall be removed during the non-nesting season, to the extent feasible and practicable.

To avoid potential impacts to active nests of special-status birds, pre-construction surveys shall be conducted and buffers implemented. A qualified biologist shall conduct preconstruction surveys to identify active special-status bird nests along the NCC, within 500 feet of construction areas. Surveys shall be conducted in accordance with NBHCP requirements. If an active nest is found, an appropriate buffer to minimize impacts and maintain consistency with the goals and objectives of the NBHCP shall be determined by a qualified biologist. 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 upon it. The size of the buffer may vary, depending on the nest location, nest stage, and construction activity. Monitoring shall be conducted by a qualified biologist to ensure project activity does not result in detectable adverse effects to the nesting pair or their young. SAFCA shall consult with USFWS and DFG regarding measures to avoid and minimize disturbance of active nests and shall implement all measures deemed appropriate and feasible during this consultation.

This mitigation would reduce the potential impact to a less-than-significant level.

Mitigation Measure 3.6-h for Consistency with the Natomas Basin HCP: Implement Mitigation Measures 3.6-a, 3.6-d, 3.6-e, and 3.6-f.

Implementation of Mitigation Measures 3.6-a (sensitive habitats), 3.6-d (giant garter snake), 3.6-e (Swainson's hawk), and 3.6-f (special-status nesting birds) would reduce the potential impact on consistency with the NBHCP to a less-than-significant level.

3.7 CULTURAL RESOURCES

This section includes an evaluation of the potential impacts on cultural resources that could result from project implementation. Cultural resources may include archaeological traces such as early Native American occupation sites and artifacts, historic-era buildings and structures, and places used for traditional Native American observances or places with special cultural significance. These resources can be found at many locations on the landscape, and along with prehistoric and historic human remains and associated grave-goods, are protected under various federal, state, and local statutes, including Section 106 of the National Historic Preservation Act (NHPA). Unique paleontological resources are addressed in Section 3.8, “Paleontological Resources.”

3.7.1 REGULATORY SETTING

See Volume I, Section 4.8, “Cultural Resources,” for a detailed discussion of the regulations that pertain to cultural resources in the project area.

3.7.2 ENVIRONMENTAL SETTING

A summary of cultural developments in the project area through the prehistoric, ethnographic, and historic past is presented in Section 4.8, “Cultural Resources,” in Volume I of this DEIR and is not repeated here except for discussions specific to the RD 1000 area.

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, however, plagued the residents of the region and posed a significant threat to the viability of agricultural interests and further settlement.

Initial efforts at flood control were generally uncoordinated and consisted of small levees and drains constructed by individual landowners. These features proved insufficient to protect cultivated land, and much of the Natomas area (a part of the larger American River Basin) flooded regularly (Dames & Moore 1994). In 1861, the state legislature created the State Board of Swampland Commissioners to affect reclamation of 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 state 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 two dollars 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 (McGowan 1961, Thompson 1958)

In the early part of the 20th century, the state legislature established the California Reclamation Board (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 area. RD 1000 was largely controlled by the Natomas Company, which 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 1994).

The infrastructure of RD 1000 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, and a series of levee and interior roads, and unpaved rights-of-way between the farm fields.

RD 1000 has been previously evaluated as a Rural Historic Landscape District on behalf of the USACE, and was found eligible for NRHP and CRHR listing (Dames & Moore 1994). 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, with the area of significance listed as reclamation and the historical context 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 non-contributing 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; 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 I-5; San Juan Road from Garden Highway to its intersection with I-5; Powerline Road; El Centro Road from north of 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 is comprised 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.

Non-contributing 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); 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.

3.7.2.1 PRE-FIELD RESEARCH

EDAW's research into cultural resource issues for Sutter County began with a records search of pertinent cultural resource information conducted at the Northeast Information Center (NEIC). The NEIC files identified one known historic resource within the project boundary, as well as two suspected prehistoric village locations in the general project area. The historic resource is CA-SUT-84H, the Natomas Cross Canal Levee/Pleasant Grove Canal Levee System. The prehistoric villages, *Wollok* and *Leuchi*, are identified as having been located east of the confluence of the Feather and Sacramento Rivers (Wilson and Towne 1978).

It appears that little of the Natomas area has been surveyed for cultural resources, except for the contributing elements of RD 1000 and some smaller surveys along the Sacramento River. The general project location was ideal for Native American exploitation. The rich riverine environment, with abundant resources and a moderate year-round climate, was heavily exploited. Known, extant occupation mound sites, as well as others that are

known to have been destroyed by agricultural activities, testify to prehistoric usage of the river vicinity. More recent use is readily visible in the form of farms and the RD 1000 facilities.

3.7.2.2 FIELD SURVEY

A survey of the project site was conducted by an EDAW archaeologist on November 10, 2006. With the exception of the NCC levee itself, which has been identified as part of the levee system identified as CA-SUT-84H, no potential cultural resources were observed.

3.7.3 ENVIRONMENTAL IMPACTS

The assessment of impacts of project construction activities was conducted using the significance criteria presented below. Existing information sources cited above were used as the baseline data upon which to analyze project effects.

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 on cultural resources if it would:

- ▶ cause a substantial adverse change in the significance of a unique archaeological resource as defined in Public Resources Code Section 21083.2 or a historical resource as defined in Public Resources Code 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.

A unique archaeological resource, as defined in Public Resources Code Section 21083.2 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 meets any of the following criteria:

- (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;
- (3) Is directly associated with a scientifically recognized important prehistoric or historic event or person.

Section 15064.5 generally defines historical resources as (1) a resource listed in, or determined to be eligible by the State Historical Resources Commission for listing in, the 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 the lead agency's determination is supported by substantial evidence. 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.

A cultural resource may be eligible for listing on 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.

3.7.3.2 IMPACT ANALYSIS

IMPACT 3.7-a *Physical Alterations to the NCC Levee. The proposed project would modify the NCC levee, which is a contributing element of the RD 1000 Rural Historic Landscape District and is a documented historic resource. Physical alterations of the levee could alter the integrity of the resource. This potential 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 to provide a greater degree of flood protection in the Natomas area. The “determination of effects” statement concluded that the USACE projects would adversely affect both contributing and non-contributing elements of the Rural Historic Landscape District by allowing for greater development to occur in the region. Mitigation measures were adopted and incorporated into the 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.

The proposed project would alter the NCC levee, which was identified as a contributing element of the district. The levee at the project site is also part of CA-SUT-84H, the Natomas Cross Canal Levee/Pleasant Grove Canal Levee System.

The proposed project would result in physical alterations to the NCC levee that could alter the integrity of the resource. This potential impact would be significant.

IMPACT 3.7-b *Damage to or Destruction of Previously Undiscovered Cultural Resources. Previously unknown cultural resources of archaeological or historical significance could be present under the levee or at the RD 1001 borrow site and could be damaged by construction. This potential impact would be significant.*

Sacramento Valley floodplains are known to have experienced a high degree of prehistoric occupation and use. Prehistoric occupation sites frequently took the form of mounds raised above the natural ground surface, but many of these have been destroyed by modern agricultural cultivation of fields, and the remains of these sites are no longer visible above ground. Additionally, frequent flooding of the American River Basin could easily have buried earlier or smaller occupation sites that would not be visible except during deeper ground-disturbing activities.

Cutoff wall construction or borrow excavation could encounter previously unknown cultural resources that could be damaged by construction activity. Cultural resources that are encountered during construction may meet the definition of a unique archaeological resource or a historical resource in Section 15064.5 of the State CEQA Guidelines. Construction activity may damage such resources sufficiently to cause a substantial adverse change in their significance. This potential impact would be significant.

IMPACT 3.7-c *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 known prehistoric sites in the general project area. It is possible that previously unknown buried human remains could be unearthed and damaged or destroyed during excavation activities associated with cutoff wall construction or excavation at the RD 1001 borrow site. Damage to or destruction of human remains would be a significant impact.

3.7.4 MITIGATION MEASURES

Mitigation is described below for Impact 3.7-a (effects on the NCC levee), Impact 3.7-b (damage of previously unknown resources), and Impact 3.7-c (discovery of human remains).

Mitigation Measure 3.7-a for Physical Alterations to the NCC Levee: Document Alterations and Distribute the Information to the Appropriate Repositories.

SAFCA shall ensure that the following measures are implemented.

The NCC levee has been recorded as a contributing element of the RD 1000 Rural Historic Landscape District. As previously described, some mitigation for previous impacts to the RD 1000 Rural Historic Landscape District has been implemented. Additional impacts to contributing elements of the Rural Historic Landscape District shall be mitigated in a manner consistent with previous mitigation efforts. This mitigation would also address alterations to the NCC levee as a component of historic resource CA-SUT-84H.

Consistent with previous mitigation efforts for alterations to RD 1000, a qualified professional archaeologist or architectural historian shall document the alterations made to the NCC levee and distribute the information to the appropriate repositories. Implementation of this mitigation measure would reduce the impact to a less-than-significant level.

Mitigation Measure 3.7-b for Damage to or Destruction of Previously Undiscovered Cultural Resources: Suspend Potentially Damaging Activity, Investigate Resources, Avoid to the Extent Feasible, and Conduct Resource Documentation and Data Recovery as Needed.

SAFCA and its primary construction contractor 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.

Before the commencement of construction, a qualified professional archaeologist shall give a presentation to all construction personnel regarding the likelihood and type of resources that might be found during construction operations associated with the individual flood control projects, and measures that shall be taken in the event that potential archaeological or historical resources are found during construction.

If unrecorded cultural resources (e.g., unusual amounts of shell, animal bone, bottle glass, ceramics, structure/building remains, etc.) are encountered during construction activity, all ground-disturbing activities shall be restricted within a 100-foot radius of the find or a distance determined by a qualified professional archaeologist to be appropriate based on the potential for disturbance of additional cultural resource materials. A qualified archaeologist shall identify the materials, determine their potential to meet the definition of a unique archaeological resource or a historical resource in Section 15064.5, and formulate appropriate measures for their treatment, which shall be implemented by the agency implementing the project. Potential treatment methods for significant and potentially significant resources may include, but would not be limited to, no action (i.e., resources determined not to be significant), avoidance of the resource through changes in construction methods or project

design, and implementation of a program of testing and data recovery, in accordance with all applicable federal and state requirements.

For unique archaeological resources and archaeological historical resources, the preferred mitigation is preservation in place of as much of the resource as possible, where feasible, through project modification or protective measures. In many cases, archaeological data recovery can mitigate impacts that cannot be avoided. However, construction activities may encounter unique archaeological resources and archaeological historical resources that cannot be protected or recovered and for which adequate data recovery may not be feasible. For example, resources encountered during excavation through the NCC levee for construction of a cutoff wall are likely to be unrecoverable. Because of the possibility that such resources may be encountered and may be significantly affected by the proposed project, this impact is considered significant and unavoidable.

Mitigation Measure 3.7-c for Discovery of Human Remains during Construction: Suspend Potentially Damaging Activity, Notify the Coroner and Most Likely Descendant (MLD), and Implement Appropriate Treatment of Remains.

SAFCA and its primary construction contractor shall ensure that the following measures are implemented to address the discovery of human remains during construction.

If human remains are uncovered during ground-disturbing activities, all ground-disturbing activities shall be immediately suspended within a 100-foot radius of the find or a distance determined by a qualified professional archaeologist to be appropriate based on the potential for disturbance of additional remains, SAFCA or its designated representative shall be notified. The implementing agency shall immediately notify the county coroner and a qualified professional archaeologist. The coroner shall examine all discoveries of human remains within 48 hours of receiving notice of the discovery (Health and Safety Code Section 7050.5[b]). If the coroner determines that the remains are those of a Native American, he or she shall contact the Native American Heritage Commission (NAHC) by telephone within 24 hours of making that determination (Health and Safety Code Section 7050[c]). In accordance with California Public Resources Code Section 5097.9, SAFCA or its appointed representative and the professional archaeologist shall contact the MLD, as determined by the NAHC, regarding the remains. The MLD, in cooperation with SAFCA and the property owner, if applicable, shall determine the ultimate disposition of the remains. Ground disturbance shall not be recommenced in the area of suspended activity without authorization from the archaeologist.

Implementing this mitigation would reduce the impact to a less-than-significant level.

3.8 PALEONTOLOGICAL RESOURCES

This section includes an evaluation of the potential impacts on paleontological resources, defined as the fossil remains of prehistoric animals and plants that are 10,000 years old or older, that could result from project implementation.

The Society of Vertebrate Paleontology (SVP), a national scientific organization of professional vertebrate paleontologists, has established standard guidelines that outline acceptable professional practices in the conduct of paleontological resource assessments and surveys, monitoring and mitigation, data and fossil recovery, sampling procedures, specimen preparation, analysis, and curation (SVP 1995). Research for the analysis in this EIR was conducted in compliance with the SVP guidelines.

3.8.1 REGULATORY SETTING

No federal, state, or local plans, policies, or laws related to paleontological resources are relevant to this analysis.

3.8.2 ENVIRONMENTAL SETTING

3.8.2.1 REGIONAL GEOLOGY

As discussed in Section 3.3, “Geology and Soils,” the project site and RD 1001 borrow site are located in the Sacramento Valley portion of the Great Valley Geologic Province of California, which is located between the Sierra Nevada Mountains on the east and the Coast Range Mountains on the west. Most of the surface of the Great Valley is covered with Recent (Holocene, i.e., 10,000 years Before Present [BP] to present day) and Pleistocene (i.e., 10,000–1,800,000 years BP) 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.

3.8.2.2 PALEONTOLOGICAL RESOURCE INVENTORY METHODS

A stratigraphic inventory was completed to develop a baseline paleontological resource inventory of the project site and surrounding area by rock unit, and to assess the potential paleontological productivity of each rock unit. Geologic maps and reports covering the geology of the project site and surrounding area were reviewed to determine the exposed rock units and to delineate their respective aerial distributions in the project area. Published and unpublished geological and paleontological reports were reviewed to document the number and locations and previously recorded fossil sites from rock units exposed in and near the proposed project site and surrounding study area, as well as the types of fossil remains each rock unit has produced. The literature review was supplemented by a database search conducted at the University of California Museum of Paleontology (UCMP) in Berkeley, California, on September 14, 2006. Results of the search are described in the next section.

A field reconnaissance was conducted in November 2006 to document the presence of any previously unrecorded fossil sites and of strata that might contain fossil remains. The surface topography of the project site is nearly flat. No fossils were observed at the project site.

3.8.2.3 PROJECT SITE AND RD 1001 BORROW SITE GEOLOGY AND RESOURCE POTENTIAL

The project site and RD 1001 borrow site are located within the U.S. Geological Survey (USGS) Verona 7.5-Minute Quadrangle. Topography at both the project site and the RD 1001 borrow site is nearly flat. Regional and local surficial geologic mapping and correlation of the various geologic units in the vicinity of the project site has been provided at a scale of 1:62,500 by Helley and Harwood (1985) and a scale of 1:250,000 by Wagner et al. (1987). The project site and RD 1001 borrow site are located in Holocene-age alluvial channel and basins

deposits, and Pleistocene-age alluvial deposits of the Modesto and Riverbank Formations. Exhibit 3.8-1 shows the distribution of these formations.

Holocene Alluvium

Sediments adjacent to the Sacramento River and along Reaches 1, 2, and 3 of the Natomas Cross Canal (NCC) are composed primarily of Recent (Holocene) (10,000 years BP and younger) alluvial channel and basin deposits (Wagner et al. 1987). In general, these deposits consist primarily of unconsolidated sand and silt. Holocene alluvial deposits overlie an older alluvial fan system composed of Pleistocene-age sediments. By definition, in order to be considered a fossil, an object must be more than 10,000 years old; therefore, parts of the project site and RD 1001 borrow site mapped in Holocene deposits are not considered sensitive for the presence of paleontological resources.

Modesto and Riverbank Formations

Portions of the RD 1001 borrow site are composed of sediments from the Modesto Formation and a small area of the project site is located in sediments of the Riverbank Formation (Wagner et al. 1987). In the Sacramento Valley, the Modesto Formation forms alluvial terraces, and some alluvial fans and abandoned channel ridges, of the Sacramento River and 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 to 26,000 years Before Present (BP) (Atwater 1982, 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. The Riverbank Formation is Pleistocene in age but is considerably older than the Modesto Formation; estimates place the age of the Riverbank between 130,000 and 450,000 years BP (Helley and Harwood 1985). The Riverbank forms alluvial fans and terraces of the Sacramento River; however, Riverbank fans and terraces are higher in elevation and generally have a more striking topography than those formed by the Modesto Formation.

As described in Volume I, Section 4.9.2.2, “Paleontological Resources by Rock Unit,” the Modesto and Riverbank Formations are paleontologically sensitive geologic formations.

The closest vertebrate fossils to the NCC were recovered from Arco Arena (Hilton et al. 2000), approximately 12 miles to the south, in sediments of the Riverbank Formation. Fossils recovered from this site include Harlan’s ground sloth, bison, coyote, horse, camel, squirrel, antelope, mammoth, and several plant specimens.

UCMP locality V-6426, approximately 16 miles north of the project site near Gilsizer Slough, is located in sediments referable to the Modesto Formation. This site yielded a vertebra from a Pleistocene (Irvingtonian) age Proboscidea, an order that includes mammoths, mastodons, and elephants. UCMP locality V-3915 on Oswald Road, approximately 18 miles northwest of the project site, yielded remains from a Pleistocene-age bison in sediments referable to the Modesto Formation. UCMP locality V-4043 in the Sutter Buttes, approximately 22 miles north of the NCC, yielded remains from a Pleistocene-age horse in sediments referable to the Riverbank Formation.

Other locations are also known throughout the Sacramento Valley (UCMP 2006). For example, there are several sites approximately 10–20 miles from the project site 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 both the Modesto and Riverbank Formations (Hay 1927, UCMP 2006).



Source: Wagner et al. 1987

Rock Formations in the Project Area

Exhibit 3.8-1

There are at least seven additional recorded Rancholabrean-age vertebrate fossils sites from the Riverbank Formation in the City of Sacramento, southeast of the NCC (UCMP 2006, Kolber 2004). These sites have yielded remains of mammoth, bison, horse, and several types of reptiles.

3.8.3 ENVIRONMENTAL IMPACTS

3.8.3.1 SIGNIFICANCE CRITERIA

Based on State CEQA Guidelines Appendix G, a project would have a significant impact on paleontological resources if it would directly or indirectly destroy a unique paleontological resource or site. For the purposes of this analysis, a unique resource or site is one that is considered significant under SVP criteria. According to the SVP criteria, 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 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).

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 for a research project). Marine invertebrates are generally common; the fossil record is well developed and well documented, and they would generally not be considered a unique paleontological resource. Identifiable vertebrate marine and terrestrial fossils are generally considered scientifically important because they are relatively rare.

The SVP criteria are described in detail in Section 4.9.3.1, “Significance Criteria,” in Volume I.

3.8.3.2 IMPACT ANALYSIS

IMPACT 3.8-a Disturbance of Unknown Unique Paleontological Resources during Earthmoving Activities. *Portions of the project site and the RD 1001 borrow site are underlain by the Riverbank and Modesto Formations, which are paleontologically sensitive rock formations. Construction activities in the Riverbank or Modesto Formations could adversely affect 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 along most of Reaches 1, 2, and 3 of the NCC would result in no impacts on paleontological resources.

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. The occurrence of Pleistocene vertebrate fossil remains in sediments referable to the Riverbank and Modesto Formations from Sutter County, Sacramento County, as well as Davis, Woodland, and numerous other areas in the Sacramento

Valley suggests there is a potential for uncovering additional similar fossil remains during construction-related earthmoving activities in some portions of the project site and RD 1001 borrow site.

The Riverbank Formation is present within a portion of the project site, and portions of the RD 1001 borrow site are underlain by the Modesto Formation. Excavations deeper than 6 feet (e.g., for the installation of the new cutoff wall in the levee alignment or excavation of borrow soils) in the Riverbank or Modesto Formations have the potential to encounter and possibly damage unique paleontologically sensitive resources. This potential impact would be significant.

3.8.4 MITIGATION MEASURES

Mitigation Measure 3.8-a for Disturbance of Unknown Unique Paleontological Resources during Earthmoving Activities: 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.

SAFCA and its primary contractors for engineering design and construction shall ensure that the following measures are implemented to avoid and minimize potential effects of construction activities on unique paleontological resources or sites.

Before the start of construction activities in the Riverbank or Modesto Formations, 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 either be prepared and presented by an experienced field archaeologist at the same time as construction worker education on cultural resources or prepared and presented separately by a qualified paleontologist.

If paleontological resources are discovered during earthmoving activities, the construction crew shall immediately cease work within at least 25 feet of the find. SAFCA shall retain a qualified paleontologist to evaluate the resource and prepare a proposed mitigation plan in accordance with Society of Vertebrate Paleontology (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 the potential impact on unique paleontological resources to a less-than-significant level.

3.9 TRANSPORTATION AND CIRCULATION

This section describes the traffic and circulation characteristics of the existing transportation corridors in the vicinity of the project site, and analyzes the potential impacts of the 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.

3.9.1 REGULATORY SETTING

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 area. Caltrans enforces various policies and regulations related to the modification of, or encroachment on, state-owned roadways.

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 public works departments of the respective jurisdictions.

3.9.2 ENVIRONMENTAL SETTING

3.9.2.1 PROJECT AREA

The primary roadways that would be used to access the project site are located in Sutter County. These roadways include Garden Highway, Riego Road, Sankey Road, Powerline Road, and State Route (SR) 99/70. SR 99 is a primary regional transportation corridor within Sutter County. 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 99 also supports north-south regional travel. The major roads that may be used by construction-related traffic are shown in Exhibits 2-2 and 2-4.

Garden Highway is a north/south two-lane roadway that extends north from the City of Sacramento along the Sacramento River to Yuba City. Garden Highway serves as an alternative north/south route to SR 99.

Riego Road is an east/west two-lane roadway extending from Garden Highway to Base Line Road in Placer County. Riego Road provides local access to the City of Roseville in Placer County.

Sankey Road is an east/west two-lane roadway that extends from Garden Highway east across SR 99/70.

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 Garden Highway to Sankey Road.

State Route 99 extends from the Sacramento County line north through Sutter County 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.

State Route 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 70/99 to the Sacramento County line. The roadway provides regional access to the cities of Sacramento and Marysville.

The Sutter County General Plan Background Report (Sutter County 1996) contains level of service (LOS) data for roadways within the Natomas area. Garden Highway between Sankey Road and Riego Road operates at LOS A (rural arterial), with an average daily traffic (ADT) volume of 340. SR 99/70 operates at LOS C (expressway) with 22,000 ADT. Riego Road operates at LOS A (rural collector) with 540 ADT, and Sankey Road operates at LOS A (rural collector) with 440 ADT (Sutter County 1996).

3.9.2.2 POTENTIAL HAUL ROUTES

Personnel, equipment, and imported construction materials would reach the project site via SR 70/99, Sankey Road or Riego Road, and Garden Highway, as described above. Exhibit 2-4 shows the potential haul routes that could be used for travel between the RD 1001 borrow site and the project site. These routes include SR 70/99, public roadways (e.g., Pacific Avenue, Striplin Road, Catlett Road, and Howsley Road), and private access roads (e.g., the unpaved operating road at the base of the landside levee toe).

3.9.3 ENVIRONMENTAL IMPACTS

The following analysis is focused on construction-related traffic effects because long-term project operation would have no effects on transportation and circulation. Typical traffic standards such as LOS, which are often calculated by counties' congestion management agencies and are used for analyzing potential long-term effects on traffic flow, were not used in this analysis.

The evaluation of temporary project effects is based on recommendations from the Institute of Transportation Engineers (ITE) (1989). ITE recommends that an impact be examined further when it involves an increase of 30 or more trucks, 100 passenger vehicles, or an equivalent combination of vehicles per hour in the peak direction during the peak hour at any roadway intersection (Institute of Transportation Engineers 1989). Impacts of project-generated traffic may be considered substantial if the amount of project-generated vehicle trips would exceed any of these thresholds.

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 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, and therefore would not affect air traffic patterns or result in substantial safety risks associated with airport operations at the nearby Sacramento International Airport.

The project would not include new design features (e.g., new facilities or obstructions within public roadways) or permanent alterations of existing features (e.g., road realignment). Therefore, the project would not result in hazards caused by a design feature or incompatible use.

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 project would not directly or indirectly eliminate alternative transportation corridors or facilities (e.g., bike paths, lanes, bus turnouts, etc.), 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 project would not conflict with adopted policies, plans, or programs supporting alternative transportation.

These issues are not discussed further in this EIR.

3.9.3.2 IMPACT ANALYSIS

IMPACT 3.9-a	<i>Temporary Increase in Traffic on Local Roadways during Construction. During the project's 6-month construction period, construction worker commute trips and haul truck trips would increase traffic on Garden Highway and other local roadways that provide access to the project site. However, construction-related trips would not likely exceed the thresholds established by the Institute of Transportation Engineers (ITE) for temporary traffic increases and would not represent a substantial increase in traffic levels on Garden Highway or other local roads. Therefore, this impact would be less than significant.</i>
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Construction would have only a temporary effect on traffic. Project construction activities would necessitate construction worker commute trips and haul truck trips (for delivery and transport of materials and equipment), resulting in increased traffic levels on Garden Highway and other local roadways in the vicinity of the project site.

Construction-related traffic would consist of daily commute trips of 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. Construction personnel, equipment, and imported materials would primarily reach the project site via Garden Highway, Riego Road, Sankey Road, Powerline Road, Howsley Road, and SR 99.

The construction labor force is estimated to average about 45-55 people over the 6-month construction period. Construction-related commute traffic, therefore, could reach a total of 55 trips during the peak morning and evening commute hours at times of peak construction activity. However, construction crew members would travel to the project site from different directions and by way of different sets of roadways and intersections. It is also likely that some ridesharing would take place. Therefore, 55 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. Therefore, commute traffic is not expected to exceed the ITE threshold of an increase in traffic volume of 100 passenger vehicles in the peak direction during the peak hour at any intersection.

It is anticipated that approximately 50 truck round trips would be required to transport the contractor's equipment to the site. A similar number of round trips would be needed to remove the equipment from the site as the work is completed. As discussed in Chapter 2, "Project Description," project construction would necessitate the following: 20 truck trips per day for clearing/grubbing waste (5 days), 40 truck trips per day for soils waste export

(33 days), 40 truck trips per day for select import (8 days), 240 truck trips per day for levee crown reconstruction (27 days), and 40 truck trips per day for finish grading (3 days) (see Table 2-2). These truck trips would not necessarily occur on the same days, but could overlap at times; however, these trucks would likely be traveling in different directions (e.g., north to the RD 1001 borrow site, south to the landfill, etc.) at different times of the day; therefore, project construction is not expected to exceed the ITE threshold of an increase in traffic volume of 30 or more trucks in the peak direction during the peak hour at any intersection.

It is likely that traffic related to the project will fluctuate during the course of the construction period. For example, there would likely be a peak in traffic volume at the commencement of construction related to initial delivery of construction equipment and materials. During other times, traffic volumes would be much lower.

Construction-related trips would not be expected to exceed the thresholds established by ITE at any time or substantially increase overall traffic levels on the local road system. Therefore, this impact would be less than significant.

IMPACT 3.9-b **Temporary Increase in Traffic Hazards on Local Roadways during Construction.** *Construction-related traffic could track mud and gravel onto local roadways and truck traffic would interfere with the flow of traffic on these roads. These conditions could pose hazards for travelers on local roadways. This potential impact would be significant.*

During the 6-month construction period, trucks delivering materials, hauling borrow material, and removing debris would be entering and exiting the project site. The addition of construction-related truck traffic to traffic volumes on local roadways is not expected to noticeably alter traffic flow in most circumstances, although it could reduce traffic speeds along local roadways near the project site at certain times. Additionally, project construction would require temporary closure of Garden Highway while a section of the new cutoff wall is installed along the Sacramento River east levee. Garden Highway traffic would be detoured to West Catlett Road and Riego Road during this approximately 2-month period. Trucks and workers entering and exiting the construction area at the beginning and end of each work day, respectively, could increase traffic hazards. At times, the presence of slow-moving trucks entering or exiting construction areas could pose hazards to other vehicles on local roadways near the project site. In addition, trucks and other vehicles could track mud and gravel onto the local roadways, potentially posing a driving hazard. This potential impact would be significant.

IMPACT 3.9-c **Temporary Effect on Emergency Service Response Times and Access during Construction.** *During the project's 6-month construction period, commute trips and haul truck trips would increase traffic on local roadways. Because this increase is not expected to significantly alter existing traffic patterns or congestion, it is not expected to adversely affect the response times of any emergency vehicles traveling on local roadways during the construction period. However, project construction would require temporary closure of Garden Highway and, although a detour would be provided, this detour could slow emergency service response times. This potential impact would be significant.*

The increase in traffic discussed above in Impact 3.9-a would not substantially disrupt daily traffic flow on local roadways in the vicinity of the project site where project-related traffic would be the most concentrated. The traffic increases associated with project construction activity would not be substantial enough to cause significant delays in emergency service response times during the construction period. Project construction is not expected to alter existing service ratios, substantially affect response times, or affect other performance objectives for emergency services providers.

However, the project would require temporary closure of Garden Highway while a section of the new cutoff wall is installed along the Sacramento River east levee. Garden Highway traffic would be detoured to West Catlett Road and Riego Road during this 2-month period. Because project construction could result in increased response times and access issues during the construction period, this impact would be potentially significant.

3.9.4 MITIGATION MEASURES

Mitigation Measure 3.9-b for Temporary Increase in Traffic Hazards on Local Roadways during Construction: 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 to avoid and minimize potential traffic hazards on local roadways during construction.

- (a) The construction contractor shall develop a traffic safety and control plan for the roadways in the Natomas area. The plan shall be submitted to the Sutter County Public Works Department and Caltrans for review before the initiation of construction-related activity that could adversely affect traffic on local roadways. The plan may 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 would reduce potential traffic hazard impacts to a less-than-significant level.

Mitigation Measure 3.9-c for Temporary Effect on Emergency Service Response Times and Access during Construction: Provide Pre-Notification of Construction to Emergency Service Providers, and Maintain Emergency Access or Coordinate Detours with Providers.

Implement Mitigation Measure 3.9-b, above. Implementation of this mitigation would reduce the potential impact to a less-than-significant level.

3.10 AIR QUALITY

3.10.1 REGULATORY SETTING

The project site is in Sutter County, which is in the Northern Sacramento Valley Air Basin (NSVAB). The NSVAB consists of Butte, Colusa, Glenn, Shasta, Sutter, Tehama, and Yuba Counties. Air quality in Sutter County is regulated by the U.S. Environmental Protection Agency (EPA), California Air Resources Board (ARB), and the Feather River Air Quality Management District (FRAQMD). Although EPA regulations may not be superseded, both state and local regulations may be more stringent. The following sections focus primarily on ozone, carbon monoxide (CO), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), particulate matter (PM), and lead. Because these are the most prevalent air pollutants known to be deleterious to human health and extensive health-effects criteria documents are available, these pollutants are commonly referred to as “criteria air pollutants.”

See Volume I, Section 4.11, “Air Quality,” for a discussion of the relevant federal and state regulatory setting.

3.10.1.1 LOCAL

FRAQMD attains and maintains air quality conditions in Yuba and Sutter Counties through a comprehensive program of planning, regulation, enforcement, technical innovation, and promotion of the understanding of air quality issues. The clean-air strategy of FRAQMD 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. FRAQMD also inspects stationary sources, responds to citizen complaints, monitors ambient air quality and meteorological conditions, and implements other programs and regulations required by the federal Clean Air Act (CAA), the federal Clean Air Act Amendments of 1990 (CAAA), and the California Clean Air Act (CCAA).

In an attempt to achieve the national ambient air quality standards (NAAQS) and California ambient air quality standards (CAAQS) and maintain healthful air quality throughout the NSVAB, FRAQMD and the other air districts in the NSVAB have jointly prepared and adopted air quality attainment plans (AQAPs) and reports. The most recent AQAP, completed in 2003, addresses all of the following:

- ▶ air quality modeling to identify the reductions needed and to help design effective emissions reduction strategies,
- ▶ comprehensive emission reduction programs that take advantage of zero- and near-zero-emission technologies, and
- ▶ the impacts of pollutant transport in the attainment demonstration.

In 1998, FRAQMD published the *Indirect Source Review Guidelines* (FRAQMD 1998). More recently, FRAQMD has provided CEQA planning guidance online (FRAQMD 2006) to assist with identification of significant adverse air quality impacts and suggest amenities that will reduce potential project emissions early in the planning process. Because stationary sources such as industrial facilities are individually regulated, the guidelines focus on transportation and land-use control measures to reduce emissions to achieve and maintain federal and state health-based air quality standards.

All projects within FRAQMD’s jurisdiction are subject to FRAQMD rules and regulations in effect at the time of construction. Specific rules applicable to the construction of the proposed project may include the following:

- ▶ Rule 3.0—Visible Emissions. A person shall not discharge into the atmosphere from any single source of emission whatsoever any air contaminant for a period or periods aggregating more than 3 minutes in any

1 hour which is as dark or darker in shade as that designated as No. 2 on the Ringelmann Chart, as published by the United States Bureau of Mines.

- ▶ Rule 3.2—Particulate Matter Concentration. A person shall not discharge into the atmosphere from any source particulate matter in excess of 0.3 grains per cubic foot of gas at standard conditions.
- ▶ Rule 3.15—Architectural Coatings. No person shall: (i) manufacture, blend, or repackage for sale within the FRAQMD; (ii) supply, sell, or offer for sale within FRAQMD; or (iii) solicit for application or apply within FRAQMD, any architectural coating with volatile organic carbon content in excess of the corresponding specified manufacturer's maximum recommendation.
- ▶ Rule 3.16—Fugitive Dust Emissions. A person shall take every reasonable precaution not to cause or allow the emissions of fugitive dust from being airborne beyond the property line, from which the emission originates, from any construction, handling or storage activity, or any wrecking, excavation, grading, clearing of land or solid waste disposal operation.
- ▶ Rule 4.1—Permit Requirements. Any person operating an article, machine, equipment, or other contrivance, the use of which may cause, eliminate, reduce, or control the issuance of air contaminants, shall first obtain a written permit from the Air Pollution Control Officer (APCO). Stationary sources subject to the requirements of Rule 10.3, Federal Operating Permit Program, must also obtain a Title V permit pursuant to the requirements and procedures of that rule.

Toxic Air Contaminants

See Section 4.11.1.4, "Toxic Air Contaminants," in Volume I for a general discussion of toxic air contaminants (TACs).

At the local level, air pollution control or management districts may adopt and enforce ARB control measures for TACs. Under FRAQMD Regulation 4.0 ("General Requirements"), Regulation 4.1 ("Permits Required"), Regulation 10.1 ("New Source Review"), and Regulation 10.3 ("Federal Operating Permits"), all sources that possess the potential to emit TACs are required to obtain permits from FRAQMD. Permits may be granted to these operations if they are constructed and operated in accordance with applicable regulations, including new-source review standards and air-toxics control measures. FRAQMD limits emissions and public exposure to TACs through a number of programs. FRAQMD prioritizes TAC-emitting stationary sources based on the quantity and toxicity of the TAC emissions and the proximity of the facilities to sensitive receptors.

Sources that require a permit are analyzed by FRAQMD (e.g., in a health risk assessment) based on their potential to emit TACs. If it is determined that the project would emit TACs in excess of FRAQMD's threshold of significance, as identified below, sources must implement the best available control technology for TACs (T-BACT) to reduce emissions. If a source cannot reduce the risk below the threshold of significance even after T-BACT has been implemented, FRAQMD will deny the permit required by the source. This helps to prevent new problems and reduces emissions from existing older sources by requiring them to apply new technology when retrofitting with respect to TACs.

3.10.2 ENVIRONMENTAL SETTING

3.10.2.1 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

The dimensions of the NSVAB are approximately 216 miles north to south and 95 miles east to west at the widest part. The NSVAB is bounded on the west and north by the Coast Range and on the east by the southern portion of the Cascade Range and the northern portion of the Sierra Nevada. The surrounding mountain ranges reach heights of 3,500 feet in the southwest, 8,500 feet in the northwest, 1,700 feet in the southeast, and 10,500 feet in the northeast. These mountain ranges provide a substantial physical barrier to locally created air pollution as well as air pollutants transported northward on prevailing winds from the Sacramento metropolitan area.

Meteorology and Climate

The annual temperature, humidity, precipitation, and wind patterns of the NSVAB reflect the regional topography and the strength and location of a semipermanent, subtropical high-pressure cell. Summer temperatures that often exceed 100°F coupled with clear sky conditions are favorable for ozone formation. Most precipitation in the valley occurs during winter storms. The coastal mountain ranges induce winter storms from the Pacific Ocean to release precipitation on the western slopes, producing a partial rain shadow over the valley. The winds and unstable atmospheric conditions associated with the passage of winter storms result in periods of low air pollution and excellent visibility. However, between winter storms, high pressure and light winds lead to the creation of low-level temperature inversions and stable atmospheric conditions that can result in high concentrations of CO and PM.

Summer conditions in the NSVAB are typically characterized by high temperatures and low humidity, with prevailing winds from the south. Summer temperatures average approximately 90°F during the day and 50°F at night (FRAQMD 1998).

Winter conditions in the NSVAB are characterized by occasional rainstorms interspersed with stagnant and foggy weather. Winter temperatures average in the low 50s (°F), and nighttime temperatures average in the upper 30s. Rainfall occurs mainly from late October to early May, averaging 17.2 inches per year, but varies significantly from year to year. During winter, north winds are frequent, but winds from the south predominate (FRAQMD 1998). The predominant wind direction and speed is from the south at 8.0 miles per hour (mph) (California Air Resources Board 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°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 NSVAB, 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 primarily during the 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 NSVAB 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 NSVAB 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.

3.10.2.2 AMBIENT AIR QUALITY IN THE PROJECT AREA

Concentrations of criteria air pollutants (e.g., ozone, respirable particulate matter [PM₁₀], fine particulate matter [PM_{2.5}], CO, and nitrogen dioxide [NO₂]) are used as indicators of ambient air quality conditions. A brief description of each criteria air pollutant, including source types, health effects, and future trends, is provided in Volume I, Section 4.11, “Air Quality.” The most current attainment area designations and monitoring data for the project area are provided below.

Air Pollutant Sources and Concentrations

Approximately 60–70% of the air pollution in the FRAQMD area comes from mobile sources, which includes on-road and off-road motor vehicles (including cars, trucks, planes, trains, tractors, combines, buses, motorcycles, and boats). The remaining 30–40% of the air pollution in the FRAQMD area is a result of stationary sources that include agricultural operations, open burning of vegetative wastes, wood burning for residential heating, manufacturing industries, electric generation industries, diesel backup generators, retail gasoline and local bulk distribution facilities, auto body shops, dry cleaners, landfills, other human-made sources that emit air contaminants, and naturally occurring sources (including biological and geological sources, wildfires, and windblown dust) (FRAQMD 2006).

Air pollutant concentrations are measured at several monitoring stations in the NSVAB. The Yuba City air quality monitoring station on Almond Street is the closest monitoring station to the project site with sufficient data to meet EPA and ARB criteria for quality assurance. In general, the ambient air quality measurements from this monitoring station are representative of the air quality in the project area.

Table 3.10-1 summarizes the air quality data from this monitoring station for the years 2003–2005.

Attainment Status

Both ARB and EPA use the type of monitoring data provided in Table 3.10-1 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.” The “unclassified” designation 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 are presented in Table 4.11-1, in Volume I, Section 4.11, “Air Quality.” Sutter County is designated as a nonattainment area with respect to the state standards for ozone (1-hour) and PM₁₀, and is either in attainment or unclassified for the remaining state standards. Sutter County is designated as a nonattainment area with respect to the 8-hour federal ozone standard, and is either in attainment or unclassified for all other federal standards (FRAQMD 2006).

ARB does not establish attainment status designations for vinyl chloride because ARB has classified it as a TAC for which ARB has established an Airborne Toxics Control Measure (ACTM) that reduces exposure below the safe threshold.

**Table 3.10-1
Summary of Annual Air Quality Data from the Yuba City–Almond Street Monitoring Station**

	2003	2004	2005
Ozone			
<i>State standard (1-hour/8-hour avg., 0.09/0.07 ppm)</i>			
<i>National standard (8-hour avg., 0.08 ppm)</i>			
Maximum concentration (1-hour/8-hour avg., ppm)	0.090/0.079	0.098/0.081	0.092/0.073
Number of days state standard exceeded	0	2	0
Number of days national 8-hour standard exceeded	0	0	0
Respirable particulate matter (PM₁₀)			
<i>State standard (24-hour avg., 50 µg/m³)</i>			
<i>National standard (24-hour avg., 150 µg/m³)</i>			
Maximum concentration (µg/m ³)	83.0	53.0	60.0
Number of days state standard exceeded (measured/calculated ^a)	5/30.7	1/NA	5/31.1
Number of days national standard exceeded (measured/calculated ^a)	0/0	0/0	0/0
Fine particulate matter (PM_{2.5})			
<i>No separate state standard</i>			
<i>National standard (24-hour avg., 65 µg/m³)</i>			
Maximum concentration (µg/m ³)	32.0	39.0	45.0
Number of days national standard exceeded (measured ^b)	0	0	0
Carbon monoxide (CO)			
<i>State standard (1-hour/8-hour avg., 20/9.1 ppm)</i>			
<i>National standard (1-hour/8-hour avg., 35/9.5 ppm)</i>			
Maximum concentration (1-hour/8-hour avg., ppm)	4.30/2.36	5.80/2.54	4.40/3.39
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
Nitrogen dioxide (NO₂)			
<i>State standard (1-hour avg., 0.25 ppm)</i>			
<i>National standard (annual, 0.053 ppm)</i>			
Maximum concentration (1-hour avg., ppm)	0.080	0.066	0.062
Annual average (ppm)	0.014	0.012	0.012
Number of days state standard exceeded	0	0	0
Notes: µg/m³ = 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: California Air Resources Board 2006, EPA 2006			

3.10.3 ENVIRONMENTAL IMPACTS

There would be no changes in levee maintenance practices from existing conditions following construction of the proposed improvements. Implementation of the proposed project would not result in the operation of any new major stationary emission sources. Therefore, all pollutant emissions above existing levels that would be associated with the proposed project would be generated by construction activities. Construction emissions are described as short-term or temporary in duration. These short-term emissions, especially PM₁₀, 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- and off-site. Reactive organic gases (ROG) and NO_x emissions 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. Diesel emissions are associated with heavy-duty diesel-fueled construction equipment and haul trucks.

3.10.3.1 ANALYSIS METHODS

The methodology used for estimating construction emissions associated with the proposed project was based on emission factors and assumptions obtained from the following sources:

- ▶ FRAQMD's *Indirect Source Review Guidelines* (FRAQMD 1998),
- ▶ FRAQMD's CEQA planning guidance (FRAQMD 2006),
- ▶ the Sacramento Metropolitan Air Quality Management District's *Guide to Air Quality Assessment* (Sacramento Metropolitan Air Quality Management District 2004),
- ▶ EPA's *Compilation of Air Pollutant Emission Factors* (EPA 1985),
- ▶ the South Coast Air Quality Management District's *CEQA Air Quality Handbook* (South Coast Air Quality Management District 1993), and
- ▶ EMFAC 2002 computer model (California Air Resources Board 2003).

Assumptions regarding construction equipment and personnel, haul distances, areas of disturbance, and durations and timing of different construction activities were developed based on the information provided in Chapter 2, "Project Description," and coordination with project engineers.

The conclusions regarding construction emissions are based on the maximum daily emissions calculated for the entire 6-month construction period. The potential overlap of construction activities was considered.

For purposes of the calculations of maximum potential daily emissions, unmitigated conditions were assumed for fugitive dust emissions (i.e., no dust-control measures were assumed to be applied). This standard method of calculating potential emissions is very conservative, given that modern construction practices include very active dust-control measures, such as watering of roadways and wetting of excavation areas and stockpiles.

3.10.3.2 SIGNIFICANCE CRITERIA

Significance thresholds for total maximum daily emissions are used by air quality management districts as a guide to identify the level of significance that a project may have on the formation of ozone and a project's contribution to the district's overall PM₁₀ load. The FRAQMD *Indirect Source Review Guidelines* and CEQA planning

guidance (FRAQMD 1998, 2006) provide recommended thresholds of significance for project-generated emissions of ozone precursors and PM₁₀.

In accordance with these recommended thresholds, the proposed project would have a significant impact on air quality if any of the following would occur:

- ▶ project implementation would substantially conflict with or substantially obstruct implementation of the applicable air quality plan;
- ▶ project construction would result in emissions that exceed:
 - 25 pounds per day (lb/day) of ROG,
 - 25 lb/day of NO_x, or
 - 80 lb/day of PM₁₀;
- ▶ 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 PM₁₀;
- ▶ operation of the project would result in or contribute to local CO concentrations that exceed the California 1-hour or 8-hour CO ambient air quality standards of 20 ppm or 9 ppm, respectively; or
- ▶ project implementation would result in exposure of sensitive receptors to excessive concentrations of toxic air emissions, criteria air pollutants, or odorous emissions.

As noted above, the proposed project would have no long-term operational emissions above existing levels, which are associated with occasional vehicle trips for inspection and maintenance. Project implementation would not result in any major sources of odor, and the 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). In addition, diesel exhaust from the use of on-site construction equipment would be intermittent and temporary, and it would dissipate rapidly from the source with an increase in distance. Thus, project implementation would not expose sensitive receptors to odorous emissions, and odor effects are not discussed further in this EIR.

3.10.3.3 IMPACT ANALYSIS

IMPACT 3.10-a Temporary Emissions of ROG, NO_x, and PM₁₀ during Construction. *Maximum daily emissions of ROG, NO_x, and PM₁₀ associated with project construction would exceed FRAQMD's recommended significance thresholds and contribute to existing nonattainment conditions for ozone and PM₁₀ in the NSVAB. This impact would be significant.*

The total length of the proposed project is approximately 12,500 feet, or roughly 2.4 miles. Cutoff wall construction along Reaches 1–3 of the NCC south levee would result in the temporary generation of construction-related emissions for approximately 6 months. Fugitive dust and mobile-source emissions (such as motor vehicle exhaust) would be generated by various construction activities, including:

- ▶ operation of equipment at the construction sites, construction personnel commute trips, and the delivery of equipment and materials to the construction areas;
- ▶ ground disturbance associated with preparing work surfaces on and near the existing levee, and excavation of material from the levee for cutoff wall installation and from the proposed borrow site; and

- placement of material for the new levee crown patrol road, finishing and cleanup, and other miscellaneous construction activities.

The anticipated equipment types, borrow quantities and sources, and truck trips required for project construction are described in Section 2.3.4, “Construction Equipment.” Detailed calculations are shown in Appendix A, “Air Quality Modeling Analyses.” The following sections describe the primary assumptions used in the calculations and summarize the results of the air quality analysis.

Assumptions

It was assumed for purposes of emissions calculations that the following mobile heavy-construction equipment could be used for project construction: scrapers, excavators, haul trucks, water trucks, bulldozers, loaders, generators, pumps, rollers, graders, and other miscellaneous construction equipment.

The amount and types of equipment used during construction activities would vary from day to day depending on the specific activities being conducted. The number of off-site vehicle trips is also anticipated to vary from day to day. For purposes of calculating the maximum potential daily emissions, it was assumed that the equipment listed above would operate simultaneously for 8 hours on a day of maximum construction activity. This is a conservative assumption used to calculate potential maximum daily emissions.

A construction labor force of 45 to 55 workers and an average travel distance of 10 miles to/from the construction site were assumed.

The daily average area of ground disturbance was estimated by calculating an estimated project footprint, including additional acreage to account for staging areas, the RD 1001 borrow site, and other activities, and dividing the total by the expected number of work days. As mentioned above, the total length of the existing levee in the three reaches is about 2.4 miles, or 12,500 feet. For purposes of this analysis, the average width of the cutoff wall work area was assumed to be 160 feet. The area of land disturbance would therefore be approximately 46 acres. To account for ground disturbance associated with removal of soil borrow and other activities, an additional 5 acres was added to the disturbance area. The total estimated acreage of ground disturbance was therefore assumed to be approximately 51 acres, with an average daily disturbance area of approximately 0.4 acre (Bassett, pers. comm., 2006). For the modeling of project-related emissions, a conservative assumption of 1 acre was used for the average daily disturbance area to account for the possibility that the construction effort may consist of two headings at times.

The emissions calculations also included expected truck trips to haul slurry wall material, concrete, demolition debris, soil borrow, and other materials to and within the site. These materials were assumed to be transported an average of 10 miles round trip on unpaved roads, and the number of trips was based on Tables 2-1 and 2-2 in Chapter 2, “Project Description.” This estimate of haul trips exceeds estimates elsewhere in this DEIR (e.g., Section 2.3.5, “Material Sources and Handling”; and Section 3.9, “Transportation and Circulation”) to provide a margin of error and to ensure that emissions are not underrepresented.

Results

Average daily construction emissions were calculated from EPA-recommended AP-42 emission factors for fugitive dust, and EMFAC 2002 emission factors for mobile-equipment. It was assumed that there would be 132 active construction work days during the 6-month construction period. Detailed calculations of the maximum daily temporary emissions are shown in Appendix A, “Air Quality Modeling Analyses.” Table 3.10-2 summarizes the results. As indicated in the table, the maximum unmitigated daily emissions associated with the proposed project were estimated at 34 lb/day of ROG, 226 lb/day of NO_x, and 4,398 lb/day of PM₁₀.

Table 3.10-2 Summary of Maximum Daily Average Construction Emissions for the Proposed Project			
Emission Source	Pollutant (lb/day)		
	ROG	NO _x	PM ₁₀
Mobile-Source Equipment	32	222	10
Employee Trips	2	4	0
Fugitive Dust	--	--	4,398
Total Unmitigated	34	226	4,398
FRAQMD Threshold	25	25	80
Notes: FRAQMD = Feather River Air Quality Management District; lb/day = pounds per day; NO _x = oxides of nitrogen; PM ₁₀ = particles with an aerodynamic diameter of 10 micrometers or less; ROG = reactive organic gases See Appendix A, "Air Quality Modeling Analyses," for assumptions and modeling results. Source: Data modeled by EDAW in 2006			

Based on the conservative assumptions described above, the project's maximum daily emissions would exceed FRAQMD's recommended significance thresholds of 25 lb/day for ROG, 25 lb/day for NO_x, and 80 lb/day for PM₁₀. In addition, Sutter County is designated as a nonattainment area for the national and state ozone standards and as a nonattainment area for the state PM₁₀ standard. Because maximum construction emissions of ROG, NO_x, and PM₁₀ would exceed FRAQMD thresholds and would contribute to existing nonattainment conditions in the NSVAB, this impact would be significant.

IMPACT 3.10-b Exposure of Sensitive Receptors to Toxic Air Emissions. *Emissions of TACs associated with project construction and operations would not result in exposure of receptors to concentrations of TACs in excess of applicable thresholds. This impact would be less than significant.*

Project construction activities would result in short-term emissions of diesel exhaust from on-site heavy-duty equipment. ARB identified particulate exhaust emissions from diesel-fueled engines (diesel PM) as a TAC in 1998. Project construction would result in the generation of diesel PM emissions from the use of off-road diesel equipment required for site grading, excavation, material hauling, and other construction activities. According to ARB, the potential cancer risk from the inhalation of diesel PM, as discussed below, outweighs the potential noncancer health impacts.

The dose to which receptors are exposed (a function of concentration and duration of exposure) is the primary factor used to determine the health risk (i.e., potential exposure to TAC emission levels that exceed applicable standards). Dose is positively correlated with time, meaning that a longer exposure period would result in a higher exposure level for the maximally exposed individual. Thus, the risks estimated for a maximally exposed individual are higher if a fixed exposure occurs over a longer period of time. According to the California Environmental Protection Agency's Office of Environmental Health Hazard Assessment (OEHHA), health risk assessments, 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).

Thus, short-term construction activities would not expose sensitive receptors to substantial pollutant concentrations for the following reasons:

- ▶ the overall use of mobilized equipment would be temporary (less than 1% of the 70-year exposure period);
- ▶ equipment would move regularly along the linear construction corridor, further limiting the exposure period at any one location because diesel PM dissipates rapidly with an increase in distance from the source (Zhu et al. 2002); and
- ▶ there are no sensitive receptors located in the immediate vicinity of a majority of the project site (Verona Village Resort is about 660 feet from the nearest part of the project site, and the nearest residence is approximately 700 feet west of the project site, on the north side of the NCC).

In addition, portable diesel-fueled generators used during construction would be subject to FRAQMD permitting and best available control technology (BACT) requirements and therefore would not be considered to result in significant air-quality impacts. In fact, air districts typically do not even require the inclusion of such emissions in CEQA analyses unless the operation of a stationary source would result in surplus emissions in excess of BACT and offsets. As a result, this impact would be less than significant. Furthermore, successful implementation of mitigation measures as recommended for Impact 3.10-a, below, would act to further reduce this less-than-significant impact for diesel PM.

3.10.4 MITIGATION MEASURES

No mitigation is required for Impact 3.10-b (toxic air emissions). Mitigation is provided below for Impact 3.10-a (temporary ROG, NO_x, and PM₁₀ emissions).

Mitigation Measure 3.10-a for Temporary Emissions of ROG, NO_x, and PM₁₀ during Construction: Implement Measures and Guidelines of the Feather River Air Quality Management District (FRAQMD) to Control Construction-Generated Emissions of Air Pollutants.

SAFCA and its primary contractors for engineering design and construction shall ensure that the following measures are implemented to avoid and minimize temporary emissions of ROG, NO_x, and PM₁₀ during construction.

As recommended by the FRAQMD's *Indirect Source Review Guidelines* and online CEQA guidance, SAFCA shall ensure that the following mitigation measures are implemented during all project construction activities to the extent practicable.

1. A fugitive dust control plan shall be prepared and submitted to the FRAQMD before the commencement of ground-disturbing construction activities. The plan shall reduce fugitive dust emissions, and may include the following measures, as applicable.
 - ▶ All grading operations on a project 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 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 non-toxic soil stabilizers according to manufacturer's specifications to all inactive construction areas.

- ▶ 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 according to the manufacturers' specifications, to all-inactive construction areas (previously graded areas that remain inactive for 96 hours) including unpaved roads and employee/equipment parking areas.
 - ▶ 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 prior to each trip. Alternatively, a gravel bed 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 (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 on surface streets, as deemed appropriate by the Sutter County Department of Public Works and/or Caltrans and to reduce vehicle dust emissions.
 - ▶ 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 and prior to final occupancy, through seeding and watering.
 - ▶ Disposal by burning: Open burning is yet another source of fugitive gas and particulate emissions and 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, et. al.) 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 to ensure that all construction equipment is properly tuned and maintained prior to and for the duration of on-site operation.
 4. Minimize idling time to 10 minutes – saves fuel and reduces emissions.
 5. Use existing power sources (e.g., power poles) or clean fuel generators rather than temporary power generators.
 6. Develop a traffic plan to minimize traffic flow interference from construction activities. The plan may include advance public notice of routing, use of public transportation, and satellite parking areas with a shuttle service. Schedule operations affecting traffic for off-peak hours. Minimize obstruction of through-traffic lanes. Provide a flag person to guide traffic properly and ensure safety at construction sites.
 7. 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 ARB Portable Equipment Registration with the State or a local district permit. The owner/operator shall be responsible for arranging appropriate consultations with the

ARB or the FRAQMD to determine registration and permitting requirements prior to equipment operation at the site.

8. 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 and greater) that will be used an aggregate of 40 or more hours for the construction project and apply the following mitigation measure:
9. The project shall provide a plan for approval by FRAQMD demonstrating that the heavy-duty (equal to or greater than 50 horsepower) 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 reduction¹ compared to the most recent ARB fleet average at time of construction.

Implementing the FRAQMD measures above 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 PM₁₀ emissions from construction equipment (Sacramento Metropolitan Air Quality Management District 2004). The resulting maximum average daily emissions, shown in Table 3.10-3, are calculated to be 32 lb/day of ROG, 180 lb/day of NO_x, and 1,105 lb/day of PM₁₀ for project construction.

Table 3.10-3 Summary of Maximum Daily Average Construction Emissions with Mitigation Incorporated			
Total Emissions	Pollutant (lb/day)		
	ROG	NO _x	PM ₁₀
Total Unmitigated	34	226	4,398
Total Mitigated ¹	32	180	1,105
FRAQMD Threshold	25	25	80
¹ Based on a 5% reduction in ROG emissions from construction equipment, 20% reduction in NO _x emissions from construction equipment, 45% reduction in PM ₁₀ emissions from construction equipment, and 75% reduction in fugitive dust emissions (Sacramento Metropolitan Air Quality Management District 2004). See Appendix A, "Air Quality Modeling Analyses," for assumptions and modeling results. Source: Data modeled by EDAW in 2006			

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 PM₁₀. Therefore, although implementing Mitigation Measure 3.10-a would reduce the impact of construction-related emissions, the impact would not be reduced to a less-than-significant level. This impact would therefore remain significant and unavoidable.

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), after-treatment products, voluntary off-site mitigation projects, providing funds for FRAQMD off-site mitigation projects, and/or other options as they become available. FRAQMD should be contacted to discuss alternative measures.

3.11 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 4.6, “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, etc. 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 an “A-weighted” decibel (dBA) scale. The dBA scale is an expression of sound pressure levels in logarithmic units called decibels (dB) that discriminates among sound frequencies (i.e., “weights”) in a manner approximating the sensitivity of the human ear. Volume I, Section 4.12.2.1, “Sounds and the Human Ear,” provides an overview of acoustic fundamentals.

3.11.1 REGULATORY SETTING

No federal or state plans, policies, regulations, or laws related to noise are applicable to this analysis.

The project would be located in the unincorporated area of Sutter County. Sutter County does not have a noise ordinance; however, the Sutter County General Plan Noise Element, adopted in 1996, establishes policies and implementation programs to limit community exposure to excessive noise levels. The following policy applies to the proposed project:

Policy 8.A-2 The County shall require that new non-transportation noise sources be mitigated to the noise level standards shown in Table 3.11-1.

Table 3.11-1 Noise Level Standards for New Non-Transportation Sources		
Noise Level Descriptor	Daytime (7 a.m. to 10 p.m.)	Nighttime (10 p.m. to 7 a.m.)
Hourly L_{eq} , dBA	50	45
Maximum level, dBA	70	65
Source: Sutter County 1996a.		

These performance standards would be applicable to noise from construction activities and other stationary sources of noise, while the remaining recommended noise-level standards in the general plan are intended to apply to long-term exposure to noise and are not applicable to the project (Sutter County 1996a).

3.11.2 ENVIRONMENTAL SETTING

3.11.2.1 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 (California Department of Transportation 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 percent of a specific period of time.
- ▶ 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. 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} .

3.11.2.2 EXISTING NOISE CONDITIONS AND NOISE-SENSITIVE LAND USES IN THE PROJECT AREA

The predominant sources of noise in Sutter County are related to transportation, and include automobile and truck traffic, aircraft, and trains. Stationary noise sources in the county include natural gas extraction facilities, construction sites, mining activities, farming activities, and commercial and industrial facilities. (Sutter County 1996b.)

The project area consists primarily of rural/agricultural land uses. Noise-sensitive land uses in the area include Verona Village Resort, which consists of a small campground on the Sacramento River, a marina, a restaurant and, a store. Verona Village Resort is approximately 660 feet southwest of the project site. The closest residences are located about 700 feet (or 0.1 mile) west (on the north side of the NCC), 3,700 feet (or 0.7 mile) north, and 5,000 feet (or 0.95 mile) south of the project site.

Noise in the project area is principally generated by vehicular traffic, agricultural activity, and aircraft flyovers. SR 99, Garden Highway, and Powerline Road are major sources of traffic noise in the project area. Portions of the project area are exposed to aircraft noise from the Sacramento International Airport, which is located about 6 miles south of the project area, at levels that are in excess of 60 CNEL (Sutter County 1996a). A private landing strip is located on Riego Road approximately 2.5 miles south of the project site.

3.11.3 ENVIRONMENTAL IMPACTS

Noise-sensitive land uses and major noise sources in the project area were identified based on existing documentation and a site visit. To assess potential temporary, short-term construction noise impacts, sensitive receptors and their relative exposure (considering topographic barriers and distance) were identified. Typical noise levels associated with the specific types of construction equipment anticipated to be used for project construction were determined, and resultant potential noise levels at those receptors were calculated. Predicted noise levels were compared with standards adopted by Sutter County.

3.11.3.1 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:

- ▶ expose persons to or generate noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- ▶ expose persons to or generate excessive groundborne vibration or groundborne noise levels;
- ▶ result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;
- ▶ result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;
- ▶ 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.

Long-term operation and maintenance of the improved levee would be the same as under existing conditions. Therefore, the proposed project would have no effect on permanent noise levels. The project area is not located within an airport land use plan, within 2 miles of a public airport or public use airport, or in the vicinity of a private airstrip. Therefore, the following analysis focuses on the potential noise and ground-borne vibration impacts of the project resulting from construction activities.

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 (California Department of Transportation 1998). A 5-dBA change in amplitude is used in the following discussions as the measure of a substantial temporary noise increase.

3.11.3.2 IMPACT ANALYSIS

IMPACT 3.11-a *Generation of Short-Term Construction Noise. Construction activities associated with the proposed project would generate noise levels that may be substantially above the ambient noise conditions in the project area, and noise levels experienced by sensitive receptors could exceed Sutter County standards. This potential impact would be significant.*

Vehicle traffic and agricultural operations are the primary noise sources in the project area. The major local roadway in the area is Garden Highway, which has an average daily traffic (ADT) volume of 340 trips. The traffic characteristics on Garden Highway include agricultural equipment; truck traffic from food processing plants and industrial sites; recreational vehicles; and rural vehicle traffic, including commuters traveling to places of employment in the Sacramento region. Additional sources of noise in this area include agricultural operations and aircraft flights overhead. As discussed in Chapter 2, “Project Description,” the average vehicle trips associated with project construction during the 6-month construction period would be: 20 truck trips per day for clearing/grubbing waste (5 days), 40 truck trips per day for soils waste export (33 days), 40 truck trips per day for select import (8 days), 240 truck trips per day for levee crown reconstruction (27 days), and 40 truck trips per day for finish grading (3 days) (see Table 2-2 in Chapter 2, “Project Description”). These truck trips would not necessarily occur on the same days, but could overlap at times; however, these trucks would likely be traveling in different directions (e.g., north to the proposed borrow site, south to the landfill, etc.) at different times of the day. For a noticeable increase in traffic noise levels to result, a doubling of roadway traffic volume is required, when traffic volumes are already high (several thousand vehicles per day). Noise impacts to sensitive receptors (i.e., greater than 60 dBA CNEL/ L_{dn}) do not typically occur until several thousand vehicles are on a roadway. This additional temporary truck traffic is not expected to add substantially to ambient noise levels.

Project construction would result in temporary construction noise and noise from intermittent truck traffic. Construction activities could occur during 10–14-hour shifts, 6 days a week, during the 6-month construction period. Construction activities would generally involve site grading, clearing, excavation, earth movement, stockpiling, cutoff wall construction, and material hauling. These construction activities would generate temporary and intermittent noise at or near the construction site. The locations of noise sources would range from adjacent to Garden Highway, in Reach 1, to over 2 miles from Garden Highway, in Reach 3. Noise levels would also fluctuate depending on the particular type, number, and duration of use of various pieces of construction equipment. On-site equipment required for construction is anticipated to include excavators, slurry pumps, dozers/rippers, bulldozers, scrapers, rollers, graders, loaders, haul trucks, and water trucks. Certain types of construction equipment generate impulsive noise, which can be particularly annoying. In addition, construction-related haul trips would raise ambient noise levels along haul routes depending on the number of haul trips and the types of vehicles used. Depending on the operations conducted, individual equipment noise levels can range from 79 to 101 dBA at 50 feet, as indicated in Table 3.11-2.

Table 3.11-2 Typical Construction Equipment Noise Levels		
Type of Equipment	Noise Level in dBA at 50 feet ^b	
	Without Feasible Noise Control	With Feasible Noise Control ^a
Dozer or Tractor	80	75
Excavator	88	80
Scraper	88	80
Front-end Loader	79	75
Backhoe	85	75
Grader	85	75
Crane	83	75
Truck	91	75
^a Feasible noise control includes the use of intake mufflers, exhaust mufflers, and engine shrouds in accordance with manufacturer's specifications.		
^b Estimates correspond to a distance of 50 feet from the noisiest piece of equipment and 200 feet from the other equipment.		
Source: EPA 1971		

The nearest noise-sensitive land uses to the project site include:

- ▶ Verona Village Resort, located about 660 feet southwest of the project site;
- ▶ Residence 1, located about 700 feet (or 0.1 mile) west of the project site;
- ▶ Residence 2, located about 3,700 feet (or 0.7 mile) north of the project site; and
- ▶ Residence 3, located about 5,000 feet (or 0.95 mile) south of the project site.

The distance to these land uses and presence of levees, trees, and other topographic features would attenuate noise from the construction site.

Sutter County does not have a noise ordinance, or an exemption for noise from construction activities. Based on the equipment noise levels described above, and assuming a noise attenuation rate of 6 dBA per doubling distance and attenuation from intervening barriers, exterior noise levels at approximately 50 feet from construction operations could be as high as 96 dBA from combined sources without the use of feasible noise control. Worst-case noise levels at the nearest receptors (660 and 700 feet away) could reach 73 dBA, which would exceed the 50-dBA hourly daytime standard (Table 3.11-1).

In addition, the construction schedule would be governed by weather conditions and the terms of permits for work in sensitive habitats or the habitats of protected species, and it cannot be ensured that the hours of equipment operation at the construction sites would be limited to the less noise-sensitive hours of the day identified in the Noise Element (between 7:00 a.m. and 10:00 p.m.). For construction activities taking place during the more noise-sensitive early morning, evening, and nighttime hours, the specified nighttime standards could be exceeded, and/or construction activities could produce a substantial temporary increase (5 dBA or more) in ambient noise levels for sustained periods and cause annoyance or sleep disruption to occupants of these receptors closest to construction areas. Therefore, this potential impact would be significant.

IMPACT **Exposure of Sensitive Receptors to or Generation of Excessive Ground-Borne Vibration or Noise.**
3.11-b *Construction activities associated with the proposed project could generate excessive ground-borne vibration or ground-borne noise levels at 25 feet from the source equipment. However, because no structures are located immediately adjacent to the project site, no structural or architectural damage would occur as a result of the associated ground-borne vibration levels. This impact would be less than 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. Ground-vibration levels associated with various types of construction equipment are summarized in Table 3.11-3. Vibration generated by construction equipment typically spreads through the ground and diminishes in magnitude with increases in distance. While effects of ground vibration may be imperceptible at low levels, they may result in detectable vibrations and slight damage to nearby structures at moderate and high levels, respectively. At the highest levels of vibration, damage to structures is primarily architectural (e.g., loosening and cracking of plaster or stucco coatings) and rarely results in structural damage.

Table 3.11-3 Representative Vibration Source Levels for Construction Equipment	
Equipment	Peak Particle Velocity at 25 feet (in/sec)
Large Bulldozer	0.089
Caisson or Well Drilling	0.089
Loaded Trucks	0.076
Jackhammer	0.035
Small Bulldozer	0.003
Source: Federal Transit Administration 2006	

The California Department of Transportation (Caltrans) recommends a conservative standard of a peak particle velocity (PPV) of 0.2 inches per second within 100 feet with respect to the prevention of structural damage for normal buildings.

Construction operations associated with the proposed project would be anticipated to include excavators, slurry pumps, dozers/rippers, bulldozers, scrapers, rollers, graders, loaders, haul trucks, and water trucks. Ground-borne noise and vibration resulting from construction activities would primarily be associated with the use of large bulldozers, which typically result in relatively high levels of ground-borne vibration at 25 feet from the process, as shown in Table 3.11-3. However, because the nearest residential or commercial structures would be located more than 660 feet from the project site, vibration levels would not be expected to surpass the most conservative threshold of 0.2 inch per second PPV at the nearest structures. Thus, the temporary construction vibration associated with on-site equipment would not be anticipated to expose sensitive receptors to or generate excessive ground-borne vibration or ground-borne noise levels. Therefore, this potential impact would be less than significant.

3.11.4 MITIGATION MEASURES

No mitigation is required for Impact 3.11-b (ground-borne vibration). Mitigation is provided below for Impact 3.11-a (short-term construction noise).

Mitigation Measure 3.11-a for Generation of Short-Term Construction Noise: 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 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 contractor shall employ noise-reducing construction practices such that noise from construction complies with applicable noise level rules, regulations, and ordinances that apply to the work. Measures that shall be used to limit noise may include, but shall not be limited to the following:

- (a) locate equipment as far as practical from noise sensitive uses;
- (b) use sound control devices, such as mufflers, on equipment;
- (c) use equipment that is quieter than standard equipment; and
- (d) use noise-reducing enclosures around noise-generating equipment.

The primary contractor shall prepare a detailed noise control plan based on the construction methods proposed. This plan shall identify specific measurements that will be taken to ensure compliance with the noise limited specified above. The noise control plan shall be submitted to and approved by SAFCA before any noise-generating construction activity begins.

If noise-generating activities are conducted within 300 feet of noise sensitive receptors, the primary contractor shall continuously measure and record sound generated as a result of the proposed work activities. Sound monitoring equipment shall be calibrated prior to taking measurements and shall have a resolution within 2 dB. Monitoring shall take place at each activity operation adjacent to sensitive receptors. The recorded noise monitoring results shall be furnished weekly to SAFCA.

Implementing these mitigation measures would reduce this impact, but may not reduce the impact to a less-than-significant level. This impact would therefore be significant and unavoidable.

3.12 RECREATION

This section describes the existing recreational setting of the project area, and analyzes the potential impacts of the proposed project on recreational resources. Effects of project construction on aesthetic resources are addressed in Section 3.13, “Visual Resources.”

3.12.1 REGULATORY SETTING

No federal or state plans, policies, regulations, or laws related to recreation are applicable to this analysis. The *Sutter County General Plan* (1996a) contains general policies that broadly promote the maintenance, improvement, and creation of park and open space recreational areas in the County.

3.12.2 ENVIRONMENTAL SETTING

The NCC is not considered a recreational resource. The channel width and depth do not accommodate water-based recreation. The levees along the north and south of the NCC are owned and maintained by Reclamation District (RD) 1001 and 1000, respectively. These levees are used by the public for passive recreational activities such as walking/jogging. No other recreational facilities are located at the project site.

The Sacramento River is a popular location for water-related recreation. Recreational boating is one of the primary uses of the Sacramento River in the project area. The closest boating facilities are located at nearby marinas, which are listed along with their locations and facilities in Table 3.12-1.

Table 3.12-1 Marinas in the Vicinity of the Project Site			
Marina	Location	Size	Facilities
Joe's Place	South of NCC at Sankey Road, along the Sacramento River (less than 1 mile southwest of project sites)	5 acres	Boat launch ramp, river docks, small RV campground, and restaurant
Rio Ramaza	Garden Highway north of Riego Road, along the Sacramento River (2+ miles southwest of project sites)	N/A	Boat launch ramp and river docks
Verona Marina	Garden Highway at Vernon Road, along the Sacramento River (about 1 mile northwest of project sites)	6.6 acres	Boat launch ramp, picnic area, and RV campground
Source: Sutter County 1996b			

Land-based activities such as camping, picnicking, hiking, and shoreline fishing also occur along the Sacramento River in the project area.

3.12.3 ENVIRONMENTAL IMPACTS

Recreation resources analyzed for this section include waterways and associated recreational resources potentially affected by the project. This evaluation is based on a general understanding of the uses and seasonality of use in the project area.

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 recreational resources 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; or
- ▶ include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment.

In addition, the proposed project was determined to result in a significant effect on recreational resources if it would:

- ▶ substantially reduce recreational opportunities.

The proposed project would be limited to the NCC, the RD 1001 borrow site, and land immediately adjacent. It would not substantially deteriorate any recreational facility along the Sacramento River levee and channel. The project would not involve recreational facilities or require the construction or expansion of recreational facilities. Therefore, the first and second significance thresholds listed above are not relevant to this analysis.

3.12.3.2 IMPACT ANALYSIS

IMPACT 3.12-a *Temporary Changes in Recreational Opportunities during Project Construction. Project construction could adversely affect recreation if boating is substantially restricted and/or construction noise substantially adversely affects the recreational experience of boaters. Although these temporary disturbances may affect the recreation experience for boaters, any such disturbance would be limited and can be relocated within the vicinity. For these reasons, this impact would be less than significant.*

Construction activities would take place at the project site on the existing RD 1000 levee along the south levee of the NCC and the RD 1001 borrow site. Typical heavy construction equipment would be used at the construction site, and a construction labor force of about 45 to 55 is expected to be present during an approximately 6-month construction period. Recreation along the Sacramento River 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.

Project construction would require temporary closure of Garden Highway for about 2 months while a section of the new cutoff wall is installed along the Sacramento River east levee. Garden Highway traffic would be detoured to West Catlett Road and Riego Road during this period. While closure of Garden Highway would be an inconvenience for recreationists, other travel routes would be made available and could be used to access recreational areas during the construction period.

During construction, a portion of the RD 1000 levee in the vicinity of the project site would be temporarily closed to public access; however, it is anticipated that recreationists could temporarily use other nearby levees for walking/jogging or other recreational facilities that provide similar recreational opportunities.

Construction noise may negatively affect the recreational setting, in turn negatively affecting the recreational experience and causing recreationists to avoid this area during loud construction periods. Construction noise impacts are discussed in Section 3.11, "Noise."

Although these disturbances may temporarily affect the recreation experience, recreationists could temporarily use alternate travel routes and/or other nearby marinas and facilities. For these reasons, this impact would be less than significant.

3.12.4 MITIGATION MEASURES

No mitigation is required.

3.13 VISUAL RESOURCES

This section focuses on visual resources that may be affected by the proposed project. Effects of project construction on recreational uses are addressed in Section 3.12, “Recreation.” Temporary effects of project construction on the noise environment are evaluated in Section 3.11, “Noise.” Section 3.7, “Cultural Resources,” addresses the designation of the project area as a Rural Historic Landscape District and the effects of the proposed project on elements contributing to that designation.

3.13.1 REGULATORY SETTING

No federal or state plans, policies, regulations, or laws related to visual resources are relevant to this analysis.

There are no *Sutter County General Plan* regulations that pertain specifically to visual resources in the Natomas area. The Visual Resources section of the Land Use Element of the *Sutter County General Plan* (Sutter County 1996) has as its general goal, “To preserve and protect the visual and scenic resources of the area.”

3.13.2 ENVIRONMENTAL SETTING

The levee area in Sutter County is rural and agricultural. Motorists on Garden Highway, Riego Road, Sankey Road, and Power Line Road are the main viewers of the Natomas area levees in this portion of Sutter County. The area between Power Line Road and the existing Sacramento River levee is rural/rural residential.

Views west and north toward the NCC and Sacramento River levees are typical of local rural areas, and consist mainly of scattered agricultural outbuildings along Sankey Road and Garden Highway, disturbed areas of ruderal vegetation bordering roadways, utility poles and overhead utility lines, and the existing levees. A few agricultural processing facilities are located in the area, and drainage canals and ponds can be found in the area. The area has little topographic variation. Approximately 25 feet high on average, the existing levee blocks views of the Sacramento River and the NCC from the east. Riparian vegetation west of the levee along the Sacramento River is visible from some areas east of the levee.

Views of the NCC levee from Sankey Road and Power Line Road and lands south and west of these roadways are neither striking nor distinctive. Because the elements of the landscape are a mixture of agricultural, agricultural industrial, and utility features, the intactness and unity of the views are low to moderate. Views from the north and east, therefore, are generally of low to moderate aesthetic value. The existing levee is a familiar, integral part of the visual setting to the majority of regular viewers, including area farmers, recreationists, and other motorists on Sankey Road, Power Line Road, and Garden Highway. Views from some parts of Power Line Road and the surrounding area include the levee as a background element, although in other areas, the riparian growth obscures views of the levee. Parts of the existing levee are visible in long-distance views across open agricultural land from some areas east of Power Line Road. However, the project site is generally not discernable from SR 70/99, which runs in a north-south direction approximately 2–3 miles to the east.

The right (west) Sacramento River levee obstructs views of the NCC levee area from rural Yolo County to the west. Most individuals viewing the levee area from the west are boaters and other recreationists along the Sacramento River near the mouth of the NCC, and individuals at the marina, restaurant, and store across Garden Highway from the project site. From the Sacramento River channel, views to the east are dominated by the river channel, intermittent mixed riparian woodland and scrub areas, and the existing left (east) Sacramento River levee, which blocks most views of the NCC. Many trees rise above the top of the levee, and views of the levee are screened by natural vegetation in many locations. Views of the NCC corridor are distinctive and moderately vivid, with the NCC channel and riparian areas forming striking and harmonious visual elements.

Recreationists are generally considered a sensitive viewer group, but because the number of recreationists in this area is low, the sensitivity of views is considered low. Overall, area views are of low to moderate aesthetic value.

The RD 1001 borrow site is located on a previously disturbed site that has been used in the past as a borrow site. The primary viewer group in this area consists of motorists along SR 70 and Pacific Avenue and agricultural workers in the area. Views of the site are of cultivated and fallow agricultural fields.

3.13.3 ENVIRONMENTAL IMPACTS

General methods for evaluating visual resource effects are described in Section 4.14, “Visual Resources,” of Volume I.

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 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 2003); therefore, the second significance threshold listed above is not relevant to this analysis.

3.13.3.2 IMPACT ANALYSIS

IMPACT	Changes in Scenic Vistas, Scenic Resources, and Existing Visual Character. <i>Project construction activities could temporarily reduce the aesthetic qualities of the project area by introducing earthmoving equipment and other construction equipment, materials, and work crews into views. However, all changes would be temporary while construction is ongoing, and most construction activities would be distant and/or shielded from most viewers. For these reasons, this impact would be less than significant.</i>
3.13-a	

Project construction activities would involve the construction of a 70–80 foot cutoff wall through the centerline of the south NCC levee along Reaches 1, 2, and 3. Typical heavy construction equipment would be used at the construction site, and a construction labor force of about 45 to 55 is expected to be present during an approximately 6-month construction period.

The presence and movement of heavy construction equipment and potential construction-related generation of dust could temporarily degrade the existing visual character and/or quality of the area. Most viewers of the construction site would be motorists along Garden Highway, Power Line Road, and Sankey Road; workers in nearby farming areas; occupants of residences in the vicinity of the project site; and recreationists at Verona Village Resort (660 feet southwest of the project site) and on the Sacramento River. Of these groups, recreationists and residents are considered the most sensitive to aesthetic qualities.

Recreationists’ views of the project construction site from the Sacramento River would be screened by Garden Highway, vegetation, and levees. Views of the project construction site from Garden Highway, Power Line Road, and Sankey Road would be brief. Agricultural workers would have longer-term views of the project construction site but are not considered a sensitive viewer group. Views from of the project construction site from residences would be largely screened by tall trees and other vegetation.

The RD 1001 borrow site is located on a previously disturbed site that has been used in the past as a borrow site. The primary viewer group in this area consists of motorists along SR 70 and Pacific Avenue and agricultural workers in the area; however, the site is screened from view by the levees of the East Side Canal. Views of the site during excavation activities associated with the project would generally not differ from current views of the site.

Following construction, the levee would be restored to its pre-construction height, all disturbed areas such as the batch plant site would be restored to pre-construction conditions, and the levee slopes, any previously vegetated areas disturbed during construction, and the RD 1001 borrow site would be seeded with a grass mix.

For the reasons listed above, including the temporary nature of this effect, the proposed project would not have a substantial adverse effect on a scenic vista or substantially degrade the existing visual character or quality of the site and its surroundings. This impact would be less than significant.

IMPACT *Changes in Light and Glare. Project implementation would not create a new source of substantial light or glare that would affect day or nighttime views in the vicinity of the individual project sites. This impact would be less than significant.*
3.13-b

Equipment staging areas may be temporarily lit for security reasons during the 6-month construction period, and portions of the project construction site may be lit if construction work needs to be conducted at night. However, views of the project construction site from nearby roadways and highways would generally be brief, and construction would be short-term and temporary. To the extent practical, all exterior lighting of construction activities would be located and directed so that it is concealed to the extent practicable when viewed from local roads and nearby residences. No new lighting would be installed at the project site for permanent use. For these reasons, this impact would be less than significant.

3.13.4 MITIGATION MEASURES

No mitigation is required.

3.14 UTILITIES AND SERVICE SYSTEMS

This section addresses the following public utilities and service systems: water and wastewater, drainage, electrical and natural gas, telephone and cable, and fire and police protection services. Utilities and public services issues include areas where construction activities related to the project would affect acceptable levels of service.

3.14.1 REGULATORY SETTING

No federal, state, or local plans, policies, regulations, or laws related to utilities and service systems are relevant to this analysis.

3.14.2 ENVIRONMENTAL SETTING

3.14.2.1 SERVICE PROVIDERS

There are no known utilities at the RD 1001 borrow site. The site has been used previously as a borrow source, and no utilities were encountered there.

Water Supply and Drainage

Irrigation water is provided in the Natomas portion of southern Sutter County 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 33,200 acres of land through pipelines, pumps, and more than 50 miles of canals. The NMWC service area is bordered on the west by the Sacramento River and stretches into Sutter County to the north (NMWC 2006).

Drainage systems for the project area are maintained by Reclamation District (RD) 1000. RD 1000 operates and maintains a drainage system consisting of 30 miles of main drainage canals, approximately 150 miles of drainage ditches, and seven main pumping stations. The drainage system collects stormwater and drainage and delivers them to the pumping plants for disposal in the Sacramento River, Natomas Cross Canal (NCC), and the Natomas East Main Drainage Canal (NEMDC) (RD 1000 2006). These drainages are also used for closed-loop agricultural drainage.

Reach 1 includes an irrigation ditch that conveys water from approximately Station 4+20 southwest along the top of an existing bench on the landside of the levee. An 18-inch corrugated metal pipe pump discharge line, owned and operated by Odysseus Farms, penetrates the south levee of the NCC at Station 4+20.

Reach 2 ends approximately 700 feet east of RD 1000's Pumping Plant No. 4 at the northern extent of this reach. A drainage canal, referred to as the Vestal Drain, runs parallel to the levee approximately 100 feet from the levee toe through most of Reach 2. In addition, the NMWC's Bennett Pumping Plant is located about midway through this reach at Station 58+75.

Reach 3 ends just west of NMWC's Northern Pumping Plant at the northern extent of this reach. An operating road and canal associated with the NBC Lucich North Habitat Preserve exists on the landside levee toe just south of RD 1000's easement line.

Wastewater

Because of the rural nature of the region, no sewer lines exist in the project area; local landowners and businesses rely on septic systems for wastewater disposal.

Electrical and Natural Gas Service

Pacific Gas and Electric Company (PG&E) provides electrical and natural gas services in Sutter County. PG&E standard overhead 12-kilovolt electrical distribution lines supported by wooden poles are located roughly parallel to the existing Sacramento River levee in the project area. Natural gas service is provided only to the urbanized areas of Yuba City and Live Oak, and to the community of Nicolaus; there are no natural gas transmission lines in the project area (Sutter County 1996a).

PG&E 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 off of the levee toe.

Telephone and Cable

SBC Communications provides telephone services and infrastructure through alternating aerial and underground telephone lines that parallel Garden Highway, and by underground lines that follow Sankey Road east from the intersection with Garden Highway. There are no telephone lines in the project area (Summers, pers. comm., 2004).

Comcast manages the cable television system in Sutter County. There are no cable television lines in the project area (Sutter County 1996a; Nonan, pers. comm., 2004); the nearest lines are located at El Centro Road (State Route 99/70).

Fire and Police Protection

The Sutter County Fire Department provides fire protection for the project area. The nearest fire station to the project area is the Pleasant Grove Fire Department (Sutter County 2006). The Sutter County Sheriff's Department provides police protection for the project area (Sutter County Sheriff 2006).

3.14.3 ENVIRONMENTAL IMPACTS

Effects on utilities and service systems were evaluated based on interviews with County Planning Department staff members, correspondence and conversations with various service providers, and maps showing the locations of existing utilities. Additional information about utilities in the project area is based on a review of the planning documents pertaining to the project area, including the *Sutter County General Plan 2015 Background Report* (Sutter County 1996a) and the *Sutter County General Plan 2015 Policy Document* (Sutter County 1996b).

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 related to utilities and service systems if 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 new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects;
- ▶ exceed water supplies available to serve the project from existing entitlements and resources, such that new or expanded entitlements would be needed;
- ▶ generate waste materials that would exceed the permitted capacity of local landfills; or

- ▶ result in substantial adverse physical impacts associated with the provision of new or physically 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 have the potential to affect a service provider's ability to continue to provide a level of service that meets established standards for the project area.

Implementation of the proposed project would involve addressing seepage and stability conditions in a portion of the NCC. There would be no change in land use. The project would therefore have no direct effect on long-term demand for public services, including fire and police protection, schools, parks, and other public facilities, that would necessitate the construction of new or altered government service facilities. Similarly, the 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. Temporary water supply for construction would be provided by local wells. 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, "Water Resources."

Section 3.9, "Transportation and Circulation," addresses the potential for the project to temporarily affect emergency response times and access during construction. The proposed project would not have an effect on emergency service performance objectives during construction such that additional services and new facilities would be required.

3.14.3.2 IMPACT ANALYSIS

IMPACT 3.14-a *Potential Damage of Utility Infrastructure and Disruption of Service during Construction. No natural gas transmission lines, aerial or underground telephone lines, or underground cable lines are located in the project area, and there would be no impacts on these facilities. Project construction would not require relocation of or modifications to PG&E overhead power lines in Reach 3 and is not expected to disrupt electrical service. This impact would be less than significant.*

No natural gas transmission lines, aerial or underground telephone lines, or underground cable lines are located in the project area; therefore, project construction would have no impact on these facilities. SAFCA has identified all existing water supply and drainage facilities in the project area, and it is unlikely that any unknown buried infrastructure elements would be identified during construction. No overhead power lines are located in Reaches 1 or 2. Reach 3 contains PG&E overhead electrical power distribution lines on wooden poles that extend parallel to the landside levee toe, approximately 30 feet from the levee toe. Project construction would not require relocation of or modifications to these lines. The potential for cutoff wall construction and associated activities to damage utility infrastructure or result in disruptions of service is very low. This impact would be less than significant.

IMPACT 3.14-b *Increases in Solid Waste Generation. Project construction would not generate construction waste materials that would exceed the capacity of local landfills. This impact would be less than significant.*

Project construction would generate approximately 21,000 cubic yards of excess spoil material, which would be hauled off-site to a suitable disposal location. 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. For purposes of this EIR analysis, it is assumed that Kiefer Landfill, owned and operated by Sacramento County, would be used. This assumption provides for a conservative estimate of hauling distance needed for off-site waste disposal.

Kiefer Landfill is located about 15 miles southeast of the City of Sacramento (approximately 40 miles southeast of the project site). With a constructed capacity through April 2009 and a permitted capacity through 2035, Kiefer

Landfill would be able to accommodate the project's construction disposal needs (Goodrich, pers. comm., 2006). Because project construction and operation would not cause this capacity to be exceeded, this impact would be less than significant.

3.14.4 MITIGATION MEASURES

No mitigation measures are required.

3.15 HAZARDS AND HAZARDOUS MATERIALS

This section provides an overview of potential sources of hazardous materials that may be present on or near the project site, and assesses potential impacts related to exposure of construction workers and the public to hazardous materials during project construction and operation. The hazardous materials analysis is based in part on a regulatory database search performed by Environmental Data Resources (EDR) in 2004.

3.15.1 REGULATORY SETTING

See Volume I, Section 4.16, “Hazards and Hazardous Materials,” for a discussion of the relevant federal and state regulatory setting.

Sutter County is responsible for enforcing the state regulations governing hazardous substance generators, hazardous substance storage, and underground storage tanks (USTs). The Environmental Health Services (EHS) Department of Sutter County regulates the use, storage, and disposal of hazardous substances 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 USTs, and is responsible for providing technical assistance to public and private entities that seek to minimize the generation of hazardous substances. Goals and policies for hazardous substance management have been developed by Sutter County.

Sutter County’s Emergency Services Program is responsible for planning, response, and recovery activities associated with natural and man-made emergencies and disasters throughout the county and coordination of those activities with local agencies, the State Office of Emergency Services, and the Federal Emergency Management Agency (FEMA). Sutter County has an adopted evacuation plan that is currently being updated. This plan specifies that the county’s major evacuation routes include Highways 113, 90, and 20 (DeBeaux, pers. comm., 2006).

3.15.2 ENVIRONMENTAL SETTING

3.15.2.1 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 (CFR) 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.

3.15.2.2 PHYSICAL SETTING

The project site is located in a rural setting and is primarily used for agricultural operations. Adjacent land uses in the project vicinity include a county roadway and Garden Highway; agricultural lands; and Verona Village Resort on the west side of Garden Highway. Verona Village Resort, which consists of a small campground on the Sacramento River, marina, and restaurant and store, is located approximately 660 feet southwest of the project site.

Sacramento International Airport is about 6 miles south of the project area. No schools are located in the vicinity of the project area. A private landing strip is located off of Riego Road approximately 2.5 miles south of the project site.

The RD 1001 borrow site is also located in a rural agricultural setting, northeast of the project site. Portions of the RD 1001 borrow site are currently used for agriculture, with other areas designated and used in the past for borrow.

3.15.2.3 RECORD SEARCHES

A hazardous materials records search was conducted by EDR in 2004 for a SAFCA planning study. The search parameters included the project site and areas within a 1-mile radius of the site. Because of the limited extent of the project site and the fact that it consists mainly of a levee, the results of the 2004 search were used for this study. The purpose of the search was to identify documented “recognized environmental conditions” (RECs) at and near the project site 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 at the project site. EDR searched a variety of federal and state databases, including the National Priorities List; the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLA); Resource Conservation and Recovery Act (RCRA) information; and the California Department of Toxic Substances Control’s (DTSC’s) Hazardous Waste & Substances Site (known as the “Cortese list”). According to the EDR database search, no known hazardous materials are present within the project site or immediately adjacent land. The search identified the presence of USTs located at a site within 1 mile of the project site. No violations or substance releases have been reported for these USTs, and this site is not expected to require removal or cleanup, or to otherwise affect the project (EDR 2004).

Because the RD 1001 borrow site is about 5 miles northeast of the project site, it is not covered in the search radius discussed above.

3.15.2.4 HAZARDOUS MATERIALS EMERGENCY RESPONSE

In Sutter County, the Sutter County Fire Department includes a Hazardous Materials Response Team with equipment and personnel trained to mitigate hazardous materials releases (Sutter County 2006).

3.15.2.5 WILDFIRES

In addition to hazardous materials, wildfires also 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, which 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 the primary service 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 the CDF’s Fire Resource Assessment Program, the majority of Sutter County and the project site is located in a “non flammable” zone for wildland fires (CDF 1998). No Very High Fire Hazard Severity Zones are located in or near Sutter County (California Resources Agency 2003). In addition, Sutter County is not in a State Responsibility Area (CDF 1998).

3.15.3 ENVIRONMENTAL IMPACTS

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 impact related to hazards materials 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 one-quarter 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 or in the vicinity of a private airstrip;
- ▶ 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.

The project site is not identified on government-maintained lists of hazardous materials sites, located within ¼ mile of an existing or proposed school, or located within an airport land use plan or within 2 miles of a public or private airport. The project site is located in a “non flammable” zone for wildland fires. Further, the project would not impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan because it would not interfere with the county’s major evacuation routes (Highways 113, 90, and 20) (DeBeaux, pers. comm., 2006). Therefore, these issues are not addressed further.

3.15.3.2 IMPACT ANALYSIS

IMPACT 3.15-a	<i>Potential Creation of a Public Health or Environmental Hazard Through the Presence or Use of Hazardous Materials during Construction. Project construction would involve the storage, use, and transport of hazardous materials at the project site during construction activities. Compliance with federal, state, and local hazardous materials regulations would ensure the appropriate use, transport, and storage of hazardous materials during construction. However, hazardous materials may be present at the RD 1001 borrow site and may result in the potential creation of a public health or environmental hazard. Therefore, this potential impact would be significant.</i>
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Potentially hazardous materials (e.g., fuel, lubricants, and paint) that are commonly used during construction activities would be used in varying amounts during project construction. Construction activities would use hazardous materials, such as fuels (gasoline and diesel); oils and lubricants; slurry; and cleaners, which could include solvents and corrosives in addition to soaps and detergents. Construction workers or the environment

could be exposed to hazards and hazardous materials as a result of improper handling or use during construction activities (particularly by untrained personnel) or transportation accidents.

Transportation of hazardous materials on area roadways is regulated by the California Highway Patrol (CHP) and the California Department of Transportation (Caltrans), and use of these materials is regulated by the DTSC, as outlined in Title 22 of the California Code of Regulations (CCR).

Construction contractors would be required to use, store, and transport hazardous materials in compliance with local, state, and federal regulations during project construction. Specifically, construction contractors would be required to comply with Cal/EPA's Unified Program; regulated activities would be managed by the Sutter County EHS, the designated Certified Unified Program Agency for Sutter County in accordance with the regulations included in the Unified Program (e.g., hazardous materials release response plans and inventories, California Uniform Fire Code [UFC] hazardous material management plans and inventories). Off-site activities would also be required to comply with these regulations. Such compliance would reduce the potential for accidental release of hazardous materials during construction of the proposed project. As a result, it would lessen the risk of exposure of construction workers to accidental release of hazardous materials, as well as the demand for incident emergency response.

Because project construction would involve the implementation and compliance with federal, state, and local hazardous materials regulations and codes, impacts related to the creation of a public health hazard through the routine transport, use, and disposal of potentially hazardous materials would be unlikely with project development.

Previously unknown hazardous materials could be present at the RD 1001 borrow site. Excavation and construction activities 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.

3.15.4 MITIGATION MEASURES

Mitigation Measure 3.15-a for Potential Creation of a Public Health or Environmental Hazard Through the Presence or Use of Hazardous Materials during Construction: Prepare a Worker Health and Safety Plan and Implement Appropriate Measures to Minimize Potential Exposure to 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 measures (i.e., stained or odorous soil), construction activities shall immediately cease in the area of the find. A qualified hazardous materials specialist shall assess the project site and collect and analyze soil samples, if needed, from the construction site. If contaminants are identified in the samples, the implementing agency or its primary construction contractor shall implement measures in accordance with federal and state regulations prior to the commencement of construction activities.

A worker health and safety plan shall be prepared before the start of construction activities that identifies, 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.

4 OTHER CEQA-REQUIRED SECTIONS

4.1 CUMULATIVE IMPACTS

The project's contribution to cumulative impacts is included in the description of cumulative impacts of SAFCA's overall program of improvements described in Volume I, Chapter 5, "Cumulative Impacts." SAFCA's funding of comprehensive flood control improvements for Sacramento through the proposed funding mechanisms would contribute to significant cumulative effects on the following resources, as described in Volume I: agriculture and land use, cultural resources, transportation and circulation (in the Folsom Dam and Reservoir area), air quality, and visual resources. Implementation of the proposed NCC Phase 1 Improvements would not alter the levee footprint or the overall appearance of the project site and therefore would not involve conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to nonagricultural uses or substantial effects on scenic resources. The proposed NCC Phase 1 Improvements would contribute only to significant cumulative effects on cultural resources and air quality, as summarized below.

4.1.1 CULTURAL RESOURCES

As described in Section 3.7, "Cultural Resources," in Volume I, 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 SAFCA's proposed funding mechanisms. If these resources would meet the definition of unique archaeological resources or historical resources as defined 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. Implementation of the proposed NCC Phase 1 Improvements could contribute to this significant cumulative impact because previously unknown cultural resources of archaeological or historical significance could be present in areas that would be subject to construction disturbance and could be damaged by construction.

4.1.2 AIR QUALITY

SAFCA's proposed program would result in significant and unavoidable construction-related air quality impacts associated with generation of NO_x and PM₁₀, even with implementation of mitigation measures identified in Section 4.11, "Air Quality," of Volume I. Other medium-sized and large projects, such as the anticipated developments in the Natomas area, would similarly contribute substantially to air quality impacts. Given the large scale of development that is expected in Natomas alone, as well as the nonattainment status of the Sacramento Valley Air Basin for ozone and PM₁₀, cumulative construction-related air quality impacts are expected to be significant and unavoidable. SAFCA's proposed funding mechanisms would make a cumulatively considerable contribution to this significant and unavoidable cumulative air quality impact.

Implementation of the proposed NCC Phase 1 Improvements would contribute to this significant cumulative impact because maximum daily emissions of ROG, NO_x, and PM₁₀ associated with project construction would exceed the Feather River Air Quality Management District's (FRAQMD's) recommended significance thresholds and contribute to existing nonattainment conditions for ozone and PM₁₀ in the Northern Sacramento Valley Air Basin. Implementing the FRAQMD measures is expected to achieve substantial reductions in air pollutants; nevertheless, the resulting maximum average daily emissions, shown in Table 3.10-3, would exceed the significance thresholds.

4.2 GROWTH-INDUCING EFFECTS

The proposed project, in itself, would not be growth-inducing because it consists of strengthening an existing levee. It would involve construction activities, which would be anticipated to rely on a local workforce, and would not involve the construction of any new housing. As a component of SAFCA's overall program of improvements, the project would accommodate planned regional growth in a manner that would be consistent with emerging "smart growth" principles, but is not growth inducing itself. See the description of growth-inducing effects in Volume I, Section 6.1, "Growth-Inducing Effects."

4.3 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. Section 4.1, "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):

- ▶ Damage to or Destruction of Previously Undiscovered Cultural Resources (direct and cumulative)
- ▶ Temporary Emissions of ROG, NO_x, and PM₁₀ during Construction (direct and cumulative)
- ▶ Generation of Short-Term Construction Noise (direct)

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.

4.4 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; 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.

5 ALTERNATIVES

5.1 ALTERNATIVES DEVELOPMENT

5.1.1 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.

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]). A no-project alternative that assumes continuation of the existing land uses and no levee improvement is analyzed in this DEIR.

In addition to the proposed project, this EIR analyzes a Seepage/Stability Berm Alternative and a No-Project Alternative.

5.1.2 ALTERNATIVES SCREENING

5.1.2.1 PROJECT OBJECTIVES

The overall objective of the proposed Natomas Cross Canal South Levee Phase 1 Improvements (NCC Phase 1 Improvements) is to improve a strategic reach of the Natomas levee system, the westernmost portion of the Natomas Cross Canal (NCC) south levee, to reduce the risk of flooding in a significant portion of the Sacramento metropolitan area (Sacramento area). The specific project objectives are to:

- ▶ address through-seepage and underseepage potential in the westernmost 12,500 feet of the NCC, and
- ▶ initiate the first phase of the improvements in 2007, before the start of the next flood season.

The need for the project and the project objectives are based on the evidence of through-seepage and underseepage conditions in this levee segment.

5.1.2.2 ALTERNATIVES EVALUATED

Potential alternatives for addressing through-seepage and underseepage include cutoff walls, seepage berms, stability berms, combined seepage/stability berms, and relief wells. These methods are summarized below, and

their applicability to NCC Reaches 1, 2, and 3 is described based on results of the preliminary geotechnical analysis prepared by Kleinfelder on behalf of SAFCA (Kleinfelder 2006).

Cutoff Walls

Cutoff walls reduce levee through-seepage and 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. Cutoff walls are installed to depths sufficient to minimize seepage both through the levee and beneath it. The depths for cutoff walls necessary to limit underseepage at the design water surface elevation to the maximum gradients specified by the U.S. Army Corps of Engineers (USACE) would be determined by geotechnical analysis. Cutoff walls for underseepage are generally placed to depths that will tie in with existing impervious or lower permeability soil layers beneath the levee foundation.

Cutoff walls can be constructed at either the levee centerline or the levee waterside toe. For either method, the available working area generally must be about 30 feet wide. 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. The top of the levee must then be reconstructed using suitable material.

Existing levee excavation and reconstruction quantities are higher with a waterside cutoff wall than with centerline installation; however, the square footage of cutoff wall is lower. Construction on the water side of the levee may require the removal of sensitive plant species or vegetation that contributes to wildlife or fish habitat or entails work below the ordinary high-water mark (OHWM) of the waterway, which would require additional permitting. That permitting process would be expected to extend the timeframe of the project approval process, which could delay the start of construction.

A review of each of the three project reaches was performed to determine their suitability for a waterside cutoff wall. To meet the project objective of constructing the proposed improvements in 2007, it was considered necessary for each reach of the levee to have a bench above the ordinary high-water mark that is relatively free of large oak trees and other plant species with habitat value for native species. A visual survey of the project site was conducted, and none of the project reaches was observed to meet these criteria. While a bench of limited width is present on the water side of the existing levee, enlarging this bench would require cutting away the waterside levee slope above the level of the bench and reconstructing the waterside of the levee following cutoff wall construction. This would require removing the existing riparian vegetation. A waterside cutoff wall was, therefore rejected as infeasible, because of increased environmental impacts, additional time needed to conduct environmental permitting, and increased cost. SCB cutoff walls through the levee crown were determined to be a feasible seepage remediation method for all three project reaches.

Seepage and Stability 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 levees to acceptable levels. There are various types of seepage berms, including impervious, semipervious, sand, and free-draining seepage berms. SAFCA's preferred configuration is a hybrid type, which uses soil mass over a drain rock layer encapsulated in filter fabric to control the exit gradient of seepage through material underlying the levee. Seepage berms typically extend from 80 to 300 feet from the levee. The berm thickness depends on the severity of the seepage pressure, but generally berms are 5 feet thick near the landside toe and taper to a thickness of 3 feet at the prescribed distance from the toe. A seepage collection ditch is generally required at the toe of the berm. All three reaches are susceptible to underseepage. Seepage berms alone were determined to be a feasible seepage remediation method for Reaches 2 and 3. However, Reach 1 would require additional remediation for through-seepage.

Stability berms are narrower bench fill structures constructed on the landside slope of the levee to buttress the slope and enhance slope stability, particularly where seepage is a concern. Stability berms typically are less than 50 feet wide. The size and shape of a stability berm is determined according to the stabilizing mass required to achieve an adequate factor of safety against slope instability. A layer of drain rock under the stability berm and extending up the levee slope may be included to collect and drain levee through-seepage. Stability berms would be an option on the NCC only where through-seepage (and not underseepage) is of concern and a stability berm is not already present. All three reaches of the project site have been determined to be susceptible to underseepage; therefore, stability berms alone are not considered to be an option for any of the project reaches.

In Reach 1, where both underseepage and through-seepage conditions exist, a combined seepage/stability berm is considered a feasible alternative. The stability berm portion of the embankment would contain the internal rock drain system, which would intercept seepage through the levee and transport it to the landside toe of the seepage berm.

Relief Wells

Relief wells provide protection against levee underseepage by providing a path 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 constructed near the levee landside toe to provide pressure relief beneath surficial fine-grained soils (clay or silt “blanket”). Relief wells are an option only in reaches where continuous sand and gravel layers have been identified by the geotechnical analysis. The preliminary geotechnical analysis found that foundation conditions in Reaches 1, 2, and 3 are not suitable for the use of relief wells. Therefore, this remediation method was eliminated from detailed analysis.

5.2 ALTERNATIVES CARRIED FORWARD FOR EVALUATION IN THE EIR

The proposed project, which consists of a 70 to 80-foot cutoff wall through the levee crown in Reaches 1, 2 and 3, is described in detail in Chapter 2, “Project Description.”

The following project alternatives are evaluated in Sections 5.2.1 and 5.2.2, below:

- ▶ Seepage/Stability Berm Alternative—a combined seepage/stability berm in Reach 1 and a seepage berm in Reaches 2 and 3.
- ▶ No-Project Alternative—no levee improvements would occur.

5.2.1 SEEPAGE/STABILITY BERM ALTERNATIVE

5.2.1.1 GENERAL CHARACTERISTICS

Under this alternative, a combined stability/seepage berm would be constructed in Reach 1, and a seepage berm would be constructed in Reaches 2 and 3. The berm width would vary by reach because of differences in the conditions of the underlying soils in these reaches: approximately 80 to 100 feet in Reach 1, 200 to 300 feet in Reach 2, and 100 feet in Reach 3. Additionally, relocation of an existing ditch and canal would be required in Reaches 1 and 2. Because of the proximity of the ditch to the levee in Reach 1 and the proximity of the Vestal Drain to the levee in Reach 2, these features would need to be relocated outside the berm footprint as a part of the project. These characteristics are presented in Table 5-1 and described in more detail by reach below.

Reach 1 encompasses a relatively short area between existing stability berms constructed at the Sacramento River and NCC levees. The new combined seepage/stability berm would overlap the adjacent berm on the Sacramento River by 200 feet. The berm in Reach 1 would extend 80 to 100 feet from the toe of the levee, into land usually planted with rice. The existing bench and irrigation ditch through this area are at an elevation lower than the

required top of the stability berm and, therefore, would need to be relocated to accommodate the new combined seepage/stability berm. The irrigation ditch, which is currently along the landside levee slope, would be reconstructed on top of the new stability berm at a higher elevation.

In **Reach 2**, a 300-foot-wide seepage berm would be constructed, necessitating the relocation of the Vestal Drain and the farm/maintenance road on its south embankment. The berm and canal/road relocation would extend into property to the south that typically is used for growing rice and into a small portion of the NBC-managed Lucich North Habitat Preserve. An unlined swale would be used south of the new berm to collect seepage. Pipes at approximately 300-foot intervals along the length of the reach would direct the drainage from the swale to the Vestal Drain. The existing Vestal Drain is approximately 7.5 feet deep on average (measured from field grade), with a bottom width of 8 feet and 2H:1V side slopes. The farm/maintenance road is 16 feet wide and 2–3 feet above field grade. The new canal would be constructed to the same dimensions as the existing canal, but with 3H:1V side slopes, and the farm/maintenance road would be reconstructed to its present configuration. An inverted siphon for the NMWC Bennett Pumping Plant outfall would need to be constructed to convey irrigation water beneath the new Vestal Drain. Similarly, a new outfall into the RD 1000 North Drainage Canal to the east would also be required. At locations where a stability berm does not currently exist at the existing levee, one would need to be constructed.

In **Reach 3**, the seepage berm would extend 100 feet from the landside levee toe. Approximately 125 feet of land exists between the levee toe and the RD 1000 easement line. An operating road and canal associated with the NBC Lucich North Habitat Preserve exists just south of this easement line. Coordination with Pacific Gas and Electric Company (PG&E) would be required for placing fill around existing power poles that are approximately 30 feet from the levee toe through this reach. The existing clearance to the wires would also be diminished by approximately 3 feet and will likely require raising of the conductors. The NMWC Northern Pumping Plant located at the northern extent of Reach 3 would not be modified as part of this alternative.

Table 5-1 Seepage/Stability Berm Alternative Characteristics			
NCC Reach	Proposed Treatment	Proposed Width	Ditch/Canal Relocation
Reach 1 (Stations 0+00 to 5+70)	Combined stability/seepage berm	80 to 100 feet	Yes (Ditch)
Reach 2 (Stations 5+70 to 105+00)	Seepage berm	300 feet	Yes (Canal)
Reach 3 (Stations 105+00 to 123+00)	Seepage berm	100 feet	No
Source: Wood Rogers 2006			

5.2.2.2 GENERAL CONSTRUCTION PLAN

Construction of the new berm would occur over a 6-month period. The anticipated construction labor force would consist of 55–65 people. The following sections describe the construction activities for this alternative. As under the proposed project, approximately 1 acre would be needed to store construction equipment and other vehicles during the construction period. It is assumed that the entire area along the landside levee toe between the levee and canal could be used for construction staging needs.

Clearing and Grubbing/Stripping. Scrapers and graders would be used to clear and grub/strip the surface of the levee landside slope of the levee, the area along the levee toe, and the area of the berm footprint to a depth of at least 6 inches to remove low-growing vegetation, loose stone, and surface soils. An inspection trench would likely be required along Reach 1, where a stability berm would be constructed. Waste material would be hauled to an off-site location (see “Demobilization/Cleanup” below).

Berm Construction. A combined stability/seepage berm would be constructed in Reach 1 and a seepage berm would be constructed in Reaches 2 and 3, with widths varying as shown in Table 5-1. The material for berm construction would be hauled from the borrow site(s) and would be placed and compacted as received. Large quantities of drain rock, filter fabric, and other supplies would be delivered from off-site and placed over the foundation at the base of the berm, and the drain rock would be compacted using smooth drum rollers. A backhoe would be used to install culverts through the farm/maintenance road along the Vestal Drain for channeling seepage berm drainage into the drain.

Vestal Drain Relocation. Scrapers would be used to excavate a new drainage channel equal in base width to the existing channel, but with 3:1 side slopes. The material would be used to fill the old channel. The volume generated by excavating a new channel is approximately equal to the volume required to fill the old channel when a shrinkage factor is applied. Sheepsfoot rollers would be used to compact the material into the old channel, and excavators would be used to final grade the new channel side slopes. This activity would occur concurrent with berm construction.

Finish Grading. Finish grading of the levee top, levee side slopes, and berms to their final grades would be accomplished using motor graders.

Demobilization/Cleanup. Following completion of construction activities, the berms would be hydroseeded with a grass mixture and any previously vegetated areas disturbed during construction, such as construction staging areas, would be seeded with grasses to a distance of at least 5 feet beyond those areas disturbed by construction activities. This phase would also entail general cleanup and off-site hauling of unused and waste materials for disposal in an authorized landfill. All construction equipment would be loaded onto trailers and taken off-site.

5.2.2.3 CONSTRUCTION EQUIPMENT AND MATERIAL SOURCES

Table 5-2 lists the construction equipment anticipated to be needed during the construction period.

Table 5-2		
Estimated Construction Equipment Requirements for the Seepage/Stability Berm Alternative		
Construction Phase	Number of Each Equipment Type	Duration of Use
Clearing and grubbing/stripping	3 scrapers	22 days
	2 water trucks	22 days
	1 front-end loader	22 days
	2 haul trucks (15 cubic yards)	22 days
Berm construction	3 front-end loaders	100 days
	3 bulldozers	100 days
	4 vibratory sheepsfoot rollers	100 days
	2 vibratory smooth drum rollers	100 days
	2 water trucks	100 days
	35 haul trucks (15 cubic yards)	100 days
	1 backhoe	25 days
Vestal Drain relocation (concurrent with berm construction)	4 elevating scrapers	60 days
	2 excavators	60 days
	2 sheepsfoot rollers	60 days
	1 motor grader	5 days
Borrow site excavation (concurrent with berm construction)	5 excavators	100 days
	1 water truck	100 days
Finish grading	2 motor graders	10 days
	2 water trucks	10 days
Demobilization/cleanup	1 water truck	10 days
	1 hydroseeding truck	10 days
	2 haul trucks (15 cubic yards)	10 days
Source: Kors, pers. comm., 2006		

The soil material needed for berm construction would be obtained from one or more borrow sites. It is anticipated that construction of this alternative would require approximately 625,000 cubic yards of imported borrow material.

5.2.2.4 ABILITY TO MEET PROJECT OBJECTIVES

The Seepage/Stability Berm Alternative would meet the project objective of addressing through-seepage and underseepage potential in the westernmost 12,500 feet of the NCC. However, environmental permitting requirements associated with relocation of the ditch and portion of the Vestal Drain along Reach 1 and Reach 2, respectively, and with filling of a seasonal wetland in Reach 3 would likely make it infeasible to meet the objectives of initiating the first phase of improvements in 2007, before the start of the next flood season.

5.2.2 NO-PROJECT ALTERNATIVE

The No-Project Alternative assumes that existing conditions at the project site would remain. No new flood control improvements would be constructed. Under this alternative, RD 1001 would continue to operate and maintain its existing facilities for flood control given physical limitations of the existing infrastructure and consistent with environmental regulations and permit conditions. In the near term, there would be no substantive or predictable operational changes implemented under the No-Project Alternative.

The No-Project Alternative would not meet either of the project objectives.

Consistent with CEQA requirements, the No-Project Alternative is evaluated in this EIR. The No-Project Alternative would not meet any of the project objectives because implementation of flood control improvements would not occur.

5.3 COMPARISON OF THE ENVIRONMENTAL EFFECTS OF THE ALTERNATIVES

5.3.1 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 through 3.15 for detailed descriptions of potential effects of the proposed project.

5.3.2 ENVIRONMENTAL EFFECTS OF THE SEEPAGE/STABILITY BERM ALTERNATIVE

Agriculture and Land Use: Although a seepage/stability berm would encroach on agricultural land, a substantial portion of seepage berms can be farmed. Construction of a seepage/stability berm would encroach onto about 58 acres of Prime Farmland and about 13 acres of Farmland of Statewide Importance. Of that total, about 10 to 15 acres would be converted to nonagricultural uses. Additional Important Farmland may also be converted from agricultural use for relocation of existing ditches and canals. *[Greater]*

Geology and Soils: The risk of construction-related erosion impacts to proposed levee improvements under this alternative would be the same as that 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 that described for the proposed project. The same levee improvements to prevent streambank erosion would be implemented under both the proposed project and this alternative; therefore, the beneficial impact to long-term streambank erosion under this alternative would be the same as that described for the proposed project. *[Similar]*

Water Resources: Potential water quality and hydrologic impacts would be similar to those described for the proposed project; however, the potential for disruption of local drainage patterns exists with the construction of a seepage/stability berm, which would require the moving of existing landside toe trenches. An irrigation ditch in Reach 1 is located within the project site. The Vestal Drain runs parallel to the existing levee throughout most of Reach 2. Interruption of drainage patterns could cause or exacerbate local flooding. *[Greater]*

Fisheries and Aquatic Resources: Construction of this alternative could result in increases in sediments, turbidity, and contaminants, which could adversely affect fish habitats immediately adjacent to and downstream of project construction activities. This impact would be similar to that described for the proposed project, except that the areas of construction disturbance with the potential to contribute sediments to fish habitat would be reduced with construction of an earthen berm on the land side of the existing levee. Similar to the proposed project, no riparian habitat is located on the surface of the south NCC levee at the project site, and no losses of riparian vegetation are anticipated during the construction of an earthen berm. *[Similar]*

Terrestrial Biological Resources: This alternative would have more extensive adverse effects to terrestrial biological resources than the proposed project. This would include more extensive effects to some species, as well as effects to species that would otherwise be unaffected under the proposed project. For example, the proposed project may temporarily disturb suitable upland habitat for giant garter snake, while the Seepage/Stability Berm Alternative would also affect aquatic habitat for giant garter snake, including fill and replacement of existing ditches/canals and conversion of rice land. Fill of ditches could also affect additional species, including special-status plants and western pond turtle. Construction of this alternative would also require fill of the large seasonal wetland on the land side of the NCC levee and could infringe upon required buffers around The Natomas Basin Conservancy (TNBC) mitigation lands. *[Greater]*

Cultural Resources: Impacts would be similar to those described for the proposed project because the project site is nearly the same and the same borrow site would be used. *[Similar]*

Paleontological Resources: Construction activities associated with berm construction would involve forming levees or berms on top of the existing ground surface. These activities would not cause adverse impacts on resources because Pleistocene-age fossils would not be encountered until approximately 6 feet below ground surface. However, excavation of borrow site soils and excavation of the new canal under this alternative has the potential to adversely affect unknown subsurface paleontological resources, similar to the proposed project. *[Similar]*

Transportation and Circulation: Construction of this alternative would generate more construction worker commute and truck traffic, compared to the proposed project, because of the increased number of construction workers and amount of borrow materials needed for this alternative. Impacts related to potential traffic hazards and conflicts with emergency response services would be similar to the proposed project. *[Greater]*

Air Quality: Compared to the proposed project, this alternative would result in greater intensity of construction activities, material handling, generation of construction traffic, and area disturbed anticipated under this alternative. As a result, construction-generated emissions would be higher, and would exceed the Feather River Air Quality Management District's significance thresholds for ozone precursors (i.e., reactive organic gases [ROG] and oxides of nitrogen [NO_x]) and respirable particulate matter (PM₁₀), as would the proposed project. Long-term emissions impacts and exposure of sensitive receptors to toxic air emissions would be the same as described under the proposed project. *[Greater]*

Noise: Impacts would be similar to those described for the proposed project because the construction processes would be very similar, with similar types and quantities of equipment required, the same construction duration, and with the same distance from sensitive receptors. *[Similar]*

Recreation: Impacts would be essentially the same as those described for the proposed project. During construction of this alternative, however, Garden Highway would remain operational. A temporary lane closure

may be necessary during placement of a K-rail barrier along the edge of the pavement to separate the roadway from the construction area. While this lane closure would be an inconvenience for recreationists and could possibly slow traffic along Garden Highway, other travel routes would be available and could be used to access recreational areas during the construction period, which would be short term. *[Similar]*

Visual Resources: Impacts would be essentially the same as those described for the proposed project. This alternative would involve the construction of an 80- to 300-foot wide seepage/stability berm on the landside of the existing levee. The new berm would be similar in appearance to the existing levee and berm. Following construction, all disturbed areas would be restored to pre-construction conditions, and the levee slopes and any previously vegetated areas disturbed during construction would be seeded with a grass mix. This alternative would not substantially alter scenic vistas or scenic resources or degrade the existing visual character of the area. *[Similar]*

Utilities and Service Systems: Impacts related to potential damage of utility infrastructure and disruption of service during construction would be similar to the proposed project because of the minimal amount of infrastructure in the project area and, thus, potential for damage and service disruption, except that NCC Reach 3 includes overhead power lines that could be damaged during construction of this alternative. Construction of the seepage berm would require placing fill around existing power poles in Reach 3. The existing clearance to the wires would also be diminished by approximately 3 feet and will likely require raising of the conductors; however, SAFCA would coordinate with PG&E and comply with its requirements regarding modification of overhead power lines and raising of conductors. Any service disruptions would be short term and temporary. *[Similar]*

Construction of this alternative would require relocation of existing ditches and canals in Reaches 1 and 2. The relocation of existing ditches and canals and any construction of new discharge pipelines or modifications of existing pipelines that pass through the levee would be required to meet USACE and Reclamation Board criteria. Therefore, the potential for accidental damage to utility infrastructure during construction is remote, and any service disruptions would be short term and temporary until repairs are completed. No facilities in Reach 3 would be modified or relocated. *[Similar]*

Hazards and Hazardous Materials: Impacts would be similar to those described for the proposed project; however, because the borrow source is unknown, it is unknown whether potentially hazardous materials are present at the potential borrow sites. This could result in the potential exposure of construction workers and the general public to hazardous materials if hazardous materials are unexpectedly found to be present at the potential borrow sites. *[Similar]*

Although this alternative would partially meet the project objectives, it would not reduce any of the significant impacts of the proposed project.

5.3.3 ENVIRONMENTAL EFFECTS OF THE NO-PROJECT ALTERNATIVE

Agriculture and Land Use: This alternative would not result in conflicts with any land use plan or policy or result in the conversion of agricultural land to nonagricultural uses. The No-Project Alternative would have no effect on agriculture and land use. *[NA]*

Geology and Soils: This alternative would have no impact associated with geological hazards or soil erosion. All of the geotechnical hazards described in Section 3.3.2, “Environmental Setting,” would remain as under existing conditions. The No-Project Alternative would not create any conditions to increase those hazards or reduce the risks to people, structures, or the environment. *[NA]*

Water Resources: The No-Project Alternative would have no water quality impacts associated with construction runoff, dewatering operations, slurry wall material, or borrow material. There would be no effects on groundwater

levels resulting from slurry wall cutoffs, disruption of local drainage systems by seepage or stability berms, or other hydrologic impacts. However, because the proposed project and Seepage/Stability Berm Alternative would provide more reliable levees less subject to seepage and failure than those currently existing, the No-Project Alternative would result in no beneficial changes in local flood protection. [NA]

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. Implementation of the No-Project Alternative would not affect fisheries or aquatic resources. [NA]

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. [NA]

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. [NA]

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. [NA]

Transportation and Circulation: Because no additional vehicle trips would be generated, this alternative would not result in any adverse environmental effects with respect to transportation and circulation. [NA]

Air Quality: The No-Project Alternative would have no impact associated with air pollutant or odorous emissions. Other projects would likely result in cumulative increases in air quality and odorous emissions in the project area associated with increased traffic and development, but the No-Project Alternative would make no contribution to these emissions. [NA]

Noise: Under the No-Action 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 ground-borne vibration or noise. [NA]

Recreation: Implementation of 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. [NA]

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 would not create any additional source of light or glare. The No-Project Alternative would have no effect on visual resources. [NA]

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 effect on utilities and service systems. [NA]

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. [NA]

5.3.4 COMPARISON OF THE ALTERNATIVES

Table 5-3 summarizes the potential environmental effects of the project alternatives.

Table 5-3 Comparison of the Environmental Effects of the Alternatives			
Environmental Issues	Proposed Project	Seepage/Stability Berm Alternative	No-Project Alternative
Agriculture and Land Use	LTS	Greater	NA
Geology and Soils	LTS	Similar	NA
Water Resources	LTS	Greater	NA
Fisheries and Aquatic Resources	LTS	Similar	NA
Terrestrial Biological Resources	LTS	Greater	NA
Cultural Resources	SU	Similar	NA
Paleontological Resources	LTS	Similar	NA
Transportation and Circulation	LTS	Greater	NA
Air Quality	SU	Greater	NA
Noise	SU	Similar	NA
Recreation	LTS	Similar	NA
Visual Resources	LTS	Similar	NA
Utilities and Service Systems	LTS	Similar	NA
Hazards and Hazardous Materials	LTS	Similar	NA
Totals			
Greater Impacts		5	NA
Lesser Impacts		0	NA
* 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 = Not applicable or no impact			

5.4 ENVIRONMENTALLY SUPERIOR ALTERNATIVE

The State CEQA Guidelines require identification of an environmentally superior alternative. If the No-Project Alternative is environmentally superior, CEQA requires selection of the “environmentally superior alternative other than the no-project alternative” from among the project and the alternatives evaluated (CEQA Guidelines Section 15126.6[e][2]).

Many of the potential impacts associated with the Seepage/Stability Berm Alternative would be comparable to the impacts of the proposed project because the alternative would involve a similar construction duration and similar equipment. However, this alternative would have greater impacts on agriculture and land use, water resources, terrestrial biological resources, transportation and circulation, and air quality due to the larger project footprint, fill and replacement of ditches/canals, and increased amount of borrow needed. Further, this alternative would not reduce or eliminate the project’s significant and unavoidable impacts. For these reasons, the proposed project is the environmentally superior alternative for purposes of CEQA Guidelines Section 15126.6(e)(2).

6 REFERENCES

CHAPTER 1, INTRODUCTION

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APPENDIX A

Air Quality Modeling Analyses

NCC South Levee Phase 1 Improvements - Proposed Cutoff Wall																		
	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	Unit	
Clearing, Grubbing, Stripping					2667.0	yd3					10.0	59.3	592.7	59.3	10.0	days		
Mobile Sources												*(assumes haul load = 45 yd3)						
Haul Truck(s)	0.84	9.30	0.29	g/mile	2.0		2.2	24.3	0.7	lb/yr						0.002204623	lb/gram	
Off-Highway Truck(s)	3.60	15.74	0.81	lb/day	1.0		36.0	157.4	8.1	lb/yr								
Scraper(s)	3.64	17.45	0.93	lb/day	3.0		109.3	523.6	27.8	lb/yr								
Loader(s)	0.92	7.67	0.41	lb/day	1.0		9.2	76.7	4.1	lb/yr								
Employee Trips	0.29	0.61	0.04	g/mile	55.0	employees	13.9	29.5	1.8	lb/yr				40.0	per employee	0.002204623	lb/gram	
Fugitive Sources																		
Travel on unpaved roads	-	-	1.38	lb/VMT	2.0	trucks	-	-	820.3	lb/yr								
Travel on paved roads			1.16	lb/VMT	2.0	trucks			688.0	lb/yr								
Material Handling											Tons/yr	Tons/day						
Truck Loading at Borrow	-	-	0.04	lb/ton					135.3	lb/yr	1.25	333.38						
Truck Unloading at Levee	-	-	0.005	lb/ton			-	-	17.5	lb/yr	1.25	333.38						
Total							170.6	811.5	1703.6	lb/yr							2000 lb/ton	
Levee Degrading					0.0	yd3					10.0	0.0	0.0	0.0	30.0	days		
Mobile Sources												*(assumes haul load = 45 yd3)						
Bulldozer(s)	3.62	23.73	1.21	lb/day	1.0		108.5	711.9	36.3	lb/yr								
Off-Highway Truck(s)	3.60	15.74	0.81	lb/day	1.0		108.1	472.2	24.3	lb/yr								
Scraper(s)	3.64	17.45	0.93	lb/day	2.0		218.5	1047.1	55.5	lb/yr								
Loader(s)	0.92	7.67	0.41	lb/day	1.0		27.6	230.1	12.2	lb/yr								
Employee Trips	0.29	0.61	0.04	g/mile	55.0	employees	41.6	88.5	5.5	lb/yr				40.0	per employee	0.002204623	lb/gram	
Fugitive Sources																		
Travel on unpaved roads	-	-	1.38	lb/VMT	2.0	trucks	-	-	-	lb/yr								
Travel on paved roads			1.16	lb/VMT	2.0	trucks			-	lb/yr								
Material Handling											Tons/yr	Tons/day						
Truck Loading at Borrow	-	-	0.04	lb/ton					0.0	lb/yr	1.25	0.00						
Truck Unloading at Levee	-	-	0.005	lb/ton			-	-	0.0	lb/yr	1.25	0.00						
Bulldozing	-	-	0.41	lb/hr	8.0	hrs/day			98.57	lb/yr								
Total							504.3	2549.9	232.4	lb/yr							2000 lb/ton	
Cutoff Wall Construction					42708.0	yd3					10.0	949.1	9490.7	118.6	80.0	days		
Mobile Sources												*(assumes haul load = 45 yd3)						
Excavator(s)	1.84	7.76	0.41	lb/day	4.0		588.9	2481.9	130.4	lb/yr								
Off-Highway Truck(s)	3.60	15.74	0.81	lb/day	1.0		288.2	1259.3	64.8	lb/yr								
Other Equipment	2.08	10.44	0.57	lb/day	5.0		832.2	4177.9	228.9	lb/yr								
Loader(s)	0.92	7.67	0.41	lb/day	3.0		221.1	1841.1	97.5	lb/yr								
Haul Truck(s)	0.84	9.30	0.29	g/mile	20.0		352.8	3890.5	119.7	lb/yr						0.002204623	lb/gram	
Employee Trips	0.29	0.61	0.04	g/mile	55.0	employees	111.0	235.9	14.7	lb/yr				40.0	per employee	0.002204623	lb/gram	
Fugitive Sources																		
Travel on unpaved roads	-	-	1.38	lb/VMT	2.0	trucks	-	-	13,136.2	lb/yr								
Travel on paved roads			1.16	lb/VMT	2.0	trucks			11,016.7	lb/yr								
Material Handling											Tons/yr	Tons/day						
Truck Loading at Borrow	-	-	0.04	lb/ton					2166.9	lb/yr	1.25	667.31						
Truck Unloading at Levee	-	-	0.005	lb/ton			-	-	280.3	lb/yr	1.25	667.31						
Total							2394.2	13886.6	27256.1	lb/yr							2000 lb/ton	
Levee Crown Reconstruction and Finishing Grading/Borrow Site Excavation					145250.0	yd3					10.0	3227.8	32277.8	1075.9	30.0	days		
Mobile Sources												*(assumes haul load = 45 yd3)						
Roller(s)	0.59	4.89	0.26	lb/day	4.0		70.4	586.6	31.1	lb/yr								
Bulldozer(s)	3.62	23.73	1.21	lb/day	2.0		216.9	1423.9	72.5	lb/yr								
Loader(s)	0.92	7.67	0.41	lb/day	3.0		82.9	690.4	36.6	lb/yr								
Haul Truck(s)	0.84	9.30	0.29	g/mile	13.0		779.8	8600.5	264.6	lb/yr						0.002204623	lb/gram	
Grader(s)	1.20	10.42	0.56	lb/day	2.0		71.9	625.1	33.4	lb/yr								
Employee Trips	0.29	0.61	0.04	g/mile	55.0	employees	41.6	88.5	5.5	lb/yr				40.0	per employee	0.002204623	lb/gram	
Fugitive Sources																		
Travel on unpaved roads	-	-	1.38	lb/VMT	13.0	trucks	-	-	290,394.8	lb/yr								
Travel on paved roads			1.16	lb/VMT	13.0	trucks			243,539.9	lb/yr								
Material Handling											Tons/yr	Tons/day						
Truck Loading at Borrow	-	-	0.04	lb/ton					7369.6	lb/yr	1.25	6052.08						
Truck Unloading at Levee	-	-	0.005	lb/ton			-	-	953.2	lb/yr	1.25	6052.08						
Bulldozing	-	-	0.41	lb/hr	8.0	hrs/day			98.57	lb/yr								
Total							1263.7	12014.9	542701.2	lb/yr							2000 lb/ton	
Demobilization and Cleanup					0.0	yd3					10.0	0.0	0.0	0.0	10.0	days		
Mobile Sources												*(assumes haul load = 45 yd3)						
Off-Highway Truck(s)	3.60	15.74	0.81	lb/day	3.0		108.1	472.2	24.3	lb/yr								
Haul Truck(s)	0.84	9.30	0.29	g/mile	2.0		0.4	4.1	0.1	lb/yr						0.002204623	lb/gram	
Employee Trips	0.29	0.61	0.04	g/mile	55.0	employees	13.9	29.5	1.8	lb/yr				40.0	per employee	0.002204623	lb/gram	
Fugitive Sources																		
Travel on unpaved roads	-	-	1.38	lb/VMT	13.0	trucks	-	-	1,799.3	lb/yr								
Material Handling											Tons/yr	Tons/day						
Truck Loading at Borrow	-	-	0.04	lb/ton					0.0	lb/yr	1.25	0.00						
Truck Unloading at Levee	-	-	0.005	lb/ton			-	-	0.0	lb/yr	1.25	0.00						
Total							122.3	505.8	1825.6	lb/yr							2000 lb/ton	
Total from Proposed Cutoff Wall							34	226	4346	lb/day	*assumes 132 days of construction (some phases will overlap slightly)							
*Emissions would be greater from Alternative 2 due to greater intensity of construction, area disturbed, and borrow brought in from offsite																		
Mobile Equipment							32.2	222.2	9.7	lb/day								
Employee Trips							1.7	3.6	0.2	lb/day								
Fugitive Dust									4,397.9	lb/day	*Includes average daily disturbance of 1 acre in addition to sources above							
Mitigated							32.062872	180.41631	1,104.80									

Equipment Type	Emission Rates for Year 2007			Unit	Assumptions: Emission factors from the Road Construction Emissions Model, Version 4.1 (SMAQMD 2002) for 2008 which assume equipment operates 1hr/day									
	ROG	NOX	PM10											
Employee Light-Duty Trucks	0.29	0.61	0.04	g/mile										
Haul Trucks	0.84	9.30	0.29	g/mile										
Backhoes	0.68	4.84	0.40	lb/day										
Bore/Drill Rigs	2.87	7.57	0.43	lb/day										
Concrete/Industrial Saws	1.13	8.01	0.66	lb/day										
Cranes	1.44	6.94	0.38	lb/day										
Crawler Tractors	1.12	11.05	0.58	lb/day										
Crushing/Proc. Equipment	1.64	16.13	0.85	lb/day										
Doser	3.62	23.73	1.21	lb/day										
Excavator	1.84	7.76	0.41	lb/day										
Forklifts, Rough Terrain	0.78	4.93	0.39	lb/day										
Grader	1.20	10.42	0.56	lb/day										
Loaders, Rubber Tired	0.92	7.67	0.41	lb/day										
Off-Highway Trucks	3.60	15.74	0.81	lb/day										
Other Construction Equip.	2.08	10.44	0.57	lb/day										
Pavers	0.93	7.74	0.41	lb/day										
Paving Equipment	0.80	7.88	0.41	lb/day										
Rollers	0.59	4.89	0.26	lb/day										
Scraper	3.64	17.45	0.93	lb/day										
Signal Boards	0.65	2.40	0.23	lb/day										
Skid Steer Loaders	0.56	3.30	0.21	lb/day										
Surfacing Equipment	3.72	24.43	1.24	lb/day										
Tractors	1.84	12.68	0.67	lb/day										
Trenchers	0.99	6.18	0.47	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):														
$E(\text{lbs/VMT})=(k)(s/12)^a (W/3)^b$					*AP-42 12/03, 13.2.2-4 eq 1a									
Where:					PM10									
k =Particle Size Multiplier:					1.5									
s =Silt Content:					4.3									
					*AP-42 12/03 Table 13.2.2-2; PM10 emissions; industrial roads									
empirical constants														
a					0.9									
b					0.45									
W =Vehicle Weight:					29,125									
					(1.25 T/cy)*45 cy truck capacity + 2)/2 (average weight of loaded and unloaded haul truck; assumed empty truck weighs 2 tons)									
					1.66									
					lbs/VMT									
$E(\text{ext})= E[(365-P)/365]$					*AP-42 12/03 12.2.2-4 eq 2									
Where:														
P =# days/yr with >=0.01 in. precip					60									
					*AP-42 12/03 Figure 13.2.2-1 for Tulare Co.									
					1.38									
					lbs/VMT									
Travel on Paved Haul Roads (Heavy Duty Trucks):														
$E(\text{lbs/VMT})=(k)(SL/2)^{0.65} (W/3)^{1.5} - C$					*AP-42 12/03, 13.2.1-4 eq 1									
Where:					PM10									
k =Particle Size Multiplier (lb/VMT)					0.016									
SL =road surface silt loading (g/m ²)					8.2									
W =Vehicle Weight:					29,125									
C =exhaust, break, tire wear (lb/VMT)					0.00047									
					(1.25 T/cy)*45 cy truck capacity + 2)/2 (average weight of loaded and unloaded haul truck; assumed empty truck weighs 2 tons)									
					*AP-42 12/03 Table 13.2.1-2; PM10 emissions									
					1.21									
					lbs/VMT									
$E(\text{ext})= E[1-(P/4N)]$					*AP-42 12/03 13.2.1 eq 2									
Where:														
P =# days/yr with >=0.01 in. precip					60									
N =number of days in averaging period					365									
					1.16									
					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).														
$E(\text{lb/ton})=(k)(U/5)^{1.3} (M/2)^{1.4}$					*AP-42 12/03, 13.2.4-3 eq 1									
Where:					PM10									
k =Particle Size Multiplier:					0.35									
U =mean wind speed (mph)					4									
M =moisture content (%)					2.4									
					*AP-42 7/98 Table 11.9-3, haul truck									
					0.20									
					lbs/ton									
Batch Loading at Borrow Area														
$E(\text{TSP}<15 \text{ um})=(.119)(M^{0.9})$					*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									
$E(\text{TSP}<10 \text{ um})=(E(\text{TSP}<15 \text{ um})*S)$					*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 at New Dam														
$E(\text{TSP}<15 \text{ um})$					PM10									
Where:					0.007									
					lb/ton									
					*AP-42 7/98 Table 11.9-4, end dump truck unloading (batch drop)									
$E(\text{TSP}<10 \text{ um})=(E(\text{TSP}<15 \text{ um})*S)$					*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														
$E(\text{TSP}<15 \text{ um})=(18.6(s)^{1.5})(M^{1.4})$					*AP-42 7/98, Table 11.9-1									
Where:														
M =moisture content (%)					7.9									
s =silt content (%)					6.9									
					*AP-42 7/98 Table 11.9-3, bulldozer									
					18.67									
					lb/hr									
$E(\text{TSP}<10 \text{ um})=(E(\text{TSP}<15 \text{ um})*S)$					*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									
$E(\text{TSP}<15 \text{ um})$					0.04									
					lb/ton									
					*AP-42 7/98 Table 11.9-4, scraper unloading									
$E(\text{TSP}<10 \text{ um})=(E(\text{TSP}<15 \text{ um})*S)$					*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									