

# **APPENDIX I**

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Alternatives Formulation and Screening Details

# APPENDIX I

## ALTERNATIVES FORMULATION AND SCREENING DETAILS

This appendix contains more detailed information on the alternatives evaluation process summarized in Chapter 2.0, “Alternatives,” of the FEIS

### 1.1 INTRODUCTION

This appendix describes the alternatives that were considered to provide additional flood risk reduction to the Natomas Basin consistent with the project objectives in Chapter 1.0, “Introduction and Statement of Purpose and Need” in this FEIS. The Phase 3 Project builds upon the analyses in the Local Funding EIR, the Phase 2 EIR and Supplemental EIR, and the Phase 2 EIS. Three alternatives for the Sacramento River east levee were evaluated at an equal level of detail in this FEIS:

- ▶ No-Action Alternative,
- ▶ Proposed Action (Adjacent Setback Levee), and
- ▶ Levee Raise-in-Place Alternative.

Although they provide contrasting advantages and disadvantages, each of the alternatives is considered feasible based on relevant economic, environmental, social, technological, and legal factors. Each of the action alternatives (i.e., the alternatives other than “No-Action”) under consideration was formulated to feasibly accomplish the basic objectives of the project as discussed in Chapter 1.0, “Introduction and Statement of Purpose and Need,” of this FEIS. In particular, the action alternatives both would achieve early compliance to meet requirements for certification of FEMA 100-year flood protection criteria and are compatible with construction of additional components to meet “200-year” flood protection criteria for urban areas.

The NLIP design criteria in terms of maximum water surface elevation and maximum flow at key locations on the Natomas Basin perimeter levee system are identified in **Table I-1** below.

<b>Table I-1 NLIP Design Criteria: Water Surface Elevation and Maximum Flow</b>				
Location	1% (100-year) FEMA Criteria Flood <sup>1</sup>		0.5% (“200-year”) NLIP Design Criteria Flood <sup>2</sup>	
	Maximum Water Surface Elevation (feet) NAVD88	Maximum Flow (cfs)	Maximum Water Surface Elevation (feet) NAVD88	Maximum Flow (cfs)
Sacramento River at Verona	43.40	117,000	44.85	143,000
Latitude of Verona	NA	528,000	NA	622,000
NCC at PGCC	43.73	NA <sup>3</sup>	45.24	NA <sup>3</sup>
NEMDC near Main Avenue	38.98	14,500	40.89	17,100

Notes: NAVD88 = North American Vertical Datum of 1988; cfs = cubic feet per second; NCC = Natomas Cross Canal; PGCC = Pleasant Grove Creek Canal; NEMDC = Natomas East Main Drainage Canal

<sup>1</sup> Levees overtop without failing; existing levees; existing Folsom Dam.

<sup>2</sup> Levees overtop without failing; “200-year” urban levees; Folsom Joint Federal Project.

<sup>3</sup> Maximum water surface elevation controlled by high tailwater in Sacramento River.

Source: Data provided by MBK Engineers in 2009

The action alternatives include components that could avoid or substantially lessen one or more of the significant effects. In addition, because the combination of components themselves could cause differing levels of significant

effects, the alternatives include criteria for combining components to substantially lessen the impacts from construction of the alternatives.

## **1.1.1 NEPA/CEQA REQUIREMENTS FOR EVALUATION OF ALTERNATIVES**

### **1.1.1.1 NEPA REQUIREMENTS**

The NEPA Council on Environmental Quality Regulations (40 CFR 15012.14) for EIS requirements are briefly described in Chapter 1.0, “Introduction and Statement of Purpose and Need,” of this FEIS.

### **1.1.1.2 CEQA REQUIREMENTS**

The CEQA requirements for an EIR (as noted in California Code of Regulations [CCR] Section 15126.6[a] of the State CEQA Guidelines) are briefly described in Chapter 1.0, “Introduction and Statement of Purpose and Need,” of this FEIS.

## **2.1 ALTERNATIVES FORMULATION**

SAFCA, in coordination with USACE, formulated the Proposed Action and a reasonable range of project alternatives that would achieve the specific project objectives through the following steps:

- ▶ identification of the deficiencies in the Natomas levee system that must be addressed to provide at least 100-year flood protection as quickly as possible;
- ▶ identification of the deficiencies in the Natomas levee system that must be addressed to provide “200-year” flood protection;
- ▶ identification of feasible remedial measures to address the deficiencies;
- ▶ determination of the likely environmental impacts of the remedial measures;
- ▶ development of a reasonable range of flood damage reduction alternatives for implementing the remedial measures; and
- ▶ identification of measures to ensure that each alternative would improve aviation safety, minimize impacts on significant cultural resource sites, and enhance habitat values.

Alternatives screening for the overall NLIP has been undertaken by SAFCA in a systematic manner through several environmental documents as described later in this appendix. A description of the flood protection measures that SAFCA considered for developing alternatives is provided below.

### **2.1.1 TYPES OF FLOOD PROTECTION MEASURES CONSIDERED**

Designing effective flood risk reduction measures is an iterative process that involves identifying, evaluating, and comparing measures and preliminary alternatives to develop a reasonable range of final alternative plans for consideration by decision makers and the general public. For the NLIP Landside Improvements Project, engineering measures were developed and considered that alone or in various combinations would address the project objectives.

The engineering measures that were considered for the Phase 3 Project must meet several criteria. First, the design selected must adequately improve performance of the levee so that certification is possible. Generally, the requirements are to provide enough levee raise so that the levee height is adequate, levee stability meets criteria,

and/or seepage through or beneath the levee is reduced to acceptable levels. Measures considered are described below.

### **2.1.1.1 LEVEE RAISE**

A levee raise is not required in all parts of the Basin. In parts of the Basin, the levee raise is necessary only to meet the “200-year” protection standard required by the State for urbanized areas, such as the Natomas Basin. However, all new levee certifications by the USACE require the removal of vegetation with stems or trunks greater than 2 inches in diameter that is on the slope of the levee, as well as slopes that are stable against failure. This vegetation requirement facilitates visual inspection of the levee to its toes, which is very important to determine the performance of the levee under flood conditions. It also provides a higher level of protection for levee stability, especially due to erosion of its banks.

For the Phase 3 Project, two engineering design methods to meet flood protection criteria compatible with the engineering design selected for the Phase 3 Project are available: 1) raising the existing levees in their current alignments (levee raise-in-place), and 2) constructing a new higher levee adjacent to the existing levee (new adjacent levee).

#### **Levee Raise-in-Place**

To raise a levee in place, the existing levee footprint would be widened at its base, on one or both sides, so that it remains stable and supports the weight of the additional material placed on top. In addition, the levee may need to be widened to ensure that the sides are not too steep, and to ensure that the crown width is adequate for continued use, particularly where roadways are located on top of the levee, and that the levee meets the minimum design topwidth standards. This engineering design is commonly referred to as the levee raise-in-place alternative. While the levee footprint (its base) size would not be substantially altered, the requirement to remove vegetation on the levee slopes, would likely require mitigation for loss of riparian habitat. Where the widening occurs below the ordinary high water mark on the water side of the levee, the mitigation requirement would likely include construction of replacement wetlands. Where the widening occurs on the land side and trees that provide habitat or are otherwise protected exist, the mitigation requirement would be to plant replacement woodlands. In some instances, irrigation and drainage ditches and canals exist at the toe of the levee, and would need to be relocated further to the landside.

#### **New Adjacent Levee**

For the Proposed Action, the concept of an adjacent levee is that the levee prism would be shifted landward, such that the concerns with vegetation on the water side slope is no longer as great. This design reduces the impact of vegetation removal on the water side, but requires obtaining additional suitable earthen embankment material to build the adjacent levee structure. The irrigation and drainage ditches and canals that exist at the toe of the levee would need to be relocated further to the landside. The widened levee footprint would also require the acquisition of additional easements and right of way, including right of way for utilities along the alignment, as well as planting replacement woodlands. Proper construction of the adjacent levee foundation requires excavation of an inspection trench beneath the adjacent levee embankment area. If a levee raise is required, the adjacent levee height would be greater than that of the existing levee. If a levee raise is not required, the adjacent levee height would be the same as the existing levee.

The landside toe of the existing levee, within the footprint of the new adjacent levee, would be stripped to a depth of approximately one foot to remove vegetative matter and topsoil material from the adjacent levee foundation.

### **2.1.1.2 SEEPAGE REMEDIATION**

Pre-NLIP existing seepage remediation designed and constructed in the perimeter levees of the Natomas Basin has primarily addressed through-seepage. Through-seepage is the movement of water through the levee itself, when high-flow conditions, and/or wind and wave action exist on the water side of the levee. Along the lower portion of the Sacramento River east levee (downstream of Powerline Road), the through-seepage was addressed by construction of a cutoff wall through the levee prism. This feature provides a low permeability barrier to water flow through the levee. In the upper portion of the Sacramento River east levee and along the Natomas Cross Canal south levee, drained and undrained stability berms were constructed. Underseepage occurs below the levee prism, and is caused by the buildup of water pressure in the subsurface levee foundations when high flows are present on the water side of the levees. This pressure can be great enough to force water through the earth. The water finds a pathway of less resistance and exits at the surface. Excessive underseepage gradients can be corrected through the use of cutoff walls, seepage berms, and relief wells, which are discussed below. Current construction methods can correct underseepage and be compatible with the underseepage improvement methods employed for Phase 3 Project construction.

#### **Cutoff Walls**

Cutoff walls use specialized earthen materials (often bentonite clay) that are mined and processed to provide the required engineering properties. The cutoff walls are typically installed into the center of the levee embankment. Successful construction of cutoff walls requires a 24 hours per day/7 days a week (24/7) construction schedule so that the cutoff wall material keeps its proper consistency and that it can be completed prior to flood season (see Section 2.3.7.1, “24/7 Construction of Cutoff Walls,” in this FEIS). Specialized equipment allows the cutoff walls to reach deep into the subsurface foundation layers, sometimes to depths of almost 100 feet below the ground surface. Often the levee crown is “degraded” to allow for construction, meaning that the top of the levee is excavated to create a wider working platform, so that the excavation equipment can operate to install the cutoff wall. Of the three seepage remediation methods, fully penetrating cutoff walls are generally preferred because they are the least costly (particularly if a soil-bentonite mix is feasible and the depth of wall is less than 85 feet); are the most reliable under uncertain hydraulic and geotechnical conditions (e.g., water surface elevations above design and variations in foundation soil conditions); and, when combined with an adjacent levee, minimize construction disturbance outside the levee footprint.

An inspection trench, usually 6-feet deep and 12-feet wide at the base with 1H:1V side slopes, is constructed at the base of the levee to allow visible inspection of the levee foundation area. In some instances, relocation of irrigation and drainage ditches and canals may be necessary to construct the levee improvements.

Due to the long history of natural and human-enhanced levee buildup in the Natomas Basin, it is not unusual to find conditions of underseepage to depths greater than the maximum feasible construction depth of a cutoff wall. In those cases, a seepage berm and/or relief wells may be used to protect against underseepage.

#### **Seepage Berms**

Seepage berms are wide, shallow features with relatively flat slopes graded to drain landward. They are constructed by using earthen material excavated from borrow sites. In some cases, a 1- to 1.5-foot-thick drainage layer consisting of sand or drainrock encapsulated in geotextile fabric is placed on the ground below the seepage berm. Seepage berms may extend up to 500 feet landside of the toe of the levee or the adjacent levee. In areas of limited space, the seepage berms are constructed with relief wells at the landside toe of the seepage berms.

Constructing seepage berms rather than cutoff walls avoids the deep ground-disturbing work that may adversely affect cultural resources that may be present, while still achieving flood damage reduction objectives. It is possible to construct a seepage berm using specialized equipment that minimizes vibration and pressure on the immediate subsurface environment. This construction method is often used where sensitive historical features

may be expected near the ground surface, and relief wells are omitted. A seepage berm without relief wells extends the levee footprint farther landside, and depending upon land use, may cause relocation of permanent structures or reduction of farm field size, as well as other environmental impacts.

## Relief Wells

Relief wells are controlled artificial springs that relieve the confined water pressures to safe values. This reduces the potential for the removal of soil via piping or internal erosion caused by the uplift pressures beneath elements of the levee or beneath landward soil next to the levee. Relief wells are usually spaced about 50 to 150 feet apart to allow water to flow without pumping during times of high water table. Piezometers are used as a tool to verify relief well performance by measuring the hydrostatic pressure between the wells. Because relief wells may only flow on an intermittent basis sometimes several years apart, it is necessary to conduct regular maintenance of relief wells to ensure that they perform properly.

### 2.1.1.3 BANK EROSION

Bank erosion poses either a high or moderate risk to the stability of the Sacramento River east levee at several locations upstream and downstream of Interstate 5 (I-5) where river flows and waves generated by boat wakes have weakened and undercut portions of the bank supporting the levee. The adjacent levee design would address the potential instability created by these bank erosion processes by enlarging the levee section and moving the levee foundation landward away from the eroding bank. These bank erosion processes could also be addressed by installing rock rivetments or other engineered structures along the eroding banks so as to reduce further erosion and protect the foundation of the levee (as proposed for the Levee Raise-in-Place Alternative).

## 3.1 ALTERNATIVES CONSIDERED, BUT ELIMINATED FROM FURTHER CONSIDERATION

Numerous alternatives have been considered by USACE and SAFCA to provide increased flood risk reduction to the Natomas Basin. Many alternatives have been evaluated and eliminated from further consideration as part of preparing the following previous environmental documents:

- ▶ *Environmental Impact Report on Local Funding Mechanisms for Comprehensive Flood Control Improvements for the Sacramento Area*, State Clearinghouse No. 2006072098(SAFCA 2007a) (Local Funding EIR);
- ▶ *Environmental Impact Report on the Natomas Levee Improvement Program, Landside Improvements Project*, State Clearinghouse No. 2007062016 (SAFCA 2007b) (Phase 2 EIR); and
- ▶ *Environmental Impact Statement for 408 Permission and 404 Permit to Sacramento Area Flood Control Agency for the Natomas Levee Improvement Project* (USACE 2008) (Phase 2 EIS).

The alternatives analyses from these documents are hereby incorporated by reference. Relevant portions of these documents, where specifically noted, are summarized throughout this FEIS. Printed copies of these documents are available to the public at SAFCA's office at 1007 7<sup>th</sup> Street, 7<sup>th</sup> Floor, Sacramento, California, during normal business hours, and are also available on SAFCA's Web site, at [http://www.safca.org/Programs\\_Natomas.html](http://www.safca.org/Programs_Natomas.html).

The following alternatives were reviewed and eliminated from further consideration in the Local Funding EIR, the Phase 2 EIR, and/or the Phase 2 EIS:

- ▶ **Yolo Bypass Improvements**—This measure would involve lengthening the Fremont Weir and widening the Yolo Bypass to increase the amount of flood water conveyed through the bypass and reduce the amount of flood water conveyed through the Sacramento River channel downstream of the weir. This alternative was

eliminated because (1) it would be too costly for SAFCA to implement; (2) even following implementation of this alternative, some levee height increases and substantial seepage, underseepage, and slope stability remediation would still be required for the perimeter levee system requiring, adding to the costs of the bypass alternative; (3) the bypass improvements would lie outside of SAFCA's jurisdiction and would require Federal, state, and local cooperation and funding; and (4) the project objective of restoring 100-year flood protection to the Natomas Basin could not be achieved as quickly as possible using the Proposed Action. (Considered and eliminated in Phase 2 EIS.)

- ▶ **Reduced Natomas Urban Levee Perimeter**—This alternative would involve construction of a cross levee running east to west across the Natomas Basin along an alignment north of Elkhorn Boulevard to protect existing developed areas in the City and County of Sacramento. This alternative was eliminated because (1) it is inconsistent with current Federal and state authorizations and would strand Federal, state, and local investments already made in improving the Natomas Cross Canal (NCC) south levee and Sacramento River east levee pursuant to past Congressional authorization; (2) it would result in the need to raise State Route (SR) 99/70 or otherwise protect SR 99/70 from flooding; (3) it would divide Reclamation District (RD) 1000 and disrupt several portions of the Natomas Basin irrigation and drainage system and require reconfiguration of these systems; (4) it would present significant barriers to achieving the goals of the Natomas Basin Habitat Conservation Plan (NBHCP); (5) it would have substantially greater costs than other alternatives without achieving any additional flood damage reduction benefit; (6) it would not protect existing residential, commercial and industrial development in the Sutter County portion of the Basin north of the cross levee; and (7) it would leave a portion of the Basin currently planned for development by Sutter County (i.e., *Sutter Pointe Specific Plan* mixed-use development project) outside the urban levee perimeter and likely cause Sutter County to exercise its rights under SAFCA's joint exercise of powers agreement to prevent the expenditure of Consolidated Capital Assessment District funds on this measure. (Considered and eliminated in Local Funding EIR and Phase 2 EIS.)
  
- ▶ **Construction of a New Setback Levee**—This alternative would involve construction of a 5-mile long levee along the northern reaches of the Sacramento River east levee parallel to the existing levee alignment but set back from the existing alignment by 500–1,000 feet. This alternative was eliminated as infeasible because (1) the presence of waterside residences along the existing levee from the southern end of Reach 2 of the Sacramento River east levee (north of Riego Road) in the north to the American River north levee in the south, and the need to maintain access to these residences from Garden Highway; (2) the proximity of the Sacramento River east levee to the Airport, and the need to prevent project features from increasing potential hazards to aviation safety; and (3) the possibility that utility relocations (power poles) and flood damage reduction measures could encroach into surface slopes of runway approach zones. (Considered and eliminated in Phase 2 EIR and Phase 2 EIS.)

Two additional alternatives were considered for the Phase 3 Project, but eliminated from further consideration. These alternatives, as well as the rationale for eliminating them from further consideration, are described in the following subsections.

### **3.1.1 NO-ACTION ALTERNATIVE—AIRPORT COMPARTMENT LEVEE**

The Phase 2 EIS evaluated and eliminated from further consideration the No-Action Alternative—Airport Compartment Levee Alternative. The prior discussion of which is hereby incorporated by reference, is summarized as follows.

With no authorization for the Phase 3 Project, which is part of the overall NLIP, SAFCA would not provide the Natomas Basin with at least a 100-year level of flood protection by the end of 2010 and would not be able to facilitate achieving a “200-year” level of protection by the end of 2012. Federal and state floodplain regulations would effectively prevent new development in most of the Natomas Basin. The Airport would either be compelled to operate within its existing footprint, abandoning its current plans for expansion and modernization,

or, alternatively, the Airport may construct its own limited flood damage reduction structure (i.e., a ring levee) to protect existing facilities and its expansion area. As of December 31, 2007, the leases for rice production on fields north of the Airport expired and were not renewed; hence, rice production has been discontinued on these fields to reduce wildlife hazards to aviation safety. These leases will not be renewed.

**Table I-2** summarizes the impacts identified in the Phase 2 EIS associated with implementation of the Airport Compartment Levee. The Phase 2 EIS concluded that significant impacts could occur. However, because there are no detailed design plans for this alternative, it is not possible to accurately determine exactly what environmental impacts could occur, therefore, one could also conclude that the potential impacts are too speculative for meaningful consideration.

<b>Table I-2 Summary of Impacts: No-Action Alternative—Airport Compartment Levee</b>	
Issue Area	Impacts
Agricultural Resources	A substantial conversion of Important Farmland to nonagricultural uses would likely occur in the footprint of the flood protection features, given that the Airport is surrounded by agricultural land, much of which is Important Farmland. However, the amount of such conversion is uncertain because no concept plan for an Airport flood damage reduction system has been developed, and the footprint size and location are unknown. This impact could be significant.
Topography, Geology, and Soils	Construction-related activities would result in localized soil erosion effects. This impact would be significant.
Hydrology and Hydraulics	The Basin’s existing residential, commercial, and industrial structures and their contents would continue to remain subject to a relatively high risk of flooding. Substantial alteration of local drainage systems around the Airport and of drainage patterns would result. This impact would be significant unless a substantial redesign of local drainage systems were included in the design of the Airport flood protection system.
Water Quality	Construction-related activities would result in adverse effects to water quality. Construction activity would involve ground disturbance and the potential for contaminants to enter local waterways either from direct spills, or from stormwater runoff. These impacts could be significant.
Fisheries	Construction-related activities would result in adverse effects on water quality in agricultural canals. These effects could, in turn, result in localized water quality degradation in receiving water bodies (e.g., the Sacramento River) and affect habitats and the physical health of individual fish and species populations in those water bodies. This impact could be significant.
Sensitive Aquatic Habitats	Construction of a compartment levee would require the fill of portions of several agricultural canals in the Airport vicinity, which may be jurisdictional waters of the United States. This impact would be significant. Because there is no conceptual design for a compartment levee, the amount of fill of potentially jurisdictional waters cannot be estimated.
Vegetation and Wildlife	Numerous elements of the irrigation and drainage system in the west-central portion of the Natomas Basin would likely be severed and would need to be rerouted with construction of a compartment levee. Ditches and canals in the basin serve as critical corridors for movement of aquatic species, and this movement could be significantly disrupted by construction of an Airport flood protection system.
Special Status Terrestrial Species	The compartment levee, as well as construction-related activities would likely affect habitat for some special-status plants in ditches and canals. A concept plan for such a flood protection system has not been developed, therefore, the likelihood and extent of such an impact is not predictable and cannot be estimated. The construction footprint might include areas where elderberry shrubs are present and would have to be relocated. The compartment levee would likely cross several irrigation and/or drainage canals in the west-central portion of the Natomas Basin that may provide habitat for giant garter snake, adversely affecting the habitat and potentially resulting in take of individual snakes. This impact would be significant.

**Table I-2  
Summary of Impacts: No-Action Alternative—Airport Compartment Levee**

Issue Area	Impacts
Cultural Resources	The compartment levee would significantly alter elements of RD 1000. It is possible that historic-era resources of significance could be encountered during construction. Known prehistoric site CA-Sac-16/H south of the Airport would likely be adversely affected. Construction-related activities could encounter previously undiscovered cultural resources and potentially encounter human remains. These impacts would be significant.
Paleontological Resources	Construction-related activities could damage unique paleontological resources. This impact could be significant.
Transportation and Circulation	Construction-related activities could cause temporary traffic delays, temporarily increase emergency service response times, and interfere with emergency service access. These impacts would be significant.
Air Quality	Construction-related activities would result in the temporary and short-term generation of ROG, NO <sub>x</sub> , and PM <sub>10</sub> emissions. Construction-related activities would likely result in the temporary, short-term generation of diesel exhaust emissions. These impacts would be significant.
Noise	Construction-related activities would generate temporary and intermittent noise that could be near individual noise-sensitive locations. This potential impact could be significant; however, because concept design for such a levee has not been developed, it is not possible to estimate the potential magnitude or location of an impact.
Recreation	It is unlikely that any recreational uses would be affected, because there are no recreational facilities in the vicinity of the Airport. There would be no impact.
Visual Resources	The presence and movement of heavy construction equipment, construction-generated dust, and the presence of the compartment levee in the landscape would likely temporarily and permanently degrade the existing visual character and/or quality of the Natomas landscape. This impact would be significant.
Utilities and Service Systems	Significant temporary interruptions of irrigation supply could occur if construction activities result in damage to irrigation infrastructure or otherwise render the infrastructure inoperable at a time when it is needed (e.g., reconnections to water supply sources are not completed by the time crop irrigation must begin). This impact would be significant.
Hazards and Hazardous Materials	It is assumed that construction would not cause any significant hazards associated with the transport and handling of hazardous materials because the applicable regulations would be followed. Previously unknown or undocumented hazardous materials could be present in construction areas (including borrow sites). Excavation at or near areas of currently unrecorded soil and/or groundwater contamination could result in the exposure of construction workers, the general public, and the environment to hazardous materials. This impact could be significant.
Wildfire Hazards	Physical and weather conditions could combine to lead to a high risk of fire hazard, and construction equipment or construction practices could ignite fires that may result in wildland fires and expose people or structures to a significant risk of loss, injury, or death under some circumstances. This potential impact would be significant.

Notes:

RD = Reclamation District; ROG = Reactive Organic Gases; NO<sub>x</sub> = oxides of nitrogen; PM<sub>10</sub> = respirable particulate matter with an aerodynamic diameter of 10 micrometers or less

Source: USACE 2008; data compiled by EDAW in 2008.

For the reasons provided in the Phase 2 EIS (listed below), this alternative was not carried forward for further evaluation:

- ▶ construction of a separate levee around the Airport would be under the responsibility and jurisdiction of another agency (Sacramento County Airport System), over which SAFCA would have no jurisdiction, and would require a lengthy process that is completely separate from the Proposed Action;
- ▶ the timeline for that process is unknown and there are no design plans that would enable an accurate evaluation of potential environmental impacts; and
- ▶ the action would require SCAS to prepare a separate CEQA and potentially NEPA environmental process and analysis.

In addition to those reasons provided in the Phase 2 EIS, detailed design plans are not available for this alternative, thus preventing USACE and SAFCA from accurately evaluating its potential impacts; implementation of the Airport Compartment Levee would not meet any of the goals and objectives of the project; the residents, residences, and businesses within the Natomas Basin would not receive flood protection; implementation of the Airport Compartment Levee would only protect the Airport; and SCAS has not proposed such a project and therefore, is not considered a reasonable alternative.

### **3.1.2 CULTURAL RESOURCES IMPACT REDUCTION ALTERNATIVE**

The Proposed Action includes construction primarily of deep cutoff walls in the Sacramento River east levee Reaches 5A–9B, which would require excavation and placement of slurry at great depths along these reaches. The Sacramento River east levee has the potential to contain buried and undiscovered cultural resources that are difficult to detect by inspecting the ground surface. The Proposed Action, therefore, has the potential to result in significant and unavoidable impacts to known prehistoric resources, previously unidentified cultural resources, and interred human remains, as described in this FEIS, in Section 4.10, “Cultural Resources.” Unlike other resources, the magnitude of potential impacts on previously undiscovered cultural resources and interred human remains is harder to discern because there are few feasible ways to investigate the presence of these resources within the footprint of deep cutoff walls proposed for construction along the Sacramento River east levee. Deep cutoff walls require excavation into strata that are currently beneath existing levees. Because of the potential magnitude of these impacts, this section analyzes an alternative means of remediating seepage along the Sacramento River east levee to determine if it is possible to reduce impacts on cultural resources. This alternative consists of construction of a 500-foot-wide seepage berm on the land side of the levee instead of construction of deep cut-off walls. This analysis concludes that while a berm may reduce impacts on any resources identified adjacent to the Sacramento River east levee, it dramatically increases the potential for impacts on undiscovered cultural deposits as well as other resources, and thus is eliminated.

Construction of a 500-foot-wide seepage berm rather than primarily deep cutoff walls in these reaches would avoid the deep ground disturbing work associated with cultural resource impacts while still achieving flood damage reduction objectives. Construction of a 500-foot-wide seepage berm would more than double the borrow material requirement for the Sacramento River east levee Reaches 5A–9B component of the Proposed Action from approximately 1.8 million cubic yards (cy) to 3.8 million cy.

This section compares the potential impacts of this alternative with the impacts of the Proposed Action. The technical analysis for this section was performed by creation of a GIS polygon that would span the approximate footprint of the 500-foot-wide seepage berm in Reaches 5A–9B. This polygon excluded properties where it is currently infeasible to acquire access or fee title for construction of a berm for the Phase 3 Project. The impacts associated with this footprint were compared with the impacts associated with the construction of cutoff walls in these reaches. This section thus provides an overall comparison of the relative impacts and environmental merits of the Proposed Action and an alternative designed to minimize impacts on cultural resources.

### **3.1.2.1 HYDROLOGY AND HYDRAULICS**

Because the 500-foot-wide seepage berm would be constructed on the land side of the Sacramento River, it would not change the hydrology of the channel or increase exposure of people or structures to a significant risk of flooding relative to the Proposed Action. The footprint of the berm would not increase the impact to the Elkhorn Canal relative to the Proposed Action, although the canal would have to be relocated further away from the Sacramento River east levee. However, the Cultural Resources Impact Reduction Alternative expanded footprint would cause more disruptions to privately maintained local canals, increasing the alteration of local drainage impact compared to the Proposed Action, resulting in greater impact.

The 500-foot-wide seepage berm would replace approximately 20,000 linear feet of cutoff walls in Reaches 5–9B. This would reduce possible restrictions on the flow of groundwater away from or toward the Sacramento River, which could affect local groundwater levels. However, the impact of the Proposed Action on local well yields is already considered to be less than significant in the Phase 3 DEIS/DEIR.

### **3.1.2.2 WATER QUALITY**

Because construction activities would be similar for the 500-foot-wide seepage berm as for the Proposed Action, temporary impacts on water quality from stormwater runoff, erosion, or spills would also be the same. Because the same Garden Highway drainage system would be required with or without the berm, possible effects on Sacramento River water quality from Garden Highway runoff during storms would also be the same. Impacts could be reduced to a less-than-significant level with implementation of the same mitigation measures and best management practices as described for the Proposed Action in the Phase 3 DEIS/DEIR, Section 4.5, “Water Quality.” Impacts under the Cultural Resources Impact Reduction Alternative and Proposed Action would therefore be similar.

### **3.1.2.3 FISHERIES AND SENSITIVE AQUATIC HABITATS**

Impacts to fisheries caused by discharge of fill and hazardous compounds during construction of the 500-foot-wide seepage berm could be reduced to a less-than-significant level with implementation of the same mitigation measures and best management practices as described for the Proposed Action in the Phase 3 DEIS/DEIR, Section 4.6, “Fisheries.” Construction of the berm would impact an additional 17.13 acres of riparian habitat, 7.58 acres of seasonal wetlands, and 0.88 acre of freshwater marsh. To the extent that these features are subject to USACE jurisdiction under Section 404 of the Clean Water Act, they would be subject to the mitigation described in the Phase 3 DEIS/DEIR, Section 4.7, “Sensitive Aquatic Habitats.” It is anticipated that impacts on these resources, after mitigation implementation, would be less than significant. However, the magnitude of impacts to sensitive aquatic habitats requiring management and mitigation would be substantially greater than for the Proposed Action. Therefore the Cultural Resources Impact Reduction Alternative would result in substantially more impacts to these resources than under the Proposed Action.

### **3.1.2.4 VEGETATION AND WILDLIFE AND SPECIAL-STATUS TERRESTRIAL SPECIES**

Relative to the Proposed Action, the Cultural Resources Impact Reduction Alternative would result in greater impacts on special-status terrestrial species and vegetation. The construction of the 500-foot-wide seepage berm would result in converting 185 acres of croplands to perennial grasslands. This would still provide foraging habitat for Swainson’s hawk but includes an additional loss of 47 acres of high quality foraging habitat (alfalfa) than the Proposed Action. This alternative would also remove an additional 14 acres of woodland habitat (potential nesting habitat) than the Proposed Action. Implementing the same mitigation measures in the Proposed Action for impacts to foraging and nesting habitat could reduce the impacts to a less-than-significant level. The impacts of the Cultural Resources Impact Reduction Alternative to Swainson’s hawk nesting and foraging habitat would be greater than under the Proposed Action.

### **3.1.2.5 CULTURAL RESOURCES**

Construction of a 500-foot-wide seepage berm would avoid direct excavation into deep foundation strata that are potentially sensitive for unidentified cultural resources and interred human remains. However, construction of this berm would more than double the borrow material requirement for the Sacramento River east levee Reaches 5A–9B component of the project from approximately 1.8 million cy to 3.8 million cy. Most of the borrow material required for construction of the 500-foot-wide berm would come from borrow sites along the western side of the Natomas Basin, which are also potentially sensitive for cultural resources. Borrow removal would occur by use of large pieces of heavy equipment, removing soil in large lifts with the potential to impact deposits before they are discovered. Because these locations are also sensitive for undiscovered cultural resources, the relative volume of disturbance for the berm alternative as compared to the deep cutoff wall, is the best indicator for the probability of damaging significant cultural resources, especially previously undiscovered deposits.

Overall the deep cutoff wall would disturb approximately 240 cubic feet per linear foot of improvement. By comparison the berm would require disturbance of approximately 1,272 cubic feet per linear foot (when borrow requirements and inspection trenches or short cutoff walls are considered together). Thus the berm would disturb approximately 5 times the volume of native soil as the deep cutoff wall. By this measure, the berm thus has a much greater potential to impact cultural resources, and thus fails to provide a means of avoiding impacts to cultural resources, especially previously undiscovered cultural deposits.

### **3.1.2.6 PALEONTOLOGICAL RESOURCES**

The geologic formations in the area adjacent to the Sacramento River east levee where proposed cutoff walls would be constructed under the Proposed Action are not formations that are paleontologically sensitive. Therefore, construction of the 500-foot-wide berm would not disturb any paleontological resources. However, depending on the location of additional borrow sites needed for the 500-foot-wide seepage berm construction, there would be a potential that fossils could be disturbed by borrow excavation. Excavations deeper than 10 feet for borrow excavation in the Riverbank Formation or the Modesto Formation could encounter and possibly damage unique paleontological resources. This impact would be potentially greater than would occur under the Proposed Action because the borrow material used under the Cultural Resources Impact Reduction Alternative would more than double that used under the Proposed Action.

### **3.1.2.7 TRANSPORTATION AND CIRCULATION**

Construction of a 500-foot-wide seepage berm would more than double the borrow material requirement for the Sacramento River east levee Reaches 5A–9B component of the Proposed Action from approximately 1.8 million cy to 3.8 million cy. Most borrow hauling would use off-road haul routes from the Airport north bufferlands or from borrow sites in Reaches 7–9B, and thus would not result in greater impacts to transit corridors. Truck hauling on Elkhorn Boulevard could significantly increase under the Cultural Resources Impact Reduction Alternative compared to the Proposed Action, causing more severe impacts to local traffic during the construction season.

### **3.1.2.8 AIR QUALITY**

Construction of a 500-foot-wide seepage berm would more than double the borrow material required from approximately 1.8 million cy to 3.8 million cy. This would result in more intense construction activity and increased associated emissions of ozone precursors (reactive organic gases and nitrogen oxides) and respirable particulate matter (PM<sub>10</sub>) than would occur under the Proposed Action. Although the exact quantitative difference has not been calculated, the greater borrow requirements with a commensurate increase in operation of equipment and trucks provide a good proxy that clearly predicts more severe air quality impacts. The same level of mitigation would be required; however, the severity of impacts under the Cultural Resources Impact Reduction Alternative would increase over levels associated with the Proposed Action.

### **3.1.2.9 NOISE**

The construction of a 500-foot-wide seepage berm would require greater quantities of construction equipment, and increased haul truck trips and borrow site activity. Construction activity associated with the Cultural Resources Reduction Alternative is predicted to generate intermittent noise levels of 89 decibels (dB) equivalent noise levels ( $L_{eq}$ ) at a distance of 50 feet. Based on the amount of borrow material required to construct the 500-foot-wide berm, haul truck trips would generate an hourly noise level of 67 dB  $L_{eq}$  at a distance of 50 feet. Noise impacts associated with the construction of the alternative seepage berm would remain significant and unavoidable, but would be generally similar to impacts described for the Proposed Action in the Phase 3 DEIS/DEIR, Section 4.14, "Noise." However, construction of a seepage berm would not require construction 7-days a week, 24-hours a day, while construction of the deep cutoff walls would be take place around the clock; therefore, this impact would be avoided under the Cultural Resources Impact Reduction Alternative, resulting in less impact than under the Proposed Action.

### **3.1.2.10 RECREATION**

Impacts caused by construction of a 500-foot-wide seepage berm would be the approximately the same as the Proposed Action because construction of a large improvement adjacent to the Sacramento River east levee would likely result in some disruption of the use of the Garden Highway and bike paths, as would the Proposed Action. The Garden Highway provides access to boat launch ramps and docks, and the bike path provides a transit connection to Sacramento and a recreational opportunity. Implementation of the seepage berm would encroach upon Teal Bend Golf Course, resulting in temporary disruption and closure of the golf course and the need to redesign portions of or all of the golf course to accommodate the 500-foot-wide seepage berm. For this reason, impacts under the Cultural Resources Impact Reduction Alternative on recreational resources would be greater than those described for the Proposed Action in the Phase 3 DEIS/DEIR, Section 4.15, "Recreation." Therefore, the impacts on recreation between the Cultural Resources Impact Reduction Alternative and the Proposed Action would be similar.

### **3.1.2.11 VISUAL RESOURCES**

Construction of the 500-foot-wide seepage berm would alter views along the land side of the Sacramento River east levee by extending the adjacent levee into the adjacent agricultural lands and requiring removal of more trees on the land side of the levee. Approximately 24 acres of valley oak woodland would be removed for this alternative, as opposed to approximately 10 acres under the Proposed Action. The visual character of the area along the Sacramento River east levee would be altered, including the views from the Teal Bend Golf Club. These visual changes would be substantially greater under the Cultural Resources Impact Reduction Alternative than those that would occur under the Proposed Action.

### **3.1.2.12 UTILITIES AND SERVICE SYSTEMS**

Substantially greater interruption of irrigation would result with construction of a 500-foot-wide seepage berm under the Cultural Resources Impact Reduction Alternative, than under the Proposed Action. Major irrigation and drainage infrastructure would be relocated, including the Natomas Central Mutual Water Company's (NCMWC's) Elkhorn Pumping Plant, Elkhorn Canal, and Elkhorn Reservoir. Additional buried irrigation lines may exist that would need to be removed or reconnected.

Construction of a large berm along the Sacramento River east levee Reaches 5A–9B would require relocation of a greater number of electric conduits, telephone conduits, conductors, irrigation pipes, and underground utilities than the Proposed Action. Project construction activities, including grading and excavation, would also have a greater potential to damage identified and unidentified utility equipment and facilities because of the larger footprint.

Construction would require several houses to be demolished, and materials including asphalt, concrete, pipe, and gravel would be removed to landfills or recycling facilities. More waste associated with grubbing and clearing would be produced as a result of a 500-foot-wide berm; however, it would not exceed regional landfill capacities. Overall, impacts associated with utilities and service systems and displacement would be substantially greater under the Cultural Resources Impact Reduction Alternative than under the Proposed Action.

### **3.1.2.13 HAZARDS AND HAZARDOUS MATERIALS**

Construction and maintenance activities associated with the 500-foot-wide seepage berm would require the use of potentially hazardous materials (fuels, oils, lubricants, and cleaners). Compliance with the applicable regulations would reduce the potential for accidental release. This impact would be less than significant under the Cultural Resources Impact Reduction Alternative and thus similar to the Proposed Action.

Construction could result in exposure of construction workers to known and unknown hazardous materials within the project site. This impact is potentially significant under this alternative, and is similar to the Proposed Action.

Project activities on the NEMDC would be the same for both the Cultural Resources Impact Reduction Alternative and the Proposed Action. These activities have the potential to result in exposure to both known and previously unknown hazardous materials within one-quarter mile of a school during construction activities; therefore, this impact would be the same under both alternatives.

Both the Cultural Resources Impact Reduction Alternative and the Proposed Action could require night lighting and security lighting. However the seepage berm would not require construction on a “24/7” basis, unlike the Proposed Action, which would involve construction of cutoff walls in Reaches 5A–9B. Therefore, impacts to Airport safety might be less than under the Proposed Action because 24/7 night lighting would not be used under the Cultural Resources Impact Reduction Alternative.

### **3.1.2.14 WILDFIRE HAZARDS**

Although no Very High Fire Hazard Severity Zones are located in the project area, and the majority of Sutter and Sacramento Counties are located in either a “nonflammable” or “moderate” zone for wildland fires, the project components would be constructed in locations where physical and weather conditions may combine to lead to a high risk of fire hazard. Construction equipment or construction practices could ignite fires that may result in wildland fires and expose people or structures to a significant risk of loss, injury, or death under some circumstances. This potential impact is considered significant, and would be similar for the Cultural Resources Impact Reduction Alternative and the Proposed Action.

### **3.1.2.15 SUMMARY**

**Table I-3** compares impacts for the Proposed Action and the Cultural Resources Impact Reduction Alternative. Impacts to cultural resources and aviation safety hazards would be reduced by the construction of a 500-foot-wide berm. Of the 16 issue areas analyzed, impacts on ten of the issue areas would be more severe with the Cultural Resources Impact Reduction Alternative. Approximately four impacts are generally similar. One impact would be reduced (“24/7” noise associated with construction of deep cut-off walls) and one impact potentially less impacted by construction of a seepage berm. Because the Cultural Resources Impact Reduction Alternative would result in a net increase in the number, intensity, and severity of environmental impacts compared to the Proposed Action, and because implementation of the 500-foot-wide seepage berm would result in the permanent displacement of residences and temporary closure, disruption, and redesign of portions or all of the Teal Bend Golf Club, it has been eliminated from further consideration, and thus has not been carried forward for detailed analysis in this FEIS.

**Table I-3  
Comparison of Impacts: Proposed Action and Cultural Resources Impact Reduction Alternative**

Issue Area	Proposed Action	Cultural Resources Impact Reduction Alternative (500-Foot-Wide Seepage Berm)
Hydrology and Hydraulics	Significant	Greater impacts to local drainage infrastructure
Water Quality	Significant	Similar
Fisheries	Significant	Similar
Sensitive Aquatic Habitats	Significant	Greater impacts to potentially jurisdictional features (loss of an additional 17.13 acres of riparian habitat, 7.58 acres of seasonal wetlands, and 0.88 acre of freshwater marsh)
Vegetation and Wildlife	Significant	Greater impacts to woodlands (additional loss of 14 acres of woodland habitat)
Special Status Terrestrial Species	Significant	Greater impacts to Swainson's hawk foraging and nesting habitat (loss of an additional 185 acres of Swainson's hawk foraging habitat [47 acres of high quality foraging alfalfa crop habitat and 14 acres of Swainson's hawk nesting habitat—woodlands])
Cultural Resources	Significant and unavoidable  Greater impacts to undiscovered cultural resources and interred human remains from deep cut-off wall construction	Potentially greater impacts to undiscovered cultural resources and interred human remains resulting from increased borrow materials usage (from 1.8 million cy to 3.8 million cy) for 500-foot-wide seepage berm
Paleontological Resources	Significant	Potentially greater impacts associated with greater borrow material excavation (from 1.8 million cy to 3.8 million cy)
Transportation and Circulation	Significant and unavoidable	Potentially greater impacts to traffic. Increase borrow use would more than double haul route usage and potentially significantly increase truck traffic on Elkhorn Boulevard
Air Quality	Significant and unavoidable	Greater severity of significant and unavoidable impacts with greater borrow material excavation (from 1.8 million cy to 3.8 million cy)
Noise	Significant and unavoidable	Similar, with exception of 24/7 construction associated with cut-off wall construction (lesser)
Recreation	Significant	Greater due to temporary closure and disruption of the Teal Bend Golf Club and likely need to redesign all or portions of the golf course  Since it is likely infeasible to construct a seepage berm within the golf course, requiring the proposal for cut-off walls in this area to remain unaffected, the impact would remain similar within the golf course
Visual Resources	Significant and unavoidable	Greater impacts to oak woodlands and existing views from removal of trees from the loss of 14 acres of woodland habitat
Utilities and Service Systems	Significant	Greater temporary impacts and relocations of existing irrigation infrastructure and utilities  Greater impacts resulting from permanent relocation of residences within the footprint of the 500-foot-wide berm
Hazards and Hazardous Materials	Significant	Potentially less impacts from fewer requirements for night lighting, potentially resulting in less aviation hazard
Wildfire Hazards	Significant	Similar
Source: Compiled by EDAW in 2008		

### 3.1.3 ALTERNATIVES CONSIDERED IN PREVIOUS ENVIRONMENTAL ANALYSES AND INCORPORATED BY REFERENCE IN THE PHASE 3 DEIS/DEIR

This section describes the alternatives analysis performed in previous documents from which the Phase 3 DEIS/DEIR is tiered (see Section 3.1, “Alternatives Considered, but Eliminated from Further Consideration,” above). The alternatives analyses from the Local Funding EIR, Phase 2 EIR, and Phase 2 EIS are incorporated by reference, herein. This material is summarized here to summarize the scope of analysis that has already been performed, and thus to also show which alternatives have been previously eliminated from further analysis or rejected by previous agency decisions.

#### 3.1.3.1 ALTERNATIVES CONSIDERED IN THE ENVIRONMENTAL IMPACT REPORT FOR LOCAL FUNDING MECHANISMS FOR COMPREHENSIVE FLOOD CONTROL IMPROVEMENTS FOR THE SACRAMENTO AREA (SAFCA 2007A)

The NLIP Landside Improvements Project is funded, in part, by funding sources developed as a result of the creation of new assessment districts. SAFCA analyzed the environmental effects of this action to create new assessment districts in the Local Funding EIR (SAFCA 2007a). The project objective used to screen alternatives for this project was the identification and creation of a source of funding that would allow SAFCA to provide 100-year flood for developed areas for SAFCA’s developed areas, and to lay groundwork for creation of 200-year flood protection over time (SAFCA 2007a: 7-2).

- ▶ **Proposed Project.** The proposed project alternative consisted of creation of an assessment district and a development fee program to fund improvements along the portions of Sacramento and American Rivers within SAFCA’s jurisdiction. This alternative was determined to provide sufficient funds for project objectives (SAFCA 2007a: 3-1).
- ▶ **No Project (Alternative 1).** In this alternative, SAFCA considered the impact of neither creating nor seeking new funding mechanisms for flood damage reduction. This would limit flood damage reduction projects to current efforts to provide 100-year flood protection along the American River and the South Sacramento Streams Group and thus would not meet project objectives (SAFCA 2007a: 7-2).
- ▶ **No New Public Funding; Private Levees in Natomas (Alternative 2).** This alternative assumed the same conditions as the No-Project Alternative but looked at the probable effect of private levee construction for residential development projects (SAFCA 2007a: 7-2). This alternative was eliminated because it would increase projected flood damages without a commensurate reduction in flood risk (SAFCA 2007a: 7-7).
- ▶ **Natomas 100-Year Protection (Alternative 3).** SAFCA analyzed the impacts associated with creation of one new assessment district which would provide only 100-year flood protection to the Natomas Basin, and would use funding raised through existing Capital Assessment District Number 3 to provide the local share of the cost of completing improvements to provide 100-year flood protection to the lower American River and South Sacramento Streams Group areas (SAFCA 2007a: 7-2). This alternative was eliminated because it would fail to provide groundwork for the creation of 200-year protection over time (SAFCA 2007a: 7-8).
- ▶ **Reduced Natomas Levee Perimeter (Alternative 4).** Under this alternative, SAFCA considered construction of a new levee across the Natomas Basin in lieu of improving the south levee of the NCC and the upper reach of the east levee of the Sacramento River. This alternative would have reduced the project footprint and would have excluded the northern undeveloped portion of the Basin both from flood protection and the assessment districts to be created (SAFCA 2007a: 7-2). This alternative was eliminated because it would have a much larger footprint than proposed improvements in the Natomas Basin (SAFCA 2007a: 7-11), and it would be subject to potential veto by RD-1000 (SAFCA 2007a: 7-12).

The Local Funding EIR analyzed the ability of these alternatives to meet the project objectives and determined that only the proposed project would meet project goals (SAFCA 2007a: 7-14). In addition, the Local Funding EIR analyzed the environmental effects of the various alternatives and concluded that Alternative 3 was the environmentally superior alternative. Alternative 3 would have eliminated or reduced a range of significant effects associated with creation of a new assessment district. However it was not selected because it would not meet the important project objective of laying the groundwork for “200-year” flood protection. The proposed project alternative was selected because it would meet all of the project objectives.

### **3.1.3.2 ALTERNATIVES CONSIDERED IN THE ENVIRONMENTAL IMPACT REPORT FOR THE NATOMAS LEVEE IMPROVEMENT PROGRAM, LANDSIDE IMPROVEMENTS PROJECT (SAFCA 2007B)**

In the Phase 2 EIR, SAFCA analyzed construction of flood damage reduction measures required to protect the Natomas Basin at a program- a project-level (SAFCA 2007b). This range of alternatives for the program presented in the Phase 2 EIR is incorporated by reference. The project objectives used to screen alternatives consisted of developing 100-year flood protection in the Natomas Basin as quickly as possible, developing “200-year” flood protection over time, and ensuring that new development in Sacramento’s floodplains does not substantially increase the risk of flooding (SAFCA 2007b: 6-2). Project-specific objectives included reducing hazards to aviation safety in the vicinity of the Sacramento International Airport, and enhancing habitat values in the Natomas Basin for giant garter snake, Swainson’s hawk, and other special-status species (SAFCA 2007b: 6-2).

- ▶ **Construct an Adjacent Setback Levee along the Sacramento River East Levee.** This alternative was analyzed as the proposed project, carried forward in the Phase 2 EIR as Alternative 1. This project consisted of constructing an adjacent setback levee on the Sacramento River east levee. Other improvements include levee raising and seepage remediation on the Sacramento River east levee, the NCC south levee, and the Pleasant Grove Creek Canal (PGCC) west levee. Other project components included improvements to major irrigation and drainage infrastructure, habitat creation and management, and right-of-way acquisition (SAFCA 2007b: 6-6, 6-7). This alternative was determined to meet project objectives (SAFCA 2007a: 6-7).
- ▶ **Raise Levee in Place with a 1,000-Foot Levee Setback in the Upper 1.4 Miles along the Sacramento River East Levee.** This alternative would have provided a location for a substantial amount of tree planting on the water side of the levee, contributing to the offsetting mitigation for the loss of trees that may need to be removed along the existing levee to meet USACE criteria. This alternative was eliminated because it was unlikely that the new setback levee would provide 100-year flood protection per USACE criteria (SAFCA 2007a: 6-11).
- ▶ **Construct an Adjacent Setback Levee with a 500-Foot Levee Setback in the Upper 1.4 Miles along the Sacramento River East Levee.** This alternative was evaluated because it would provide the opportunity for partially offsetting the loss of landside tree groves through the establishment of new riparian plantings in the levee setback area as well as woodland plantings on the land side of the adjacent setback levee. This alternative was eliminated because it would require substantially greater quantities of borrow material with greater impacts on important farmland and transportation and circulation (SAFCA 2007b: 6-19, 6-20).
- ▶ **No-Project Alternative—No Flood Control Improvements in Natomas.** Consideration of a no-project alternative is required under CEQA. Under this alternative, it was assumed that the Natomas Basin flood damage reduction system would not be improved. This alternative was eliminated because it would not meet project objectives (SAFCA 2007b: 6-14).
- ▶ **No SAFCA Levee Improvements—Private Levees in Natomas.** This alternative was analyzed assuming no SAFCA project providing flood protection in the Basin, thus causing private developers to separately fund individual flood protection in the form of private compartment levees that would protect new developments. This was eliminated because it would only partially meet the first objective of providing 100-year flood

protection and it would potentially lead to increased fragmentation of habitat for special-status species (SAFCA 2007b: 6-15).

The proposed project was identified as the environmentally superior alternative after all alternatives were compared relative to their foreseeable effects (SAFCA 2007b: 6-25). The proposed project was selected for implementation.

## 4.1 ALTERNATIVES CARRIED FORWARD FOR EVALUATION IN THIS FEIS

The following alternatives are carried forward for detailed analysis in the Phase 3 DEIS/DEIR, and remain for this FEIS, and are described in Chapter 2.0, “Alternatives:”

- ▶ **No-Action Alternative**—Under NEPA, the expected future without-project conditions; under CEQA, the existing condition at the time the notice of preparation was published (July 18, 2008), as well as what would be reasonably expected to occur in the foreseeable future (two scenarios) if the Phase 3 Project were not approved.
- ▶ **Proposed Action**—Construction of an adjacent setback levee along the Sacramento River east levee and improvements to the PGCC west levee and the NEMDC west levee from Elkhorn Boulevard to Northgate Boulevard.
- ▶ **Levee Raise-in-Place Alternative**—Raising of the Sacramento River East Levee in place in addition to improvements to the PGCC west levee and the NEMDC west levee from Elkhorn Boulevard to Northgate Boulevard.

The Proposed Action and the Levee Raise-in-Place Alternative were developed for consideration for the Phase 3 Project with a focus on improvements to the Sacramento River east levee (Reaches 5A–9B). Phase 3 Project improvements to the PGCC west levee, the NEMDC west levee, and landscape and irrigation/drainage system modifications would be similar under the Proposed Action and the Levee Raise-in-Place Alternative.

Development of the Proposed Action and the Levee Raise-in-Place Alternative included substantial planning based on consideration of effects on wetlands and other waters of the United States, woodlands, giant garter snake habitat, and other habitats. Accordingly, levee improvements were designed to avoid or minimize such effects where practicable and feasible. However, several agricultural canals or portions of canals and small seasonal wetlands exist near the levee toe along the Sacramento River east levee, PGCC west levee, and NEMDC west levee. These would require filling under either the Proposed Action or the Levee Raise-in-Place Alternative because their proximity to the existing levees places them within the expanded landside levee footprint or adjacent maintenance access under the Proposed Action and the Levee Raise-in-Place Alternative. Similarly, portions of several woodland groves extend into the proposed footprint of the flood damage reduction features along the land side of the Sacramento River east levee under the Proposed Action and the Levee Raise-in-Place Alternative and would need to be removed and/or relocated. Consequently, effects on wetlands and other waters of the United States and on other habitats along the land side of the levees are very similar for the Proposed Action and the Levee Raise-in-Place Alternative, and the same compensation strategies are proposed for unavoidable effects.

The Levee Raise-in-Place Alternative differs from the Proposed Action in that it would result in the (1) removal of waterside trees along the Sacramento River east levee to conform with USACE guidance regarding levee encroachments, and (2) loss of waters of the United States due to the implementation of erosion control improvements along the waterside toe of Sacramento River east levee. These effects would require a different compensation strategy than for the Proposed Action because, under the Proposed Action, these actions would not occur on the waterside of the levee.

In terms of flood reduction system design, the Proposed Action and the Levee Raise-in-Place Alternative differ in terms of how they would achieve the required levee height increases along the Sacramento River east levee. Therefore, the differences between the Proposed Action and the Levee Raise-in-Place Alternative, including effects on habitats, are the result of these Sacramento River east levee design differences. These effects are more fully described in Chapter 4.0, “Environmental Consequences and Mitigation Measures,” of this FEIS.

## REFERENCES

Sacramento Area Flood Control Agency. 2007a (February). *Final Environmental Impact Report on Local Funding Mechanisms for Comprehensive Flood Control Improvements for the Sacramento Area*. State Clearinghouse No. 2006072098. Sacramento, CA. Prepared by EDAW, Sacramento, CA.

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