3 AFFECTED ENVIRONMENT

The baseline environmental conditions assumed in this EIS/EIR for analyzing the effects of the Phase 4b Project consist of the existing physical environment as of November 5, 2009, the date when SAFCA published the Phase 4b Project notice of preparation (NOP) to prepare an EIR and filed it with the State Clearinghouse. Under CEQA, baseline environmental conditions are set at the time the NOP is published. Even though this chapter is titled “Affected Environment” for the purposes of NEPA, it also constitutes the “Environmental Setting” required under CEQA.

3.1 GENERAL SITE CONDITIONS

3.1.1 NATOMAS BASIN

The Natomas Basin (Plate 1-1) is located at the confluence of the American and Sacramento Rivers. Encompassing approximately 53,000 acres, the Basin extends northward from the American River and includes portions of the city of Sacramento, Sacramento County, and Sutter County. In addition to the American and Sacramento Rivers, the Natomas Basin is bordered on the north by the Natomas Cross Canal (NCC) and on the east by the Pleasant Grove Creek Canal (PGCC) and the Natomas East Main Drainage Canal (NEMDC) (also known as Steelhead Creek). The NCC diverts the runoff from a large watershed in western Placer and southern Sutter Counties around the Natomas Basin and is a contributor to the flows in the upper reach of the Sacramento River channel in SAFCA’s jurisdiction. The NEMDC is an engineered channel along the southeastern flank of the Natomas Basin. Tributaries to the NEMDC include Dry Creek, Arcade Creek, Rio Linda Creek, Robla Creek, and Magpie Creek Diversion Channel. The Natomas Basin is protected from high flows in these water bodies and in the American and Sacramento Rivers by an interconnected perimeter levee system. This levee system was originally created to promote agricultural development. Today, however, the Natomas Basin contains three major public transportation facilities (Interstate 5 [I-5], Interstate 80 [I-80], and State Route [SR] 99) and is the site of the Sacramento International Airport (Airport). Airport lands account for a little over 10% of the total acreage in the Basin. Half of the Airport lands lie outside of the Airport Operations Area and consist of “bufferlands” managed as grassland open space (see Plate 1-7). About 30% of the Basin consists of developed urban uses, mostly located south of Elkhorn Boulevard in the city of Sacramento. The remaining 60% of the Basin is in some form of developed agricultural or open space use in unincorporated areas of Sacramento and Sutter Counties, including 4,000 acres under the management of The Natomas Basin Conservancy (TNBC) (see Plate 1-8).

The “Affected Environment” consists of the environmental setting for the entire Natomas Levee Improvement Program (NLIP) area. The NLIP area is the same as the “Natomas Basin.” Both terms are used interchangeably in this EIS/EIR, but cover the same geography and consist of the same boundaries. The NLIP area also includes the Phase 4b Project area, the final phase of the NLIP Landside Improvements Project. The entire NLIP is addressed in the “Affected Environment,” because this EIS/EIR not only supports implementation of the Phase 4b Project, but will also help support the approval of USACE’s Common Features/Natomas PACR, described in Chapter 1, “Introduction and Statement of Purpose and Need.”

3.1.2 LEVEE IMPROVEMENT AREAS

As described in Chapter 1, “Introduction and Statement of Purpose and Need,” USACE has divided the flood damage reduction improvements within the Natomas Basin into nine reaches (Reaches A–I), as shown on Plate 1-3. USACE’s reach designations differ from SAFCA’s reach designations, which are more finely subdivided than the USACE system for the Sacramento River east levee, American River north levee, and NCC. In Plate 1-3, and

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1 As noted in Chapter 1, “Introduction,” USACE published a notice of intent (NOI) to prepare an EIS for the Common Features GRR in the Federal Register (Vol. 73, No. 41) on February 29, 2008, which is serving as the NOI for the Phase 4b Project. Because SAFCA’s NOP publication date is more recent, that is the baseline used in this EIS/EIR.
as listed below, lettered reaches follow the USACE designation, while numbered reaches follow the SAFCA designations:

- Sacramento River east levee: Reach A:16–20
- Sacramento River east levee: Reach B:5A–15
- Sacramento River east levee: Reach C:1–4B
- NCC: Reach D:1–7
- PGCC: Reach E: there are no SAFCA reaches, just station numbers
- NEMDC North: Reaches F–G
- NEMDC South: Reach H
- American River north levee: Reach I:1–4

### 3.1.2.1  NATOMAS CROSS CANAL SOUTH LEVEE

The NCC is a 5.3-mile-long channel that carries water from several tributary watersheds in western Placer County and eastern Sutter County to the Sacramento River. The NCC begins at the PGCC and East Side Canal and extends southwest to its confluence with the Sacramento River near the Sankey Road/Garden Highway intersection. During periods of flooding, the Sutter Bypass, Sacramento River, and NCC all contribute to increase water elevations that can affect the NCC levees. USACE has designated the NCC as Reach D (Plate 1-3).

For engineering analysis purposes, SAFCA has divided the NCC levee into seven reaches, as shown in Plate 1-3.

In the pre-NLIP project condition, much of the south levee contained a stability berm with an internal drainage system. Levee slopes were approximately 3H:1V on the waterside and 2H:1V on the landside, with an approximately 80- to 100-foot maintenance access area on the landside of the levee through most of the NCC’s length. The Phase 2 Project widened the levee footprint by raising the levee, flattening the landside levee slope, and constructing a cutoff wall.

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

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

### 3.1.2.2  SACRAMENTO RIVER EAST LEVEE

Table 3.1-1 describes the areas along the Sacramento River east levee. The Phase 4b Project includes improvements to the Sacramento River east levee Reach A:16–20 only; however, all reaches are included in the table below for completeness and because these reaches are part of the Phase 2, 3, 4a, and 4b Projects.

### 3.1.2.3  PLEASANT GROVE CREEK CANAL WEST LEVEE

The area along the PGCC west levee contains primarily agricultural uses along with minimal industrial, manufacturing, and rural residential uses.
### Table 3.1-1
Description of the Sacramento River East Levee Area by Reach and by Project Phase

<table>
<thead>
<tr>
<th>Reach</th>
<th>Landside</th>
<th>Waterside</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Phase 2 Project</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C:1</td>
<td>Sankey Road intersects Garden Highway near the start of Reach C:1. Oak woodland and a rural residence are located approximately 3,000 feet south of the start of Reach C:1. The rural residence is located within 50 feet of the landside toe of the levee. Rice and field crops border the levee throughout the reach.</td>
<td>Verona Village Resort (a small trailer campground, marina, restaurant, and store) is located on the west side of Garden Highway bordering the start of the reach. Small clusters of woodland are scattered along Garden Highway to the south.</td>
</tr>
<tr>
<td>C:2</td>
<td>A rural residence adjacent to the existing levee is located approximately 1/3 mile south of the start of Reach C:2. Field crops border the levee throughout the reach. The northern part of the TNBC Huffman West Habitat Preserve borders the levee in the southern end of the reach.</td>
<td>Small clusters of woodland are scattered along Garden Highway. Eight residences are located at the end of Reach C:2 adjacent to Garden Highway.</td>
</tr>
<tr>
<td>C:3</td>
<td>A field used for row crops, part of the TNBC Huffman West Habitat Preserve, covers the entire reach.</td>
<td>Six residences are located adjacent to Garden Highway.</td>
</tr>
<tr>
<td>C:4A and 4B</td>
<td>Field crops or open space border the levee throughout the reach. Most of the parcels bordering the levee are TNBC land (Huffman West and Atkinson Habitat Preserves) or Airport land. Riego Road intersects Garden Highway approximately 1,500 feet from the start of Reach C:4A. Agricultural facilities at the end of a narrow paved road are located approximately 2,000 feet south of Riego Road. The RD 1000 Pumping Plant No. 2 is located on the North Drainage Canal. The Elkhorn Canal closely parallels the levee from the North Drainage Canal south. A highline canal perpendicular to the levee is located approximately 2,000 feet south of the North Drainage Canal. A cluster of woodlands is located just south of the canal. A line of trees perpendicular to the levee is located near the southern end of the reach.</td>
<td>Approximately nine residences, interspersed among woodland, are located adjacent to Garden Highway. Several docks and private marinas, including the Rio Ramaza Marina, are located along the bank. The NCMWC’s Prichard Lake Pumping Plant and pump tender’s residence are located at the North Drainage Canal.</td>
</tr>
<tr>
<td><strong>Phase 3 Project</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B:5A and 5B</td>
<td>Field crops and idle Airport north bufferlands border the levee throughout the reach on Airport land. A cluster of woodlands is located at the start of the reach. A rural residence with outbuildings and surrounding woodland is located approximately 1,600 feet south of the start of the reach. West Elverta Road intersects Garden Highway approximately 1,500 feet north of the end of the reach. The Elkhorn Canal closely parallels the levee throughout the reach.</td>
<td>Woodland covers the entire reach west of Garden Highway.</td>
</tr>
<tr>
<td>B:6A and 6B</td>
<td>Field crops border the levee throughout the reach. The West Drainage Canal, which borders Teal Bend Golf Club on the north, intersects the levee approximately 1,400 feet south of the orchard. Reservoir Road intersects Garden Highway approximately 1,000 feet south of the West Drainage Canal. Teal Bend Golf Club covers the remaining 2,800 feet of the reach. The Elkhorn Canal closely parallels the levee throughout the reach.</td>
<td>Approximately eight residences, interspersed among woodland, are located adjacent to Garden Highway. Several docks are located along the bank. NMCWC’s Elkhorn Pumping Plant is located at the start of Reach B:6A.</td>
</tr>
<tr>
<td>B:7</td>
<td>Teal Bend Golf Club extends approximately 600 feet beyond the start of the reach. Field crops border the levee for the remaining 2,400 feet of the reach. The Elkhorn Canal closely parallels the levee throughout the reach.</td>
<td>Approximately 14 residences, interspersed among woodland, are located adjacent to Garden Highway. Several private docks are located along the bank.</td>
</tr>
</tbody>
</table>
### Table 3.1-1
#### Description of the Sacramento River East Levee Area by Reach and by Project Phase

<table>
<thead>
<tr>
<th>Reach</th>
<th>Landside</th>
<th>Waterside</th>
</tr>
</thead>
<tbody>
<tr>
<td>B:8</td>
<td>Field crops border the levee throughout the reach. A rural residence with outbuildings and surrounding woodland is located at the start of the reach. Another rural residence with outbuildings and surrounding woodland is located approximately 1,200 feet south of the first residence. West Elkhorn Boulevard intersects Garden Highway approximately 800 feet north of the end of the reach. A woodland cluster is located at the end of the reach. The Elkhorn Canal closely parallels the levee throughout the reach, ending approximately 1,200 feet south of Elkhorn Boulevard.</td>
<td>Approximately eight residences, interspersed among woodland, are located adjacent to Garden Highway. Several private docks are located along the bank.</td>
</tr>
<tr>
<td>B:9A and 9B</td>
<td>A woodland cluster is located approximately 1,300 feet south of the start of the reach. Two rural residences are located within 1,000 feet of Bayou Road and the I-5 overpass. A woodland cluster is located on the south side of the I-5 overpass. Another woodland cluster is located approximately 700 feet farther south. A woodland cluster is located at the end of Reach B:9. Field crops border the levee throughout the reach.</td>
<td>Approximately 10 residences are located adjacent to Garden Highway interspersed among woodland. Several private docks are located along the bank. Two restaurant/marina facilities are located within 800 feet of the intersection of Bayou Road and Garden Highway. The Elkhorn Boat Launch Facility operated by Sacramento County Regional Parks Department is located adjacent to the marinas.</td>
</tr>
<tr>
<td><strong>Phase 4a Project</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B:10</td>
<td>A rural residence is located at the start of the reach. A woodland cluster is located approximately 1,100 feet farther south. A large ranch occupies Reach B:10 from approximately 1,700 feet south of the start of the reach to the end of the reach. Field crops border the levee throughout the reach. RD 1000’s Pumping Plant No. 5 is located in the middle of the reach.</td>
<td>Approximately five residences, interspersed among woodland, are located adjacent to Garden Highway. Several private docks are located along the bank.</td>
</tr>
<tr>
<td>B:11A and 11B</td>
<td>Reach B:11 contains the remaining 400 linear feet of the large ranch in Reach B:10. Field crops border the levee throughout the reach. A rural residence is located approximately two-thirds mile from the start of Reach B:11. Another rural residence is located another 2,000 feet south. Approximately 1/2-mile farther south, the river bends to the east. A cluster of trees is located approximately 1,600 feet west of the end of the reach. Field crops border the levee throughout the reach. RD 1000’s Pumping Plant No. 3 is located within the reach.</td>
<td>Approximately 12 residences, interspersed among woodland, are located adjacent to Garden Highway. Several private docks are located along the bank.</td>
</tr>
<tr>
<td>B:12</td>
<td>An orchard covers much of Reach B:12, at which point the river trends south again. A rural residence is located approximately one-half mile south of the start of the reach. A rural residence and the Kimura Ditch are located 500–700 feet north of the end of the reach, followed by two more residences. A highline ditch starts at the Kimura Ditch and closely parallels the levee to the south. Field crops border the levee throughout the reach.</td>
<td>Approximately 14 residences, interspersed among woodland, are located adjacent to Garden Highway. Several private docks are located along the bank.</td>
</tr>
<tr>
<td>B:13</td>
<td>A residence is located at the start of Reach B:13. Pumping Plant No. 3 and a large drainage ditch perpendicular to the levee are located 800 feet south of the start of the levee. Another 1,400 feet farther south is a woodland cluster. A highline ditch closely parallels the levee for the length of the reach. Field crops border the levee throughout the reach. The TNBC Cummings preserve includes mitigation plantings for valley elderberry longhorn beetle.</td>
<td>Approximately 13 residences, interspersed among woodland, are located adjacent to Garden Highway. Several private docks are located along the bank.</td>
</tr>
</tbody>
</table>
### Table 3.1-1

**Description of the Sacramento River East Levee Area by Reach and by Project Phase**

<table>
<thead>
<tr>
<th>Reach</th>
<th>Landside</th>
<th>Waterside</th>
</tr>
</thead>
<tbody>
<tr>
<td>B:14</td>
<td>Radio Road intersects Garden Highway approximately 1,600 feet south of the start of Reach B:14 at the end of a large field used for row crops. A rural residence is located approximately 800 feet farther south. The southern part of the reach is bordered by the TNBC Alleghany preserve.</td>
<td>Approximately 14 residences, interspersed among woodland, are located adjacent to Garden Highway. Several private docks are located along the bank. NCMWC’s Riverside Pumping Plant is located in the middle of the reach.</td>
</tr>
<tr>
<td>B:15</td>
<td>Reach B:15 starts at the intersection of San Juan Road and Garden Highway. Two residential estates are located 600 and 1,200 feet farther south. Scattered trees are located adjacent to the levee. The northern part of the reach is bordered by the TNBC Alleghany preserve.</td>
<td>Approximately 21 residences, interspersed among woodland, are located adjacent to Garden Highway. More than a dozen private docks are located along the bank.</td>
</tr>
<tr>
<td>A:16</td>
<td>Eight rural residences amid scattered trees are located in the first 1,600 feet of Reach A:16. The next 2,000 feet are a mixture of open fields, rural residences, farm buildings, and scattered trees. Dense woodland makes up the remaining 1,200 feet of the reach. The reach contains approximately 20 residences.</td>
<td>Approximately 12 residences, interspersed among woodland, are located adjacent to Garden Highway. Several private docks are located along the bank.</td>
</tr>
<tr>
<td>A:17</td>
<td>A rural residence is located at the start of Reach A:17, approximately 600 feet inland from the levee toe. A rural residence with outbuildings is located approximately 800 feet south of the start of the reach.</td>
<td>Approximately seven residences, interspersed among woodland, are located adjacent to Garden Highway. Several private docks are located along the bank.</td>
</tr>
<tr>
<td>A:18</td>
<td>Reach A:18 contains four to five rural residences among small orchards north of the I-80 overcrossing. A woodland cluster is located on the east side of the I-80 overcrossing, where the river bends east.</td>
<td>Approximately six residences, interspersed among woodland, are located northwest of the I-80 overcrossing, adjacent to Garden Highway. Several private docks are located along the bank.</td>
</tr>
<tr>
<td>A:19A and A:19B</td>
<td>Two rural residences are located within 800 feet of the start of Reach A:19, with scattered trees along and adjacent to the levee. The rest of the reach contains a subdivision of several hundred homes, the Swallows Nest Golf Course and condominium complex, and a subdivision of approximately 90 residential units. Scattered trees are located on or adjacent to the levee. The City of Sacramento’s Willow Creek Pump Station is located in Reach A:19B.</td>
<td>Sand Cove Park (37 acres) is located southeast of the I-80 overcrossing. Woodland occupies the first 1,700 feet of Reach A:19. The remaining mile to the east is a mixture of residences, private docks, and businesses, including the River View Marina and the City of Sacramento’s Willow Creek Pump Station in Reach A:19B.</td>
</tr>
<tr>
<td>A:20A and A:20B</td>
<td>Reach A:20 contains an office park and the 13-acre Natomas Oaks Park. Scattered trees are located on or adjacent to the levee. RD 1000's Pumping Plant No. 1 is located in Reach A:20A.</td>
<td>The first 2/3-mile east of Reach A:19 contains a mixture of homes, private docks, and businesses, including the Riverbank Marina. The remaining 2,000 feet contains Discovery Park woodland and RD 1000 Pump Plant No. 1 in Reach A:20A.</td>
</tr>
</tbody>
</table>

**Phase 4b Project**

**Notes:**
- I-5 = Interstate 5; I-80 = Interstate 80; NCMWC = Natomas Central Mutual Water Company; RD = Reclamation District; TNBC = The Natomas Basin Conservancy
- Source: Data compiled AECOM in 2009

### 3.1.2.4 Natomas East Main Drainage Canal West Levee

The area west of and adjacent to the NEMDC ranges from agricultural uses to the north to urban uses to the south. The area adjacent to the northern portion of the NEMDC, between Sankey Road and Elkhorn Boulevard, contains primarily agricultural uses with scattered farm residences and associated structures. The area between Elkhorn Boulevard and Del Paso Road contains agricultural uses with scattered large-lot residential. South of Del Paso...
Road and north of San Juan Road, land uses are more urbanized with a mix of commercial, business parks, and manufacturing uses. The area south of San Juan Road is primarily single-family residential.

3.1.2.5 **AMERICAN RIVER NORTH LEVEE**

Along the American River north levee, land uses are primarily residential, office, and commercial. Residences and businesses are located on the landside of the American River north levee. Between Folsom Dam and the confluence with the Sacramento River, the lower American River is bordered by the American River Parkway. The parkway is flanked by homes and businesses along the riverbanks and levees.

3.1.3 **REGULATORY SETTING**

The “Regulatory Setting,” section in each issue area contains the Federal, state, regional, and local laws, regulations, plans, and ordinances that are relevant to the NLIP, including the Phase 4b Project. Although USACE is the project proponent, where state laws or regional/local plans or ordinances have requirements in addition to, but not conflicting with NEPA, the Federal agency (USACE) must fulfill those requirements.

3.2 **AGRICULTURAL RESOURCES**

3.2.1 **REGULATORY SETTING**

3.2.1.1 **FEDERAL**

The following Federal law related to agricultural resources is relevant to the NLIP, including the Phase 4b Project, and is described in detail in Chapter 6, “Compliance with Federal Environmental Laws and Regulations”:


3.2.1.2 **STATE**

**California Important Farmland Inventory System and Farmland Mapping and Monitoring Program**

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

► **Prime Farmland**—land that has the best combination of physical and chemical characteristics for crop production. It has the soil quality, growing season, and moisture supply needed to produce sustained high yields of crops when treated and managed.

► **Farmland of Statewide Importance**—land other than Prime Farmland that has a good combination of physical and chemical characteristics for crop production.

► **Unique Farmland**—land that does not meet the criteria for Prime Farmland or Farmland of Statewide Importance, but that has been used for the production of specific crops with high economic value.

► **Farmland of Local Importance**—land that is either currently producing crops or has the capability of production, but that does not meet the criteria of the categories above.
► **Grazing Land**—land on which the vegetation is suited to the grazing of livestock.

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

Much of the farmland in the Natomas Basin is designated by the FMMP as Prime Farmland and Farmland of Statewide Importance (California Department of Conservation 2008). Plate 3-1 shows the designated farmland within and surrounding the Natomas Basin according to the latest data available from FMMP.

### California Land Conservation Act of 1965 (Williamson Act)

The California Land Conservation Act of 1965, commonly known as the Williamson Act (California Government Code Section 51200 et seq.), enables local governments to enter into contracts with private landowners for the purpose of promoting the continued use of the relevant land in agricultural or related open space use. In return, landowners receive property tax assessments that are based on farming and open space uses instead of full market value. Local governments receive an annual subvention (subsidy) of forgone property tax revenues from the state via the Open Space Subvention Act of 1971. Amendments to the California State Budget Act of 2009 greatly reduced the Williamson Act Subvention payments, but the Williamson Act Program remains in place and contracts remain in effect.

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

As a public agency that may acquire lands within agricultural preserves, including lands under contract, the project proponent(s) is exempt from the normal cancellation process for Williamson Act contracts, because the contract is nullified for the portion of the land actually acquired (California Government Code Section 51295). The project proponent(s) must provide notice to the California Department of Conservation prior to acquiring such lands (California Government Code Section 51291[b]). A second notice is required within 10 working days after the land is actually acquired (California Government Code Section 51291[c]). As the land would be acquired for flood damage reduction measures, the project proponent(s) is exempt from the findings required in California Government Code Section 51292 (California Government Code Section 51293[e][1]) because the proposed project consists of flood damage reduction works. The preliminary notice to the California Department of Conservation, provided before lands are actually acquired, would demonstrate the purpose of the project and the exemption from the findings.

Much of the farmland in the Natomas Basin is in an agricultural preserve, with portions of those lands currently held in Williamson Act Contracts (Plate 3-2).

### 3.2.1.3 **Regional and Local**

SAFCA, acting as a joint powers authority pursuant to the Joint Exercise of Power Act (California Government Code Section 6500 et seq.) and the SAFCA Act (California Water Code App. Section 130-1 et seq.), is immune from compliance with local laws and regulations; however, SAFCA has substantially complied with adopted regional and local plans, policies, and ordinances applicable to the NLIP. This EIS/EIR provides relevant local plans and policies to describe the land use planning and policy context in which the NLIP, including the Phase 4b...
Important Farmland in the Project Area

Plate 3-1
Source: Base map from CASIL Layers; adapted by AECOM in 2009 with data from California Department of Conservation 2007

Parcels Subject to Williamson Act Contracts

Plate 3-2

Common Features/Natomas PACR/Phase 4b Project
USACE and SAFCA

FEIS/FEIR
Affected Environment
Project, exists and how local agency plans and policies address resource issues in the NLIP area, including the Phase 4b Project, and because if USACE implements the Phase 4b Project, USACE would be bound by all regional and local laws, regulations, and ordinances.

3.2.1.4 SUTTER COUNTY GENERAL PLAN

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

- **Goal 6.A:** To preserve high-quality agricultural land for agricultural purposes.
  - **Policy 6.B-3:** The County shall encourage the continued operation and expansion of existing agricultural industries.

Sacramento County General Plan

The Sacramento County General Plan is currently being updated (the DEIR was issued in spring 2009), but is not yet adopted. The Agricultural and Conservation Elements of the current Sacramento County General Plan (Sacramento County 1993) contain the following goals, objectives, and policies that may be relevant to this project:

**Agricultural Element**

- **Goal:** Protect important farmlands from conversion and encroachment and conserve agricultural resources.

- **Objective:** Prime farmlands (as defined by the California Department of Conservation) and lands with intensive agricultural investments (such as orchards, vineyards, dairies, and other concentrated livestock or poultry operations) protected from urban encroachment.
  - **Policy AG-5:** Mitigate loss of prime farmlands or lands with intensive agricultural investments through CEQA requirements to provide in-kind protection of nearby farmland.

- **Objective:** Retain agricultural land holdings in units large enough to guarantee future and continued agricultural use.
  - **Policy AG-7:** Agricultural zoning district boundaries shall be rational and shall respect parcel boundaries.
  - **Policy AG-8:** Agricultural land divisions shall not adversely affect the integrity of agricultural pursuits. Agricultural land divisions may be denied if the reviewing authority finds that the division of land is likely to create circumstances inconsistent with this policy.

**Conservation Element**

- **Goal:** Preserve and protect long-term health and resource value of agricultural soils.

- **Objective:** Loss of important agricultural soils compensated for by long-term protection of land with similar productivity value.
  - **Policy CO-54:** Direct development away from prime or statewide importance soils or otherwise provide for mitigation that slows the loss of additional farmland conversion to other uses.
• **Policy CO-55:** Projects resulting in the conversion of more than 50 acres of prime or statewide in importance farmland shall be deemed to have a significant environmental effect, as defined by CEQA.

### City of Sacramento General Plan

The City of Sacramento 2030 General Plan was adopted on March 3, 2009 (City of Sacramento 2009). The City has a program with USACE and SAFCA in which it works with these and other responsible agencies to resolve floodplain restrictions. The following policies from the Agricultural Element of the City of Sacramento 2030 General Plan may be relevant to this project.

- **Goal ER 4.2:** Growth and Agriculture. Support preservation and protection of agricultural lands and operations outside of the city for their value for open space, habitat, flood protection, aesthetics, and food security by working with surrounding jurisdictions.

  - **Policy ER 4.2.2:** Permanent Preservation. The City shall work with the County, Natomas Basin Conservancy, and other entities to protect and permanently preserve a 1-mile buffer outside of the current city limits as of adoption of the General Plan to preserve viable agricultural activities and as a community separator between Sutter and Sacramento Counties and along the Sacramento River.

  - **Policy ER 4.2.3:** Coordinate to Protect Farmland. The City shall continue to work with County and other adjacent jurisdictions to implement existing conservation plans to preserve prime farmland and critical habitat outside the city.

#### 3.2.2 Environmental Setting

Approximately 60% of the Natomas Basin is in some form of developed agricultural or open space use in unincorporated areas of Sacramento and Sutter Counties. Rice is the most common crop and is generally grown over large areas of contiguous land north of Elkhorn Boulevard, although the amount of land in active rice production has greatly diminished in recent years and many former rice fields are now fallow or support grain crops, such as wheat. Agricultural lands in the southern and western portions support other crops (field crops and orchards) (City of Sacramento, Sutter County, and TNBC 2003). Table 3.7-1 summarizes information compiled for the most recent categorization of land cover types in the Natomas Basin conducted for TNBC.

According to the Sutter County Agricultural Commissioner, the gross value of agricultural production in Sutter County was $498,195,000 in 2008 (Sutter County Agricultural Commissioner 2009). Of the crops grown in the Natomas Basin, rice and alfalfa were among the ten leading farm commodities produced in Sutter County (Sutter County Agricultural Commissioner 2009). According to the Sacramento County Agricultural Commissioner, the gross value of agricultural production in Sacramento County was $357,803,000 in 2008 (Sacramento County Agricultural Commissioner 2009). Of the crops grown in the Natomas Basin, alfalfa hay and corn (silage and field) were among the ten leading farm commodities produced in Sacramento County (Sacramento County Agricultural Commissioner 2009).

The Local Funding EIR, which was certified by SAFCA in February 2007, anticipates that as part of SAFCA’s comprehensive strategy for reducing the risk of flooding along the Sacramento River, SAFCA could acquire agricultural preservation easements from willing sellers in Sutter and Yolo Counties. In October 2007, the Governor signed into law Assembly Bill 930 amending the Sacramento Area Flood Control Agency Act of 1990 to make explicit SAFCA’s authority to acquire agricultural preservation easements from willing sellers outside its jurisdiction, provided such acquisition is consistent with applicable county plans and the State Plan of Flood Control.

Pursuant to this authority, SAFCA recently cooperated with Yolo County, the California Department of Water Resources (DWR), the Yolo Land Trust, and the Sacramento Valley Conservancy in acquiring and recording
agricultural conservation easements on approximately 1,660 acres of agricultural land in the Elkhorn Basin of Yolo County. The Elkhorn Basin is an agricultural area located directly across the Sacramento River from the Natomas Basin and is classified as Prime Farmland by the FMMP. It is protected from flooding by the Sacramento River west levee and the Yolo Bypass east levee. Preservation of this farmland is consistent with the Yolo County General Plan and zoning for this area, and with recently enacted state legislation (Senate Bill 5) recognizing that “the level of flood protection afforded rural and agricultural lands by the original flood damage reduction system would not be adequate to protect those lands if they are developed for urban uses, and that a dichotomous system of flood protection for urban and rural lands has developed through many years of practice.” SAFCA will assist in upgrading and maintaining levees at a standard suitable for agriculture.

3.2.2.1 California Important Farmland System and Farmland Mapping and Monitoring Program

Plate 3-1 shows the designated farmland within the Natomas Basin and the area northeast of the Basin according to the latest data available from the FMMP (Farmland Mapping and Monitoring Program 2006). As shown in Plate 3-1, much of the farmland in the Natomas Basin, including the farmland in areas where project features would be located, is designated by the FMMP as Prime Farmland and Farmland of Statewide Importance (California Department of Conservation 2008). The mapping indicates that Important Farmland in the Natomas Basin totaled approximately 40,000 acres in 2006. This represents approximately 6% of the total of approximately 715,000 acres of Important Farmland mapped by the FMMP in Sutter and Sacramento Counties in 2006 (California Department of Conservation 2008).

The Land Evaluation and Site Assessment (LESA) system is a tool used to rank lands for suitability and inclusion in the Federal Farmland Protection Program (FPP) administered by the Natural Resources Conservation Service (NRCS). LESA evaluates several factors, including soil potential for agriculture, location, market access, and adjacent land use. In general, because of the soil qualities, availability of irrigation water, and proximity of markets for agricultural products, agricultural lands in the Phase 4a Project area that are designated by the State of California as Important Farmlands would also receive a high ranking in the LESA system.

3.2.2.2 Williamson Act Contracts

The California Land Conservation Act of 1965, commonly known as the Williamson Act (California Government Code Section 51200 et seq.), is described above. Within the Natomas Basin, a total of approximately 7,586 acres are under Williamson Act Contract with an additional 1,534 acres filed for nonrenewal (see Plate 3-2).

3.3 Land Use, Socioeconomics, and Population and Housing

3.3.1 Regulatory Setting

3.3.1.1 Federal

The following Federal laws related to socioeconomics and population and housing are relevant to the NLIP, including the Phase 4b Project, and is described in detail in Chapter 6, “Compliance with Federal Environmental Laws and Regulations”:

► Executive Order 11988, Floodplain Management, and
► Uniform Relocation Assistance and Real Property Acquisition Policies Act.
3.3.1.2 STATE

Title 23 of the California Code of Regulations (Waters)

Section 133 of Title 23 of the California Code of Regulations (CCR) provides standards for control of residential encroachments on the waterside of the Sacramento River east levee. These standards apply to the construction, reconstruction, or repair of dwellings and associated improvements on the left bank waterward berm and waterward levee slope of the Sacramento River within RD 1000. The standards require the owner or permittee to maintain the waterward slope of the levee and the utilized area within the floodway of the Sacramento River in the manner required by RD 1000 or any other agency responsible for maintenance. The standards specify where fill may be placed, and where improvements such as driveways, fences, walls and dwellings may be constructed on the waterward side of the levee. Areas less than one foot above the design floodplain must be maintained so that unobstructed visual inspection of the levee slope and toe is possible from the levee crown.

Relocation Assistance and Property Acquisition

The State of California’s Government Code Section 7260, et seq. brings the California Relocation Act into conformity with the Federal Uniform Act. In the acquisition of real property by a public agency, both the Federal and state acts seek to (1) ensure consistent and fair treatment of owners of real property, (2) encourage and expedite acquisition by agreement to avoid litigation and relieve congestion in the courts, and (3) promote confidence in public land acquisition.

The Relocation Assistance and Real Property Acquisition Guidelines (Guidelines) were established by 25 CCR 1.6. The Guidelines were developed to assist public entities with developing regulations and procedures implementing Title 42, Chapter 61 of the United States Code – the Uniform Act, for Federal and Federally assisted programs. The Guidelines are designed to ensure that uniform, fair, and equitable treatment is given to people displaced from their homes, businesses, or farms as a result of the actions of a public entity. Under the Act, persons required to relocate temporarily are not considered “displaced,” but must be treated fairly. Such persons have a right to temporary housing that is decent, safe, and sanitary and must be reimbursed for all reasonable out-of-pocket expenses. In accordance with these Guidelines, people shall not suffer disproportionate injury as a result of action taken for the benefit of the public as a whole. Additionally, public entities must ensure consistent and fair treatment of owners of such property, and encourage and expedite acquisitions by agreement with owners of displaced property to avoid litigation.

Phase 4b Project implementation would include both permanent and temporary displacement of people because it would require acquisition of property to construct flood damage reduction facilities and could potentially result in temporary relocation of affected residents during portions of project construction. Property acquisition and relocation services and compensation for living expenses for temporarily relocated residents as a result of project implementation would be accomplished in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act and California Government Code Section 7267 et seq.

3.3.1.3 REGIONAL AND LOCAL

As noted above in Section 3.2.1.3, SAFCA, acting as a joint powers authority pursuant to the Joint Exercise of Power Act (California Government Code Section 6500 et seq.) and the SAFCA Act (California Water Code App. Section 130-1 et seq.), is immune from compliance with local laws and regulations; however, SAFCA has substantially complied with adopted regional and local plans, policies, and ordinances applicable to the NLIP. This EIS/EIR provides relevant local plans and policies in order to describe the land use planning and policy context in which the project exists and how local agency plans and policies address resource issues in the NLIP, including the Phase 4b Project, area and because if USACE implements the Phase 4b Project, USACE would be bound by all regional and local laws, regulations, and ordinances.
Sacramento International Airport Master Plan

The Sacramento International Airport Master Plan (Sacramento County Airport System 2007a) was adopted by the Sacramento County Board of Supervisors in August 2007, upon certification of the FEIR for the Sacramento International Airport Master Plan. This plan represents the first full-scale master planning effort for the Airport since the mid-1970s. The master plan includes an evaluation of current conditions; definition of objectives, obstacles, and alternatives; an extensive public involvement program; and an implementation plan. The master plan is intended to guide airport development for at least the next 20 years. Phase 1 of the Master Plan (2007–2013) has been permitted and is under construction. Among the Phase 1 improvements are the following (Sacramento County 2007: 3-8 through 3-26):

- replacement of the existing Terminal B;
- construction of a new concourse from the replacement Terminal B, with a capacity of 23 contiguous gates;
- hotel/parking garage;
- new parallel Taxiway Y;
- new full-length parallel Taxiway A, hold pads, and high-speed taxiway exits for Runway 16R/34L (west runway);
- new airport traffic control tower north and west of Cy Homer Road and airport, airfield, and equipment maintenance buildings;
- general aviation area including corporate hangars, fixed base operator facility, and apron;
- expanded surface rental car parking lot between Airport Boulevard and Earhart Drive;
- expanded rental car terminal facility east of Airport Boulevard and McNair Circle;
- extension of Elkhorn Boulevard from Metro Air Park to Airport Boulevard;
- surface employee parking lot north of I-5 and west of Airport Boulevard to accommodate 1,500 automobile parking spaces;
- new remote economy parking and rental car overflow facility south of I-5 to accommodate 13,800 automobile parking spaces;
- extension of Airport Boulevard to the new parking facility;
- new ground-service equipment maintenance building east of Aviation Drive;
- new community fire station at the northwest corner of Lindbergh Drive and Crossfield Drive; and
- acquisition of two areas (48 acres and 313 acres) north of I-5 for buffers.

Components of future phases of the master plan are listed below (Sacramento County 2007: 3-8 through 3-26):

- extension of the east runway from the current 8,600 feet to 11,000 feet to accommodate nonstop transcontinental flights;
- construction of a new, 8,600-foot-long north-south runway 1,200 feet to the west of the current west runway;
► further expansion of Terminal B and a new Terminal B parking garage;

► extension of Terminal A concourse;

► 2,400-foot extension of Runway 16L/34R (east runway) to provide a total runway length of 11,000 feet;

► addition of a localizer, instrument landing system glide slope, and high-intensity approach lighting system with sequenced flashing lights for new instrument landing system approach to Runway 16L/34R perpendicularly taxiway exits for parallel Taxiway A;

► construction of additional taxiways;

► improvement of off-airport roadway access to the airport, including extension of Elkhorn Boulevard to the airport, where it would connect to the airport road system; and

► extension by the Sacramento Regional Transit District of the proposed Downtown-Natomas-Airport light rail line to the airport, with a light rail stop at one of the Airport terminals.

**Sacramento International Airport Comprehensive Airport Land Use Plan**

The 2002 *California Airport Land Use Planning Handbook* (California Department of Transportation [Caltrans] 2002) is the guiding document for establishing, preparing, and modifying local airport land use compatibility plans (ALUCPs) (formerly known as comprehensive airport land use plans [CLUPs]) and their policies and procedures. ALUCP policies are intended to increase the awareness of residents, in any future residential communities that are approved, of their possible exposure to aircraft operations; to limit the potential for conflict between the airport and adjacent communities; and to protect future airport development and aircraft operations. The Sacramento Area Council of Governments (SACOG) serves as the Airport Land Use Commission (ALUC) for Sacramento, Sutter, Yolo, and Yuba Counties. It is responsible for developing and maintaining ALUCPs to protect public health and safety and ensure compatible land uses in the areas around each airport.

The Sacramento International Airport (formerly the Sacramento Metropolitan Airport) CLUP (ALUCP 1994) was adopted by the Sacramento County Board of Supervisors in October 1984 and amended in January 1994. The CLUP establishes planning boundaries for the Airport and defines compatible types and patterns of future land use. The purpose of the CLUP is to provide the Sacramento International Airport land area with compatibility guidelines for height, noise, and safety. The current Sacramento International Airport CLUP is more than 11 years old; since publication of the CLUP, the level of regional growth and expansion of airport operations have indicated the need for an update to the plan. (ALUCP 1994.)

The Sacramento County Board of Supervisors approved Resolution 2006-0490 for the Airport, which defined Airport Policy Planning Areas (APPAs) to be included into the County’s General Plan. However, the current County’s General Plan does not include this.

The Sacramento International Airport CLUP describes safety compatibility standards for public use airports, which include the Clear Zone, which is near the runway and is the most restrictive; the Approach/Departure Zone, which is located under the takeoff and landing slopes and is less restrictive; and the Overflight Zone, which is the area overflown by aircraft during the normal traffic pattern and is the least restrictive (Plate 1-7). New land uses proposed in any of these zones must comply with the standards identified by the CLUP.

In addition, the CLUP prohibits new residential development and school uses in those areas subject to noise levels of 65 decibels (dB) community noise equivalent level (CNEL) or above. Development in areas between the 60 and 65 CNEL are subject to an aircraft noise evaluation and implementation of recommend noise reduction measures.
Sacramento International Airport Wildlife Hazards Management Plan

The *Wildlife Hazards Management Plan* emphasizes the identification and abatement of wildlife hazards and outlines steps for monitoring, documenting, and reporting potential wildlife hazards and birds strikes. Agricultural crops and open water are the primary wildlife attractants within the Airport Perimeter B. Rice, wheat, safflower, corn, and alfalfa are all grown in the non-Airport portion of the Airport Perimeter B (SCAS 2007b).

Natomas Basin Habitat Conservation Plan

The 2003 *Natomas Basin Habitat Conservation Plan* (NBHCP) was prepared and adopted by the City of Sacramento, Sutter County, and TNBC (City of Sacramento, Sutter County, and TNBC 2003). An HCP is a planning document required under Section 10 of the Federal Endangered Species Act and was developed in consultation and coordination with the U.S. Fish and Wildlife Service (USFWS) to promote biological conservation in conjunction with economic and urban development in the Natomas Basin. The NBHCP establishes a multispecies conservation program to minimize and mitigate the expected loss of habitat values and incidental take of “covered species” that could result from urban development and operation and maintenance of irrigation and drainage systems. The NBHCP authorizes incidental take associated with 17,500 acres of urban development in southern Sutter County and within the City and County of Sacramento (i.e., 8,050 acres for the City of Sacramento, 7,467 acres for Sutter County, and 1,983 acres of Metro Air Park in Sacramento County).

The potential for the Phase 4b Project to conflict with this adopted plan is addressed in this EIS/EIR (see Impact 4.7-I, “Impacts on Successful Implementation of Habitat Conservation Plans”).

American River Parkway Plan

The American River Parkway (Parkway) is an open space greenbelt that extends approximately 29 miles from Folsom Dam to the American River’s confluence with the Sacramento River. Within this area, the Parkway is defined to include the American River and adjacent floodplain. The American River Parkway Plan (Parkway Plan) provides a guide to land use decisions affecting the American River Parkway; specifically addressing its preservation, use, development, and administration. The purpose of the Parkway Plan is to ensure preservation of the naturalistic environment while providing limited development to facilitate human enjoyment of the Parkway, and to act as the management plan for the Federal and state Wild and Scenic Rivers Acts. The Parkway Plan is adopted as an element of the Sacramento County General Plan, and is referenced in the General Plans of the cities of Sacramento and Rancho Cordova.

Sacramento County has the principal responsibility for the administration and management of the portion of the Parkway from the confluence of the American River with the Sacramento River upstream to Hazel Avenue. The Parkway has several distinct areas, each having unique features and for which Area Plans are adopted. Reach I:1 of the American River north levee, within the Phase 4b Project area, is located in the Discovery Park Area.

Parkway land use designations regulate the types of land uses, location, and level of facility development or degree of natural resource protection within the Parkway. The land use designations for the portion of the Parkway located adjacent to the American River north levee, west of the I-5 Bridge is designated “Protected Area” and “Nature Study” on the Discovery Park Area Plan. These land use designations are described as follows:

- **Protected Area:** contains tracts of naturally occurring vegetation and wildlife, which although capable of sustaining light to moderate use with minimal alterations to the natural landscape, would be easily disturbed by heavy use. General access is encouraged, but facilities and other improvements are limited to convenience-type facilities. Activities that are compatible with these areas include nature appreciation, trails recreation, and aquatic recreation, (other than motorized boating and motorized boat access) for individuals and small groups.

- **Nature Study:** These areas include the most environmentally sensitive areas of the Parkway, including those with special characteristics of flora, fauna, topography, available surface water, or other characteristics that
are appropriate for the interpretive education and other limited passive recreational activities. The predominant user group is the individual or small groups under supervision.

**Relevant Land Use Policies**

Specific direction is provided in the policies of the Parkway Plan to encourage a positive relationship with adjacent land uses while still protecting the Parkway from visual impacts outside the Parkway (Sacramento County 2008:7-109). The Parkway Plan’s land use policies regulate uses within the Parkway including the location and type of activities, as well as facilities and structures associated with those uses. For uses adjacent to the Parkway, the Parkway Plan provides policy guidance for jurisdictions regulating uses outside of the Parkway. The purpose of this policy guidance is to ensure that adjacent uses are sensitive to the Parkway’s naturalistic setting and scenic values, protect the Parkway from negative visual impacts, and encourage a positive relationship with adjacent communities (Sacramento County 2008:7-111). Relevant policies include:

- **Policy 7.1:** Facilities and improvements shall not be installed within the Parkway unless consistent with an adopted Parkway area plan.
- **Policy 7.3:** Brush clearing, mowing of natural vegetation, fire breaks, or similar activities shall be permitted where necessary to protect the public’s health, safety, or for the purposes of habitat restoration.
- **Policy 7.6:** Development in Nature Study Areas shall be strictly limited.
- **Policy 7.17:** Habitat restoration, local drainage, public utilities, and public flood control facilities, as determined to be appropriate to, and permitted within, a Wild and Scenic Rivers corridor, are permitted in all land use categories.
- **Policy 7.23:** Levees, landscaping, or other man-made or natural buffers should be used to separate, buffer or screen the Parkway visually form adjoining land uses, unless the adjacent land uses are indistinguishable from the Parkway.

**Relevant Flood Control and Levee Protection Policies**

- **Policy 4.9:** Flood management agencies should continue to maintain, and improve when required, the reliability of the existing public flood-control system along the lower American River to meet the need to provide a high level of flood protection to the heavily urbanized floodplain along the lower American River consistent with other major urban areas. This effort is expected to include raising and strengthening the levees as necessary to safely contain very high flow in the river (up to 160,000 cubic feet per second) for a sustained period.
- **Policy 4.10:** Flood control projects, including levee protection projects and vegetation removal for flood control purposes, shall be designed to avoid or minimize adverse impacts on the Parkway, including impacts to wildlife and wildlife corridors. To the extent that adverse impacts are unavoidable, appropriate feasible compensatory mitigation shall be part of the project. Such mitigation should be close to the site of the adverse impact, unless such mitigation creates other undesirable impacts.
- **Policy 4.12:** Vegetation in the Parkway should be appropriately managed to maintain the structural integrity and conveyance capacity of the flood control system, consistent with the need to provide a high level of flood protection to the heavily urbanized floodplain along the lower American River and in a manner that preserves the environmental, aesthetic, and recreational quality of the Parkway.
Sutter County General Plan

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

- **Goal 6.A:** To preserve high-quality agricultural land for agricultural purposes.
  - **Policy 6.B-3:** The County shall encourage the continued operation and expansion of existing agricultural industries.

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

Sacramento County General Plan

The *Sacramento County General Plan* is currently being updated (the DEIR was issued in spring 2009), but is not yet adopted. The Agricultural Element of the current *Sacramento County General Plan* (Sacramento County 1993) describes the goals of this element as the challenge of “maintenance of the County’s agricultural lands, [and] their agricultural productivity....” The following objective and policies of the current general plan may be relevant to this project.

- **Objective:** Retain agricultural land holdings in units large enough to guarantee future and continued agricultural use.
  - **Policy AG-7:** Agricultural zoning district boundaries shall be rational and shall respect parcel boundaries.
  - **Policy AG-8:** Agricultural land divisions shall not adversely affect the integrity of agricultural pursuits. Agricultural land divisions may be denied if the reviewing authority finds that the division of land is likely to create circumstances inconsistent with this policy.

The Scenic Highways Element of the *Sacramento County General Plan* includes the objective to “take necessary steps to preserve and enhance the scenic qualities of the Garden Highway,” and Garden Highway is designated a scenic corridor by the County. Policies included in the Scenic Highways Element encourage maintenance of natural roadside vegetation. (Sacramento County 1974.)

City of Sacramento General Plan

The *City of Sacramento 2030 General Plan* was adopted on March 3, 2009 (City of Sacramento 2009a). The City has a program with USACE and SAFCA in which it works with these and other responsible agencies to resolve floodplain restrictions. The following policies from the *City of Sacramento 2030 General Plan* may be relevant to this project.
Land Use and Urban Design

► Goal LU 2.2: City of Rivers. Preserve and enhance Sacramento’s riverfronts as signature features and destinations within the city and maximize riverfront access from adjoining neighborhoods to facilitate public enjoyment of this unique open space resource.

• Policy LU 2.2.2: Waterway Conservation. The City shall encourage the conservation and restoration of rivers and creeks within the urbanized area as multi-functional open space corridors that complement adjoining development and connect the city’s parks and recreation system to the Sacramento and American Rivers.

Education, Recreation, and Culture:

► Goal ERC 2.4: Rivers, Creeks, and Natural Resource Areas. Provide positive recreational experiences and enjoyment of nature through the development, maintenance, patrol, and preservation of the rivers, creeks, and natural resource areas, while maximizing the use of these areas through partnerships with other agencies.

• Policy ERC 2.4.3: Connections to Other Trails. The City shall maintain existing and pursue new connections to local, regional, and state trails.

Environmental Resources

► Goal ER 2.1: Natural and Open Space Protection. Protect and enhance open space, natural areas, and significant wildlife and vegetation in the city as integral parts of a sustainable environment within a larger regional ecosystem.

• Policy ER 2.1.4: Retain Habitat Areas. The City shall retain plant and wildlife habitat areas where there are known sensitive resources (e.g., sensitive habitats, special-status, threatened, endangered, candidate species, and species of concern). Particular attention shall be focused on retaining habitat areas that are contiguous with other existing natural areas and/or wildlife movement corridors.

► Goal ER 7.1: Visual Resource Preservation. Maintain and protect significant visual resources and aesthetics that define Sacramento.

3.3.2 ENVIRONMENTAL SETTING

3.3.2.1 LAND USE PATTERNS

Cultivated lands and scattered rural residences are present in the northern portion of the Natomas Basin; however, the Airport, operated by the Sacramento County Airport System (SCAS), is a major feature in the Natomas Basin in northern Sacramento County. The rural land use pattern transitions from agriculture to urbanization where Sacramento County gives way to the City of Sacramento. The portion of the Natomas Basin that is within the City of Sacramento includes the North Natomas Community Plan area and the South Natomas planning area. The South Natomas planning area consists of more than 5,000 acres bounded by the American River on the South, the Sacramento River and I-80 on the west, I-80 on the north, and the NEMDC/Steelhead Creek on the east. Of the total, 590 acres are vacant. Close to 2,200 acres are designated for residential uses; 200 acres of the residential-designated lands are vacant (City of Sacramento Planning Department 2006). The North Natomas Community Plan area extends generally between I-80 on the south and Elverta Road on the north, and between the West Drainage Canal, Fisherman’s Lake, and SR 99 on the west and the NEMDC/Steelhead Creek on the east. The plan area includes more than 9,000 acres, most of which are in the City of the Sacramento and 1,600 acres of which are in Sacramento County. Approximately 3,500 acres are designated for residential use, the primary use in
the plan area. The Employment Center designation has the most remaining vacant land with 890 acres of available land (City of Sacramento Planning Department 2007).

The Phase 4b Project area includes portions of the community of South Natomas within the incorporated boundaries of the city of Sacramento as well as rural portions of Sacramento County and southern Sutter County. Within the city of Sacramento, along the Sacramento River east levee, the American River north levee, and the NEMDC South, land uses are primarily residential, office, and retail commercial. Residences and businesses are located on the waterside and landside of the Sacramento River east levee and on the landside of the American River north levee. The American River Parkway is located in the floodplain south of the American River north levee. Land uses along the NEMDC North, west levee, and the NCC south levee consist of cultivated lands and scattered rural residences.

Land uses adjacent to the existing alignment of the West Drainage Canal and to the proposed West Drainage Canal relocation are agricultural except for the intersection of the canal alignment and Powerline Road, where there is a residence located on the south side of the canal.

The new sources of soil borrow proposed for the Phase 4b Project include the South Fisherman’s Lake Borrow Area, the West Lakeside School Site south of I-5 (see Plate 2-17), and the Triangle Properties Borrow Area, which is located on the east side of the PGCC between Sankey Road and just south of Catlett Road (see Plate 2-13). Land uses in the immediate vicinity of the South Fisherman’s Lake Borrow Area are agricultural; however, a residential subdivision in the city of Sacramento is located approximately 600 feet to the east of the portion of the South Fisherman’s Lake Borrow Area that is north of San Juan Road. Land uses in the vicinity of the West Lakeside School Site are agricultural except to the east, where the site abuts a residential subdivision in the city of Sacramento. The Triangle Properties Borrow Area is located in Sutter County and is primarily an agricultural area with lands in rice cultivation, field crops, and orchards. Approximately 14 farm complexes (farm houses with barns, associated sheds, and equipment storage) and a small cemetery are located within the Triangle Properties Borrow Area. The Union Pacific Railroad line extends along the east boundary of the Triangle Properties Borrow Area.

### 3.3.2.2 Population

According to the 2000 U.S. Census Bureau, Sacramento County had a resident population of 1,223,499 persons. The population projection for Sacramento County is 1,725,710 persons by 2025, representing a gain of approximately 502,211 new residents by 2025 and an increase of slightly more than 41%. Sutter County had a resident population of 78,930 in 2000. By 2025, the population of Sutter County is projected to reach approximately 137,108 persons, an increase of approximately 74%. (SACOG 2005)

Within the Natomas Basin, the majority of the population resides within the city of Sacramento. The 2000 Census recorded a population of approximately 35,500 persons within the Natomas Basin with a population of 86 persons recorded for the Sutter County portion and the remainder within the Sacramento County portion of the Basin. Within the Triangle Properties Borrow Area, the 2000 Census recorded approximately 56 residents (U.S. Census Bureau 2000).

The 2000 Census data show that the percentage of population with minority status in the South Natomas portion of Sacramento County is generally higher than for Sacramento County as a whole (42.2%). The 2000 Census data for Sacramento County census tracts in the Phase 4b Project area show that the percentage of minority populations is highest in the areas nearest to the American River north levee and the west levee of the NEMDC South. Populations with minority status make up over 50% of the population in this area. For Sutter County, the minority population makes up approximately 40% of Sutter County’s overall population. In the Sutter County census tracts located within the Phase 4b Project area, the minority population makes up approximately 23% of the population, which is lower than for the county as a whole (U.S. Census Bureau 2000).
The U.S. Department of Housing and Urban Development (HUD) low-income limit\(^2\) for a family of four in the Sacramento area in 2000 was at $42,300 and in the Yuba City area of Sutter County was $29,600 (HUD 2000a). The U.S. Census data reported that the median family income for the city of Sacramento was $42,051, for Sacramento County was $50,717, and for Sutter County was $44,300 (U.S. Census Bureau 2000).

According to the 2000 Census data for the census tract adjacent to the NEMDC South, the median family income was $27,460. For the census tracts adjacent to the Sacramento River east levee, Reach A:16–18, the median family income was $59,750; in Reach A:19, the median family income was $79,614; and in Reach A:20, the median family income was $44,028. For the census tracts adjacent to the American River north levee, the median family income was $48,650 (U.S. Census Bureau 2000).

### 3.3.2.3 Housing

The majority of housing in the Natomas Basin is located within the city of Sacramento in the communities of North and South Natomas. In 2005, SACOG reported a total of 13,495 housing units in North Natomas, of which 70% were single family and 30% were multi-family. For the same time period, SACOG reported 15,757 housing units in South Natomas, of which 57% were single family and 43% were multi-family (City of Sacramento 2009b: 5-6). According to the 2000 Census, the average vacancy rate for census tracts in North Natomas was 12.2% and the average vacancy rate for the combined census tracts in South Natomas was 7.0%. Of the census tracts within South Natomas, those tracts adjacent to the Sacramento River east levee had vacancy rates as high as 18.9% (U.S. Census Bureau 2000). The average rental vacancy rate in North Natomas in 2007 was 7.0% and in South Natomas it was 5.2% (City of Sacramento 2009b: 5-6). A residential building moratorium in North and South Natomas went into effect in December 2008; however, because of the slow-down in the housing market, the inventory of houses for sale remains high in the Natomas area (Long 2008).

In Sutter County, the vacancy rate in the census tracts covering southern Sutter County including the northern portion of the Natomas Basin was 7.6% (U.S. Census Bureau 2000).

The 2000 Census data recorded the median home price in North Natomas for the census tract adjacent to the Sacramento River east levee as $154,100. For the two census tracts in Reach A:19–20, the median home price was $220,100 and $217,600, respectively. Along the American River north levee, the median home price was $131,900. For the census tract adjacent to the NEMDC South, the median home price was $79,800. The median home price for the census tract adjacent to the NEMDC North was $199,100 (U.S. Census Bureau 2000).

### 3.4 GEOLOGY, SOILS, AND MINERAL RESOURCES

#### 3.4.1 Regulatory Setting

##### 3.4.1.1 Federal

The following Federal law related to geology, soils, and mineral resources is relevant to the NLIP, including the Phase 4b Project, and is described in detail in Chapter 6, “Compliance with Federal Environmental Laws and Regulations”:

- Federal Earthquake Hazards Reduction Act.

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\(^2\) HUD defines “low income” and “very low income” for its many housing assistance programs. Generally, low income is considered to be 80% of the median income for the Metropolitan Statistical Area (MSA) and adjusted for household size and the specific housing program (HUD 2003). The median family income in 2000 for the Sacramento MSA was $52,900 and for the Yuba City MSA was $36,000. The low-income level for the Yuba City MSA for fiscal year 2000 was based on the state median income; therefore, the low-income level is greater than 80% of the MSA median income (HUD 2000b).
3.4.1.1 STATE

California Building Standards Code

The State of California provides minimum standard for building design through the California Building Standards Code (CBC) (California Code of Regulations [CCR], Title 24). Where no other building codes apply, Chapter 29 of the CBC regulates excavation, foundations, and retaining walls. The CBC also applies to building design and construction in the state and is based on the Federal Uniform Building Code (UBC) used widely throughout the country (generally adopted on a state-by-state or district-by-district basis). The CBC has been modified for California conditions with numerous, more detailed and/or more stringent regulations.

The state earthquake protection law (California Health and Safety Code Section 19100 et seq.) requires that structures be designed to resist stresses produced by lateral forces caused by wind and earthquakes. Specific minimum seismic safety and structural design requirements are set forth in Chapter 16 of the CBC. The CBC identifies seismic factors that must be considered in structural design.

Chapter 18 of the CBC regulates the excavation of foundations and retaining walls, and Appendix Chapter A33 regulates grading activities, including drainage and erosion control, and construction on unstable soils, such as expansive soils and liquefaction areas.

The NLIP, including the Phase 4b Project, would require reconstruction of pumping plants, excavation, and drainage and erosion control, which must conform to the CBC.

California Seismic Hazards Mapping Act

The California Seismic Hazards Mapping Act of 1990 (California Public Resources Code [PRC] Sections 2690–2699.6) addresses seismic hazards other than surface rupture, such as liquefaction and induced landslides. The Seismic Hazards Mapping Act specifies that the lead agency for a project may withhold development permits until geologic or soils investigations are conducted for specific sites, and mitigation measures are incorporated into plans to reduce hazards associated with seismicity and unstable soils. The closest active fault to the Natomas Basin is located approximately 15 miles to the northwest, as shown in Table 3.4-2.

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act (California PRC Sections 2621–2630) was passed by the California Legislature in 1972 to mitigate the hazard of surface faulting to structures. The act’s main purpose is to prevent the construction of buildings used for human occupancy on the surface trace of active faults. The act addresses only the hazard of surface fault rupture and is not directed toward other earthquake hazards. Local agencies must regulate most development in fault zones established by the State Geologist. Before a project can be permitted in a designated Alquist-Priolo Earthquake Fault Zone, cities and counties must require a geologic investigation to demonstrate that proposed buildings would not be constructed across active faults. As discussed below in Section 3.4.2.2, “Seismicity,” the NLIP area, including the Phase 4b Project area, does not contain any Alquist-Priolo Earthquake Fault Zones.

California Surface Mining and Reclamation Act

The California Surface Mining and Reclamation Act of 1975 (SMARA) (California PRC Section 2710 et seq.) addresses surface mining operations. Surface mining operations include, “…borrow pitting, streambed skimming, segregation and stockpiling of mined materials (and recovery of the same) …” (CCR, Title 14, Section 3501). Section 3501 further defines excavations for on-site construction as “earth material moving activities that are required to prepare a site for construction of structures, landscaping, or other land improvements (such as excavation, grading, compaction, and the creation of fills and embankments), or that in and of themselves constitute engineered works (such as dams, road cuts, fills, and catchment basins).” The SMARA statute requires
mitigation to reduce adverse impacts on public health, property, and the environment. Because borrow activities associated with the NLIP, including the Phase 4b Project, would disturb more than 1 acre or remove more than 1,000 cubic yards of material through surface mining activities, including the excavation of borrow pits for soil material, the project proponent(s) must comply with SMARA.

SMARA is implemented through ordinances adopted by local government “lead agencies” that provide the regulatory framework under which local mining and reclamation activities are conducted. The State Mining and Geology Board reviews the local ordinances to ensure that they meet the procedures established by SMARA. In general, SMARA permitting requires lead agency approval of a permit, a reclamation plan, and the posting of approved financial assurance for the reclamation of mined land.

Cities and counties have the authority to enforce SMARA and create additional regulations. Sacramento and Sutter Counties are the SMARA lead agencies for surface mining operations in their respective counties within the NLIP area. Compliance is achieved by either obtaining a SMARA permit or exemption.

Certain construction activities do not require a SMARA permit. As stated in California PRC Section 2714, the following activities are exempt:

b) On-site excavation and onsite earthmoving activities that are an integral and necessary part of a construction project and that are undertaken to prepare a site for construction of structures, landscaping, or other land improvements associated with those structures, including the related excavation, grading, compaction, or the creation of fills, road cuts, and embankments, whether or not surplus materials are exported from the site, subject to all of the following conditions:

1. All required permits for the construction, landscaping, or related land improvements have been approved by a public agency in accordance with applicable provisions of state law and locally adopted plans and ordinances, including, but not limited to, Division 13 (commencing with Section 21000).

2. The lead agency’s approval of the construction project included consideration of the onsite excavation and onsite earthmoving activities pursuant to Division 13 (commencing with Section 21000).

3. The approved construction project is consistent with the general plan or zoning of the site.

4. Surplus materials shall not be exported from the site unless and until actual construction work has commenced and shall cease if it is determined that construction activities have terminated, have been indefinitely suspended, or are no longer being actively pursued.

Sacramento County has granted SMARA exemptions for the Airport north bufferlands (for Phase 2 Project construction), most of the Fisherman’s Lake Borrow Area (including Novak, for Phase 4a Project construction), and the South Sutter, LLC borrow site (for Phase 3 and 4a Projects’ construction); and Sutter County has granted a SMARA exemption for the Brookfield borrow site (for Phase 2 Project construction). Exemptions were granted under Section 20.01.040(B) of the Sacramento County Code and Section 290-030 of the Sutter County Code, for NLIP borrow sites in each respective county, which are consistent with Section 2714(b) of SMARA. Sacramento County determined that the northeastern corner of the Fisherman’s Lake Borrow Area (called the Natomas Urban Development site) would require a SMARA permit and, as such, SAFCA will obtain a SMARA permit for this site (for Phase 4a Project construction).

Table 2-22 lists the borrow sites that would supply soil borrow for the NLIP and potentially for Phase 4b Project construction. SMARA permits or exemptions would be obtained, as appropriate, for selected Phase 4b Project...
borrow sites. Excavation activities would not commence until all regulatory and compliance requirements for borrow activities have been met.

SMARA also requires identification and classification of mineral resource zones (MRZs). In Sacramento County, Portland cement concrete-grade alluvial sand and gravel and kaolin clay resources are considered to be economically important industrial mineral resources. Table 3.4-1 provides descriptions for each MRZ classification within the NLIP area.

<table>
<thead>
<tr>
<th>Classification</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MRZ-1</td>
<td>Areas where adequate information indicates that no significant mineral deposits are present or where it is judged that little likelihood exists for their presence</td>
</tr>
<tr>
<td>MRZ-2</td>
<td>Areas where adequate information indicates that significant mineral deposits are present or where it is judged that a high likelihood for their presence exists</td>
</tr>
<tr>
<td>MRZ-3</td>
<td>Areas containing mineral deposits, the significance of which cannot be evaluated from existing data</td>
</tr>
<tr>
<td>MRZ-4</td>
<td>Areas where available data are inadequate for placement in any other mineral resource zone</td>
</tr>
</tbody>
</table>

Note: MRZ = Mineral Resource Zone
Source: Dupras 1999

### 3.4.1.2 REGIONAL AND LOCAL

There are no local laws, regulations, policies, or ordinances related to geology, soils, and mineral resources that are relevant to the NLIP, including the Phase 4b Project.

### 3.4.2 ENVIRONMENTAL SETTING

The Natomas Basin is relatively flat and open. Levees provide the only significant topographic relief in the Basin and near the Phase 4b Project area.

### 3.4.1.3 GEOLOGY

The Natomas Basin, which includes the Phase 4b Project area, lies in the Sacramento Valley portion of the Great Valley Geomorphic Province. The Great Valley is 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. The Great Valley is drained by the Sacramento and San Joaquin Rivers, which join and flow out of the Great Valley province through San Francisco Bay. This geomorphic province is an asymmetric trough approximately 400 miles long and 50 miles wide that is characterized by a relatively flat alluvial plain made up of a deep sequence of sediment deposits from Jurasssic (180 million years ago) to recent age. The sediments in the Great Valley vary between 3 and 6 miles in thickness and were derived primarily from erosion of the Sierra Nevada to the east, with lesser material from the Coast Ranges to the west. The eastern edge of the Sacramento Valley is flanked by uplifted and tilted sedimentary strata that overlie rocks of the Foothills Metamorphic Belt and are in turn overlain on the west by younger alluvium.

The Sacramento Valley has been a depositional basin throughout most of the late Mesozoic and Cenozoic time. A vast accumulation of sediments was deposited during cyclic transgressions and regressions of a shallow sea that once inundated the valley. Overlying the thick sequence of sedimentary rock units that form the deeply buried bedrock units in the mid-basin areas of the valley are Late Pleistocene and Holocene (Recent) alluvial deposits, consisting of reworked fan and stream materials that were deposited by streams before the construction of the existing flood damage reduction systems. The youngest geomorphic features in the program study area are low
floodplains, which are found primarily along the Sacramento and American Rivers. The natural floodplains of these rivers are very wide in this area because the land is relatively flat. These major drainage ways were originally confined within broad natural levees sloping away from the rivers or streams. The natural levees formed through the deposition of alluvium during periods of flooding. As flood waters lost energy, the coarser materials settled out nearest the rivers and streams, forming the natural levees and sand bars in the vicinity of the river channel. The finer material was carried in suspension farther from the rivers or streams, and settled out in quiet water areas such as swales, abandoned meander channels, and lakes. However, because the streams have meandered and reworked the previously deposited sediments, extreme variations in material types may be found over a limited distance or depth.

Flanking the Recent alluvial deposits in the Natomas Basin 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 major source of sediments deposited in the Natomas Basin is from the erosion of the Sierra Nevada mountain range and foothills to the east of the Sacramento Valley. Naturally occurring asbestos (NOA) is known to occur in the foothill metamorphic belt. Therefore, NOA may be present in the Basin; however, the likelihood of project area soils containing significant concentrations of NOA is low due to the long distance from the source rock (Anderson 2008).

3.4.1.4 SEISMICITY

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

The closest active faults to the project area are listed in Table 3.4-2. In addition, the approximate distance from the project area, maximum moment magnitude, and fault class are identified.

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 in the NLIP area by the California Geological Survey or the U.S. Geological Survey, and the area is not located within an Alquist-Priolo Earthquake Fault Zone, fault ground rupture is unlikely in the Phase 4b Project area. Common secondary seismic hazards include ground shaking, liquefaction, subsidence, and seiches. These hazards are discussed briefly below:

- **Ground shaking.** Seismic ground shaking refers to ground motion that results from the release of stored energy during an earthquake. The intensity of ground shaking depends on the distance from the earthquake epicenter to the site, the magnitude of the earthquake, site soil conditions, and the characteristic of the source.

- **Ground failure/liquefaction.** Liquefaction is a process by which water-saturated materials (including soil, sediment, and certain types of volcanic deposits) lose strength and may fail during strong ground shaking, when granular materials are transformed from a solid state into a liquefied state as a result of increased pore-water pressure. Structures on ground that undergoes liquefaction may settle or suffer major structural damage. Liquefaction is most likely to occur in low-lying areas where the subgrade consists of poorly consolidated unconsolidated water-saturated sediments or similar deposits of artificial fill. Liquefaction during an
Table 3.4-2
Active Faults in the NLIP Area

<table>
<thead>
<tr>
<th>Fault Name</th>
<th>Approximate Distance (Miles)¹</th>
<th>Fault Class²</th>
<th>Maximum Moment Magnitude³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dunnigan Hills</td>
<td>15</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Great Valley 3</td>
<td>23</td>
<td>B</td>
<td>6.9</td>
</tr>
<tr>
<td>Great Valley 4</td>
<td>26</td>
<td>B</td>
<td>6.6</td>
</tr>
<tr>
<td>Great Valley 5</td>
<td>35</td>
<td>B</td>
<td>6.5</td>
</tr>
<tr>
<td>Hunting Creek-Berryessa</td>
<td>38</td>
<td>B</td>
<td>7.1</td>
</tr>
<tr>
<td>Concord-Green Valley</td>
<td>41</td>
<td>B</td>
<td>6.7</td>
</tr>
<tr>
<td>Great Valley 2</td>
<td>44</td>
<td>B</td>
<td>6.4</td>
</tr>
<tr>
<td>West Napa</td>
<td>48</td>
<td>B</td>
<td>6.5</td>
</tr>
<tr>
<td>Bartlett Springs</td>
<td>50</td>
<td>B</td>
<td>7.6</td>
</tr>
<tr>
<td>Great Valley 1</td>
<td>52</td>
<td>B</td>
<td>6.7</td>
</tr>
<tr>
<td>Collayomi</td>
<td>58</td>
<td>B</td>
<td>6.5</td>
</tr>
<tr>
<td>Mount Diablo Thrust</td>
<td>59</td>
<td>B</td>
<td>6.6</td>
</tr>
<tr>
<td>Maacama-Garberville</td>
<td>60</td>
<td>B</td>
<td>7.5</td>
</tr>
<tr>
<td>Greenville</td>
<td>61</td>
<td>B</td>
<td>6.9</td>
</tr>
<tr>
<td>Hayward–Rodgers Creek</td>
<td>62</td>
<td>A</td>
<td>7.2</td>
</tr>
</tbody>
</table>

Notes: NA = not available

¹ Approximate distance is measured from the Natomas Basin to the respective active fault line.

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

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


The liquefaction can occur during the earthquake when the soil properties are such that the horizontal shaking is large enough to cause the soil to liquefy. Liquefaction can be identified by the presence of sand boils, which are expulsions of sand and water from below the surface due to increased pore-water pressure below the surface. Areas paralleling the Sacramento River that contain clean sand layers with low relative densities coinciding with a relatively high water table have generally high liquefaction potential.

Subsidence and settlement. Subsidence is the gradual settling or sudden sinking of the ground surface resulting from subsurface movement of earth materials. Seismically induced settlement refers to the compaction of soils and alluvium caused by ground shaking. Fine-grained soils are subject to seismic settlement and differential settlement. Areas underlain by low-density silts and clays associated with fluvial depositional environments are susceptible to seismically induced settlement. These environments include old lakes, sloughs, swamps, and streambeds. The amount of settlement may range from a few inches to several feet. The potential for differential settlement is highest and occurs over the largest areas during great earthquakes. A potential for differential settlement exists where low-density and unconsolidated material is encountered, such as overbank river deposits (present day and historical) common along the Sacramento River. Subsidence and settlement may also occur from construction of the adjacent levee separate from
liquefaction or densification due to both immediate settlements in granular soils and the consolidation of fine grained soils.

► **Seismic seiches.** A seiche is an earthquake-induced wave within an enclosed or restricted body of water, such as a lake, reservoir, or channel. Seiches can cause a body of water to overtop and damage levees and dams and may lead to inundation of surrounding areas.

Wind-induced waves and subsidence, either with or without a seismic event, may result from installation of cutoff walls. Geotechnical engineering studies performed for the Landslide Improvements Project are required to comply with standard engineering practices for levee design. The Central Valley Flood Protection Board’s (CVFPB’s) standards are the primary State standards applicable to the proposed levee improvements; these are stated in Title 23, Division 1, Article 8, Section 111–137 of the California Code of Regulations. CVFPB’s standards direct that levee design and construction be in accordance with USACE’s *Engineering Design and Construction of Levees* (USACE 2000), the primary Federal standards applicable to levee improvements. Because the design, construction, and maintenance of levee improvements must comply with the regulatory standards of USACE and CVFPB, it is assumed that the design and construction of all levee modifications under the Adjacent Levee Alternative (Proposed Action) or Fix-in-Place Alternative would meet or exceed applicable design standards for static and dynamic stability, seismic ground shaking, liquefaction, subsidence, and seepage, as well as wind-induced waves and subsidence.

### 3.4.1.5 Soils

The Sutter and Sacramento County soil surveys (NRCS 1988, 1993) identify a variety of soil map units in the NLIP area. Most of the soils in the NLIP area, including the Phase 4b Project area, are shallow to moderately deep, sloping, well-drained soils with very slowly permeable subsoils underlain with hardpan. These soils have good natural drainage, slow subsoil permeability, and slow runoff (NRCS 1988, 1993).

The Natomas Basin generally consists of deep soils derived from alluvial sources, which range from low to high permeability rates and low to high shrink-swell potential. Soils range from low to high hazard ratings for construction of roads, buildings, and other structures related to soil bearing strength, shrink-swell potential, and the potential for cave-ins during excavation. Soils immediately adjacent to the Sacramento River are dominated by deep, nearly level, well-drained loamy and sandy soils. The natural drainage is good, and the soils have slow to moderate subsoil permeability. The river terraces consist of very deep, well-drained alluvial soils. (NRCS 1988, 1993.) The porous nature of the soils underneath the existing levee system is an important consideration for the design of levee improvements within the NLIP area, including the Phase 4b Project.

### 3.4.1.6 Minerals

Sacramento County protects aggregate (i.e., sand and gravel) from land uses that could preclude or inhibit a timely mineral extraction to meet market demand (Sacramento County 1993). According to the California Department of Conservation (DOC), Division of Mines and Geology, a small area of the northern corner of the proposed West Lakeside borrow site is located in an area designated by DOC as MRZ-3, meaning it is an area containing mineral deposits, the significance of which cannot be evaluated from existing data; the remainder of the Phase 4b Project footprint is designated as MRZ-1, meaning that no significant mineral deposits are present in this area or where it is judged that little likelihood exists for their presence (Dupras 1999). Other than the West Lakeside borrow area located within the Phase 4b Project footprint, there are no other MRZ-designated areas within the Sacramento County portion of the NLIP area.

There are no MRZ-designated areas within the Sutter County portion of the NLIP area, including the Phase 4b Project area.
3.5 HYDROLOGY AND HYDRAULICS

3.5.1 REGULATORY SETTING

3.5.1.1 FEDERAL

The following Federal laws related to hydrology and hydraulics are relevant to the NLIP, including the Phase 4b Project, and are described in detail in Chapter 6, “Compliance with Federal Environmental Laws and Regulations”:

► Executive Order 11988, Floodplain Management;

► Federal Emergency Management Agency Code of Federal Regulations Title 44, Section 65.10 (Levee Requirements) and FEMA Flood Zone Designations; and

► Rivers and Harbors Act of 1899, As Amended (Sections 14 and 10).

3.5.1.2 STATE

California Executive Order S-01-06, Identification and Repair of Critical Erosion Sites

On February 24, 2006, Governor Arnold Schwarzenegger declared a state of emergency for California’s levee system. Soon after, he signed Executive Order S-01-06, directing DWR to identify and repair eroded levee sites on the Federal/State levee system to prevent catastrophic flooding and loss of life. To date, nearly 250 levee repair sites have been identified, and more than 100 of the most critical sites have been completed. Two of the sites are along the bank of the Sacramento River east levee between the NCC and the American River. Rock toe protection has been installed at these sites. These improvements do not overlap temporally with construction of the Phase 4b Project.

Central Valley Flood Control Act of 2008

The Central Valley Flood Control Act of 2008, passed in 2007, recognizes that the Central Valley of California, which includes the Natomas Basin, is experiencing unprecedented development, resulting in the conversion of historically agricultural lands and communities to densely populated residential and urban centers. Because of the potentially catastrophic consequences of flooding, the Act recognizes that the Federal government’s current (100-year (0.01 AEP) design flood elevation standard is not sufficient to protect urban and urbanizing areas within flood-prone areas throughout the Central Valley and declares that the minimum standard for these areas is a 200-year (0.005 AEP) design flood elevation. To continue with urban development, cities and counties must develop and implement plans for achieving this new standard by 2025. With respect to flood risk damage reduction, the Central Valley Flood Control Act also calls upon DWR to develop a comprehensive Central Valley Flood Protection Plan by the end of 2012 for protecting the lands currently within the Sacramento–San Joaquin River Flood Management System.

Central Valley Flood Protection Board Encroachment Permit

The California Central Valley Flood Protection Board (CVFPB, formerly The Reclamation Board) requires an encroachment permit for any non-Federal activity along or near Federal flood damage reduction project levees and floodways or in CVFPB-designated floodways to ensure that proposed local actions or projects do not impair the integrity of existing flood damage reduction systems to withstand flood conditions. The permits are conditioned upon SAFCA receipt of permission from USACE for alteration of the Federal project works pursuant to Section 408. For the Phase 4b Project, CVFPB encroachment permits would only be needed if Congress does not provide authorization and SAFCA chooses to proceed with the Phase 4b Project without Federal participation.
3.5.1.3 REGIONAL AND LOCAL

Sutter County General Plan

There are no policies in the Sutter County General Plan related to hydrology and hydraulics that are relevant to the NLIP, including the Phase 4b Project.

Sacramento County General Plan

The Sacramento County General Plan is currently being updated (the DEIR was issued in spring 2009), but is not yet adopted. The Safety Element of the existing Sacramento County General Plan (Sacramento County 1993) contains the goal, “Minimize the loss of life, injury and property damage due to flood hazards.” Policies in support of this goal generally require that the County work with USACE, SAFCA, and other Federal, state, and local government entities to provide for flood protection within the County and discourage development within the 100-year floodplain. Policy SA-6 requires the County to participate through SAFCA in obtaining Federal authorization for construction of flood control projects on the Sacramento and American Rivers to provide 200-year flood protection; Policy SA-10 requires the County to continue local efforts that encourage implementation of the Federal Flood Insurance Program; Policy SA-13 requires the County to prohibit urban uses on unprotected flood land; and Policy SA-14 requires the County to participate with the City of Sacramento and USACE and other Federal, state, regional, and local governments and agencies to develop policies to finance, construct, and plan flood improvements to eliminate flooding in Sacramento County.

City of Sacramento General Plan

There are no policies in the Sacramento County General Plan related to hydrology and hydraulics that are relevant to the NLIP, including the Phase 4b Project.

3.5.2 ENVIRONMENTAL SETTING

3.5.2.1 SURFACE WATER HYDROLOGY

The NLIP area, including the Phase 4b Project, lies just north of the confluence of the Sacramento and American Rivers. The Sacramento River drainage basin covers approximately 26,150 square miles and includes the Feather River drainage basin, which totals approximately 5,500 square miles. Despite its relatively small size, the Feather River has the potential to generate very high peak floods. Table 3.5-1 compares the runoff characteristics of these drainage basins.

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

Note: cfs = cubic feet per second
Source: SAFCA 2007 (data provided by MBK Engineers)
Total annual precipitation within the Sacramento River watershed falls as both rain and snow. Precipitation in winter falls primarily as snow in the higher elevations. Annual, monthly, and daily precipitation varies widely within the watershed, with the highest precipitation totals generally falling in winter, in the Sierra Nevada, and in the northern part of the watershed. The high variability in precipitation, snowfall, and snowmelt results in highly variable runoff patterns each year and month during late fall, winter, and spring. The number of high-water events in the waterways surrounding the Natomas Basin each year varies widely as well, and ranges from no events to five or more events.

The American and Feather Rivers produce about 90% of the flood flows approaching Sacramento from the north and the east. Both historically and as part of the design of the Sacramento River Flood Control Project (SRFCP), flood flows approaching from the north are split between the Sacramento River and the Yolo Basin (Bypass). Under the current design of the SRFCP, the Yolo Bypass absorbs about 70% of this flow at the latitude of Verona and 80% at the latitude of Sacramento. To the east, the entire flow of the American River must be passed through the urban core of Sacramento. Improved flood protection for the Sacramento area is thus dependent on the strength of the levee system along the lower Sacramento and American Rivers and on the capability of Folsom Dam to limit American River flows to the design capacity of the American River levee system.

The SRFCP was designed based on the flows and water surface elevations produced by the great floods of 1907 and 1909. The project design considered that areas inundated by these floods would be protected by levees, thus increasing flood flows downstream due to the elimination of floodplain storage. Because the 1907 and 1909 floods were the largest to occur since 1862, it was assumed that floods of this magnitude would recur very infrequently throughout the watershed. In fact, based on the continuous record of streamflow data since the SRFCP was approved, it appears that the 1907 and 1909 floods are approximately equal to a 10-year flood (0.10 AEP) along the American and Feather Rivers. Consequently, the original plan of flood damage reduction has been modified numerous times to account for changes in the SRFCP design flood and the flood risk associated with the urban areas in the American and Feather River basins. The most recent modifications have involved the construction of Folsom Dam and the extension of the levee along the north side of the American River (completed 1955) and the construction of Oroville Dam and New Bullards Bar Dam in the Feather River basin (completed 1969).

### 3.5.2.2 LEVEE DESIGN

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

This design, although well suited to address the technical and financial challenges of a previous era, has left a succeeding generation of flood managers with two systemic problems and levee risk factors: chronic erosion and seepage. Because of the use of relatively porous hydraulic mining sediments in many parts of the mainstem levee system, the levees have a propensity to seep when subjected to prolonged high water surface elevations such as occurred during the floods of 1986 and 1997. Through-seepage was deemed a levee system design deficiency in the aftermath of the 1986 flood, and a substantial capital improvement program has been under way since the early 1990s to address this deficiency. Additionally, because the mainstem levees are constructed on high berms relatively close to the river channel, the same energy that was harnessed to drive hydraulic mining sediment from the system also exerts itself against the sandy alluvial soil layers that lie beneath the levees. In high river stage conditions, this energy is strong enough to push water through these layers in volumes great enough to exert an uplift force capable of fracturing the soil mantel on the landside of the levee. This “underseepage” can occur.
where levees are constructed on low-permeability foundation soil (silt and clay) underlain by a higher-permeability layer (sand and gravel), and makes the levee susceptible to failure during periods of high river stage.

### 3.5.2.3 Frequency of Flooding

The Natomas Basin is subject to flooding from a combination of flows in the Sacramento and American River channels and in the tributary streams east of the Basin. Along the northern and western perimeters of the Basin, the greatest threat is from a large flood in the Sacramento/Feather River basin combined with high runoff in the creeks and streams of southern Sutter and western Placer Counties that drain through the NCC. The probability (or frequency) of an uncontrolled flood in the Natomas Basin is linked to the hydrology of the lower Sacramento Valley and the performance of the levees comprising the SRFCP, including the levees upstream of the Natomas Basin. The hydrology of the lower Sacramento Valley was extensively analyzed by USACE and the State of California Reclamation Board (now the Central Valley Flood Protection Board) as part of the Sacramento and San Joaquin River Basins California Comprehensive Study. These data have been used to create hydraulic models that route the estimated runoff for various flood events through the river and stream channels comprising the SRFCP and estimate the resulting water surface elevations. In very large floods that exceed the design capacity of the SRFCP, these calculated water surface elevations are highly sensitive to assumptions about the performance of upstream SRFCP levees. If the SRFCP levees upstream of the Natomas Basin are assumed to fail when overtopped, these very large floods produce much lower water surface elevation in the channels around the Natomas Basin (by 1 to 2 feet) than if it is assumed the upstream levees will not fail when overtopped.

### 3.5.2.4 Irrigation and Drainage Facilities

Reclamation of the Natomas Basin for agricultural development required construction of two major ditch and canal systems in the Natomas Basin: an irrigation system owned and operated by NCMWC and a drainage system owned and operated by RD 1000. NCMWC pumps water into the Basin to provide irrigation water to its shareholders for agricultural use within the Basin. During winter (October through April), drainage is primarily rainfall runoff; during summer (May through September), drainage water from agricultural fields is typically recirculated for irrigation. Because the Basin is surrounded by levees, all excess drainage within the Basin must be pumped out. In general, water is pumped into the Basin from the Sacramento River and NCC as irrigation water and returned to the perimeter drainage channels via RD 1000’s interior drainage system.

Several irrigation canals, pipelines, wells, and pump stations exist along the Sacramento River east levee. These include the Elkhorn Main Irrigation Canal (Elkhorn Canal), which runs parallel to the Sacramento River east levee from the North Drainage Canal to just south of West Elkhorn Boulevard, and the Riverside Main Irrigation Canal (Riverside Canal), which runs parallel to the east levee from approximately 1 mile north of San Juan Road to approximately Orchard Lane. These NCMWC canals are fed by three pumping plants on the Sacramento River (Plate 1-9). They have earthen embankments that allow water levels to be maintained above surrounding ground surfaces so that water can be delivered to agricultural receiving lands by gravity flow. The NCMWC also operates two pumps along the NCC south levee that provide irrigation water to agricultural lands in the northern portion of the Basin. NCMWC irrigation systems and several other landowner-operated systems along the Sacramento River east levee will need to be relocated to accommodate improvements to these levees. The new facilities along the Sacramento River east levee could provide a sustainable long-term source of agricultural irrigation water in the western and northern portions of the Basin that are expected to remain in some form of agriculture or open space use to accommodate the Airport and two of the three major blocks of habitat being assembled by TNBC.

RD 1000 operates several drainage pumping plants that could be affected by levee improvement activity. Pumping Plant No. 2, located in Sacramento River east levee Reach C:4B, pumps drain water from the lower end of the North Drainage Canal; Pumping Plant No. 5, located in Sacramento River east levee Reach B:10, pumps water from the West Drainage Canal; Pumping Plant No. 3, located in Sacramento River east levee Reach B:13, pumps drain water from the West Drainage Canal; Pumping Plant No. 1, located in Sacramento River east levee Reach A:20A, pumps drain water from the Main Drainage Canal; and Pumping Plant No. 4, located in NCC
Reach D:2, pumps drain water from the upper end of the North Drainage Canal; Pumping Plant No. 5, located in Sacramento River east levee Reach B:10, pumps drain water from the West Drainage Canal; Pumping Plant No. 8, located on the NEMDC west levee between Del Paso Road and North Market Boulevard, pumps drain water from the C-1 Drain; and Pumping Plant No. 6, located on the NEMDEC west levee between Elvorta Road and Elkhor Boulevard, pumps drain water from the E Drain. These pumping facilities include discharge pipelines that would need to be relocated as part of the levee improvements in these locations. The City of Sacramento operates the Willow Creek drainage pumping station that is located in Sacramento River east levee Reach A:19B; Pump Station No. 58, which is located on the American River north levee at Asuza Street; and Pump Station No. 102, which is located on the NEMDC west levee in Gardenland Park.

The major irrigation and drainage facilities that would be affected by the project are discussed in Section 2.3.3.3, “Irrigation and Drainage Components.”

### 3.5.2.5 GROUNDWATER HYDROLOGY

#### Basin and Aquifer Description

The Natomas Basin lies in the North American Subbasin within the Sacramento Groundwater Basin. The North American Subbasin is bounded on the north by the Bear River, on the west by the Feather and Sacramento Rivers, and on the south by the Sacramento River in the west and the American River in the east. The eastern boundary is a north-south line extending from the Bear River south to Folsom Lake, which passes about 2 miles east of the town of Lincoln (see Plates 1-1 and 1-2 for general locations). The eastern boundary represents the approximate edge of the alluvial basin, where little or no groundwater flows into or out of the groundwater basin from the rock of the Sierra Nevada (DWR 1997). The eastern portion of the subbasin is characterized by low, rolling dissected uplands. The western portion is nearly a flat 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% (DWR 2003).

DWR Bulletin 118 (DWR 2003) describes the aquifer system in the subbasin as heterogeneous and consisting of many discontinuous beds of clay, silt, sand, and gravel. The water-bearing materials of the subbasin are dominated by unconsolidated continental deposits of Late Tertiary and Quaternary age deposits that include Miocene/Pliocene volcanics, older alluvium, and younger alluvium. Younger alluvium consisting of alluvial flood basin and stream channel deposits is present in the upper 100 feet in areas along and adjacent to the Sacramento and American Rivers. Sand and gravel zones, along with dredger tailings that are found sporadically along the American River, are highly permeable and yield significant quantities of water to wells. Older alluvium, deposited during Pliocene and Pleistocene times and occurring over the area between the Sierra Nevada foothills and the valley axis, consists of loosely to moderately compacted sand, silt, and gravel. Permeability varies considerably in these alluvial deposits (Valley Springs, Laguna, and Fair Oaks formations), which occupy the upper 200 to 300 feet of the aquifer system. Groundwater in the older alluvium is typically unconfined, although semi-confined conditions exist on localized levels. The Mehrten and older geologic units can be characterized as composing the lower aquifer system, which is generally deeper than 300 feet toward the west side of the subbasin. Typically, the level of confinement increases with depth. 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 subbasin. Most of the groundwater is produced in the northern portion of the subbasin. (DWR 2003.)

#### Groundwater Recharge and Local Levels

Major recharge to the local aquifer system generally occurs along active river and stream channels where extensive sand and gravel deposits exist, particularly in the American River and Sacramento River channels (Sacramento Groundwater Authority [SGA] 2002). Where surface water is hydrologically disconnected from groundwater, it percolates through the unsaturated zone beneath the streambed to the groundwater and is a function of the underlying aquifer materials and water levels in the stream. Some evidence suggests this occurs in
parts of the Sacramento River in northern Sacramento County (SGA 2003). In western Placer County (northeast section of the subbasin), the rivers adjacent to the subbasin, including the Sacramento and Bear Rivers, and the major streams, ravines, and creeks that cross the valley floor, are the main sources of recharge (Placer County Water Agency 2003). Other sources of recharge within the system include inflow of groundwater generally from the northeast; subsurface recharge from fractured geologic formations to the east; and deep percolation from applied surface water, precipitation, and small streams. The extensive agricultural operations in the Natomas Basin have also contributed to recharge there, with the portion of applied irrigation water in excess of crop demands becoming recharge water through deep percolation (SGA 2003).

Groundwater levels average 10 to 25 feet below ground surface in the Natomas Basin (MWH 2001). According to the SGA, hydrographs for wells in the western part of the North American Subbasin show groundwater levels varying between -5 and 20 feet mean spring groundwater level between wells.

**Groundwater Storage**

DWR’s Bulletin 118 assumed a specific yield of 7% and an aquifer thickness of 200 feet for 200,000 acres within the North American Subbasin. Storage capacity can be estimated for the North American Subbasin by applying the same assumptions as previous DWR studies (DWR 1997a), which indicated a specific yield of 7% and an assumed thickness of 200 feet over the entire 351,000-acre subbasin. The result is an estimated storage capacity of approximately 4.9 million acre-feet (DWR 2003).

**Groundwater Budget**

Luhdorff & Scalmanini Consulting Engineers (LSCE) prepared a report in November 2008 evaluating the potential groundwater impacts of the NLIP (see Appendix C2) (LSCE 2008). The report includes a groundwater budget for existing conditions (without NLIP construction activities) in the Natomas Basin based on the final water year of the 1970–2004 calibration period for the Sacramento County Integrated Groundwater and Surface Water Model. The model results for 2004, shown in Table 3.5-2, are grouped into inflow and outflow components, with the change in storage representing the difference between the inflow and the outflow. The simulated change in storage shows a decline of almost 5,000 AFY. Divided by the area of the Natomas Basin, this represents a small decrease in storage on a per acre basis of less than 0.1 acre-foot per acre per year.

<table>
<thead>
<tr>
<th>Water Budget Component</th>
<th>2004 Simulation (AFY)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inflow</strong></td>
<td></td>
</tr>
<tr>
<td>Deep Percolation (including Canal Seepage)</td>
<td>31,429</td>
</tr>
<tr>
<td>Recharge from Sacramento River</td>
<td>6,469</td>
</tr>
<tr>
<td>Recharge from American River</td>
<td>1,086</td>
</tr>
<tr>
<td>Boundary Inflow from West</td>
<td>10,365</td>
</tr>
<tr>
<td>Subsurface Inflow from North and South</td>
<td>2,955</td>
</tr>
<tr>
<td><strong>Total Inflow</strong></td>
<td>52,304</td>
</tr>
<tr>
<td><strong>Outflow</strong></td>
<td></td>
</tr>
<tr>
<td>Groundwater Pumping</td>
<td>35,537</td>
</tr>
<tr>
<td>Subsurface Outflow to East</td>
<td>21,738</td>
</tr>
<tr>
<td>Subsurface Outflow to South</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total Outflow</strong></td>
<td>57,275</td>
</tr>
<tr>
<td><strong>Inflow minus Outflow</strong></td>
<td>Change in Storage</td>
</tr>
<tr>
<td></td>
<td>-4,971</td>
</tr>
</tbody>
</table>

Table 3.5-2
Simulated Groundwater Budget for Natomas Basin—Existing Conditions

Note: AFY = acre-feet per year
Source: Data adapted by EDAW/AECOM (now AECOM) in 2008 from LSCE 2008
3.6 WATER QUALITY

3.6.1 REGULATORY SETTING

3.6.1.1 FEDERAL

The following Federal law related to water quality is relevant to the NLIP, including the Phase 4b Project, and is described in detail in Chapter 6, “Compliance with Federal Environmental Laws and Regulations”:

► Clean Water Act (Section 404).

3.6.1.2 STATE

Clean Water Act (Section 401)

Under Federal law, EPA has published water quality regulations under Volume 40 of the Code of Federal Regulations (40 CFR). Section 303 of the Clean Water Act (CWA) requires states to adopt water quality standards for all surface waters of the United States. As defined by the CWA, water quality standards consist of two elements: (1) designated beneficial uses of the water body in question, and (2) criteria that protect the designated uses. Section 304(a) requires EPA to publish advisory water quality criteria that accurately reflect the latest scientific knowledge on the kind and extent of all effects on health and welfare that may be expected from the presence of pollutants in water. Where multiple uses exist, water quality standards must protect the most sensitive use. In California, EPA has delegated responsibility to the State Water Resources Control Board (SWRCB) and its nine regional water quality control boards (RWQCBs) for identifying beneficial uses, adopting applicable water quality objectives, and issuing National Pollutant Discharge Elimination System (NPDES) permits.

Under CWA Section 401(a)(1), applicants for a Federal license or permit to conduct activities that may result in the discharge of a pollutant into waters of the United States must obtain certification from the state in which the discharge would originate or, if appropriate, from the interstate water pollution control agency with jurisdiction over affected waters at the point where the discharge would originate. Therefore, all projects with a Federal component that may affect state water quality (including projects that require Federal agency approval such as issuance of a Section 404 permit) must also comply with CWA Section 401. The Section 401 water quality certification certifies that the proposed activity will not violate state water quality standards. The RWQCBs administer the Section 401 program with the intent of prescribing measures necessary to avoid, minimize, or mitigate adverse impacts of proposed projects on water quality.

A Section 401 water quality certification has been obtained, or is in the process of being obtained for all previously approved NLIP project phases. To implement the Phase 4b Project, the project proponent(s) is applying to the Central Valley RWQCB for Section 401 water quality certification for the Adjacent Levee Alternative (Proposed Action).

Porter-Cologne Water Quality Control Act and Clean Water Act (Section 402)

The SWRCB and RWQCBs regulate discharges of waste into waters of the United States through NPDES permits, authorized under Section 402 of the CWA, and regulated discharges of waste into waters of the state through waste discharge requirements (WDRs), authorized under the state’s Porter-Cologne Water Quality Control Act (Porter-Cologne Act). The RWQCBs issue NPDES permits and WDRs to ensure that projects that may discharge wastes to land or water conform to water quality objectives and policies and procedures of the applicable water quality control plans. The Porter-Cologne Act defines waters of the state as “any surface water or ground water, including saline waters, within the boundaries of the state.” Some waters that qualify as waters of
the state, such as certain isolated wetlands and groundwater, do not necessarily qualify as waters of the United States.

SWRCB General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (Order 99-08-Division of Water Quality [DWQ]) is applicable to all land-disturbing construction activities that would affect 1 acre or more. NPDES permits involve similar processes, including submittal of notices of intent (NOI) to discharge to the Central Valley RWQCB and implementation of best management practices (BMPs) to minimize those discharges. The Central Valley RWQCB may also issue site-specific WDRs, or waivers to WDRs, for certain waste discharges to land or waters of the state.

Construction activities subject to the general construction activity permit include clearing, grading, stockpiling, and excavation. Dischargers are required to eliminate or reduce non-stormwater discharges to storm sewer systems and other waters. The permit also requires dischargers to consider the use of post-construction permanent BMPs that will remain in service to protect water quality throughout the life of the project. Types of BMPs include source controls, treatment controls, and site planning measures.

Activities subject to the NPDES general permit for construction activity must develop and implement a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP includes a site map and description of construction activities and identifies the BMPs that will be employed to prevent soil erosion and discharge of other construction related pollutants, such as petroleum products, solvents, paints, cement, that could contaminate nearby water resources. A monitoring program is generally required to ensure that BMPs are implemented according to the SWPPP and are effective at controlling discharges of storm water related pollutants.

On September 2, 2009, SWRCB approved important changes to Order 99-08-DWQ. The amended general permit (Order 2009-0009-DWQ) will become effective on July 1, 2010 and differs from Order 99-08-DWQ relating to the following:

► approach to risk-based permitting,
► rainfall erosivity waiver requirements,
► technology-based numeric action levels,
► technology-based numeric effluent limitations,
► specified minimum requirements,
► project site soil characteristics monitoring and reporting,
► effluent monitoring and reporting,
► receiving water monitoring and reporting,
► post-construction storm water performance standards,
► rain event action plan requirements,
► annual reporting,
► certification/training requirements for key project personnel, and
► linear underground/overhead project requirements.

As for all previous phases of the NLIP, the project proponent(s) would implement BMPs, prepare and implement a SWPPP, and comply with NPDES permit conditions for the Phase 4b Project.

**Basin Plan**

Pursuant to the Porter-Cologne Act, the Central Valley RWQCB prepares and updates the *Water Quality Control Plan for the Sacramento and San Joaquin River Basins* (Basin Plan) every 3 years; the most recent update was completed in September 2009 (Central Valley RWQCB 2009). The Basin Plan describes the officially designated beneficial uses for specific surface water and groundwater resources and the enforceable water quality objectives necessary to protect those beneficial uses. The Natomas Basin is located within the Central Valley RWQCB’s jurisdiction and is subject to the Basin Plan.
The Basin Plan includes numerical and narrative water quality objectives for physical and chemical water quality constituents. Numerical objectives are set for temperature, dissolved oxygen, turbidity, and pH; total dissolved solids, electrical conductivity, bacterial content, and various specific ions; trace metals; and synthetic organic compounds. Narrative objectives are set for parameters such as suspended solids, biostimulatory substances (e.g., nitrogen and phosphorus), oil and grease, color, taste, odor, and aquatic toxicity. Narrative objectives are often precursors to numeric objectives. The primary method used by the Central Valley RWQCB to ensure conformance with the Basin Plan’s water quality objectives and implementation policies and procedures is to issue WDRs for projects that may discharge wastes to land or water. WDRs specify terms and conditions that must be followed during the implementation and operation of a project.

### 3.6.1.3 REGIONAL AND LOCAL

**Sutter County General Plan**

The Public Facilities and Services Element and Conservation/Open Space Element of the *Sutter County General Plan* (Sutter County 1996a) include the following policies that may be relevant to the NLIP, including the Phase 4b Project:

- **Policy 3.D-2:** The County shall require new development to adequately mitigate increases in storm water flows and/or volume and to avoid cumulative increases in downstream flows.
- **Policy 3.D-5:** The County shall require new development projects to provide adequate drainage facilities.
- **Policy 4.A-4:** Monitoring of agricultural water runoff should be encouraged to ensure that pollutants are not being returned to the overall water system.

**Sacramento County General Plan**

The Conservation Element of the *Sacramento County General Plan* (Sacramento County 1993) includes the following policies that may be relevant to the NLIP, including the Phase 4b Project:

- **Policy CO-10:** Development within newly urbanizing areas shall incorporate runoff control measures in their design or participate in an areawide runoff control management effort consistent with the urban runoff management program developed by the Public Works Department.
- **Policy CO-13:** Roads and structures shall be designed, built and landscaped so as to minimize erosion during and after construction.
- **Policy CO-15:** Erosion protection measures and on-site ponding shall be required for all borrow pits and surface mining operations.

**City of Sacramento General Plan**

The Environmental Resources Element of the *City of Sacramento 2030 General Plan* (City of Sacramento 2009) includes the following goal and policies that may be relevant to the NLIP, including the Phase 4b Project:

- **Goal ER 1.1 Water Quality Protection:** Protect local watersheds, water bodies and groundwater resources, including creeks, reservoirs, the Sacramento and American rivers, and their shorelines.
- **Policy ER 1.1.3 Stormwater Quality:** The City shall control sources of pollutants and improve and maintain urban runoff water quality through storm water protection measures consistent with the City’s National Pollution Discharge Elimination System (NPDES) Permit.
► **Policy ER 1.1.4 New Development:** The City shall require new development to protect the quality of water bodies and natural drainage systems through site design, source controls, storm water treatment, runoff reduction measures, best management practices (BMPs) and Low Impact Development (LID), and hydromodification strategies consistent with the city’s NPDES Permit.

► **Policy ER 1.1.7 Construction Site Impacts:** The City shall minimize disturbances of natural water bodies and natural drainage systems caused by development, implement measures to protect areas from erosion and sediment loss, and continue to require construction contractors to comply with the City’s erosion and sediment control ordinance and stormwater management and discharge control ordinance.

### City of Sacramento Stormwater Management and Discharge Control Code

The City Stormwater Management and Discharge Control Code (Chapter 13.16 of the City Code) is intended to control non-stormwater discharges to the stormwater conveyance system; eliminate discharges to the stormwater conveyance system from spills, dumping, or disposal of materials other than stormwater; and reduce pollutants in urban stormwater discharges to the maximum extent practicable. Non-stormwater discharges are prohibited except where the discharge is regulated under a NPDES permit (see the description of the NPDES in the discussion of state water quality regulations above). Discharges of pumped groundwater not subject to a NPDES permit may be permitted to discharge to the stormwater conveyance system upon written approval from the City.

### City of Sacramento Grading, Erosion, and Sediment Control Ordinance

The City Grading, Erosion, and Sediment Control Ordinance (Title 15, Chapter 15.88 of the City Code) sets forth rules and regulations to control land disturbances, landfill, soil storage, pollution, and erosion and sedimentation resulting from construction activities. With limited exceptions, grading approval must be received from the City of Sacramento Department of Utilities before construction. All project proponents, regardless of project location, are required to prepare and submit separate erosion and sediment control plans applicable to the construction and postconstruction periods. The ordinance also specifies other requirements, such as written approval from the City for grading work within the right-of-way of a public road or street, or within a public easement.

### City of Sacramento Stormwater Quality Improvement Plan (2007)

The City of Sacramento Stormwater Quality Improvement Program is a comprehensive program comprised of various program elements and activities designed to reduce stormwater pollution to the maximum extent practicable and eliminate prohibited non-stormwater discharges in accordance with Federal and state laws and regulations. These laws and regulations are implemented through NPDES municipal stormwater discharge permits (see the description of the NPDES in the discussion of state water quality regulations above). In 1990, the County of Sacramento and the Cities of Sacramento, Folsom, and Galt applied for and received one of the first area-wide NPDES stormwater permits in the country and began development of core stormwater management program elements and activities to address local urban runoff water quality problems. The Stormwater Quality Improvement Plan outlines and directs the program’s implementation (City of Sacramento 2007).

### 3.6.2 ENVIRONMENTAL SETTING

The East Drainage Canal and the West Drainage Canal drain large portions of the Natomas Basin. The Main Drainage Canal conveys the combined flows of the East and West Drainage Canals from their confluence southwest of the I-80/I-5 interchange through South Natomas west of I-5. Drainage water from the Main Drainage Canal is pumped into the Sacramento River. Currently, seven pumping sites remove stormwater from the Natomas Basin. Five sites pump into the Sacramento River, one pumps into the NCC, and four RD 1000 sites (Pumping Plant No. 6, Pumping Plant No. 8, and City of Sacramento Gardenland and Azuza Pump Stations) pump into the NEMDC. The NEMDC conveys drainage water from Dry Creek, Arcade Creek, and a large portion of the Natomas area north of the confluence with Dry Creek. The NEMDC outfalls to the Sacramento River are at
the northern edge of Discovery Park near the confluence of the Sacramento and American Rivers. Therefore, the Sacramento River is a receiving water for much of the agricultural drainage from the Natomas Basin. Agricultural drainage water contributes salts, nutrients, pesticides, trace elements, sediments, and other byproducts that could affect the water quality of the Sacramento River. In addition to agricultural drainage, urban stormwater runoff is discharged to the Sacramento River, the American River, and the NEMDC via pumps operated by the City of Sacramento, including City Sump 160, City Sump 58, and City Sump 102. Urban stormwater runoff contains sediments, nutrients, pathogens, oil and grease, metals, and pesticides.

3.6.2.1 **Surface Water Quality**

Surface water quality in the hydrologic region is generally good. Possible types 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 (USGS 2000, DWR 2005). The portion of the Sacramento River forming the southern boundary of the NLIP, including the Phase 4b Project area, is part of a 16-mile segment from Knights Landing to the Sacramento–San Joaquin Delta that is on the Section 303(d) list for mercury from abandoned mines and toxicity from unknown sources. In addition, the portion of the American River in the NLIP, including the Phase 4b Project area, is part of a 27-mile segment from Nimbus Dam to the confluence with the Sacramento River that is also on the Section 303(d) list for mercury from abandoned mines and toxicity from unknown sources (SWRCB 2006).

As defined by the Basin Plan (Central Valley RWQCB 2009), the following are the designated beneficial uses for the Sacramento River and all tributaries from the Colusa Basin Drain, upstream of the NLIP, including the Phase 4b Project area to the I Street Bridge in Sacramento:

- municipal, industrial, and agricultural supply;
- irrigation;
- contact and noncontact recreation;
- coldwater fish habitat, migration, and spawning;
- warm water fish habitat, migration, and spawning;
- wildlife habitat;
- power generation; and
- navigation.

3.6.2.2 **Groundwater Quality**

The NLIP, including the Phase 4b Project area, is in the North American Groundwater Subbasin, which lies in the eastern central portion of the Sacramento Valley Groundwater basin (see description in Section 3.5.2.5, “Groundwater Hydrology”).

Although there are many areas of good quality groundwater in the North American Subbasin, some areas within the subbasin have shown elevated levels of total dissolved solids (TDS), chloride, sodium, bicarbonate, boron, fluoride, nitrate, iron manganese, and arsenic, based on applicable water quality standards and guidelines for domestic and irrigation uses. An area between the Airport and the Bear River to the north has high levels of TDS, chloride, sodium, bicarbonate, manganese, and arsenic (DWR 2006).
3.7 BIOLOGICAL RESOURCES

3.7.1 REGULATORY SETTING

3.7.1.1 FEDERAL

The following Federal laws related to biological resources are relevant to the NLIP, including the Phase 4b Project, and are described in detail in Chapter 6, “Compliance with Federal Environmental Laws and Regulations”:

► Clean Water Act (Section 404);
► Fish and Wildlife Coordination Act of 1934, as Amended;
► Endangered Species Act of 1973, as Amended;
► Migratory Bird Treaty Act of 1918;
► Bald and Golden Eagle Protection Act of 1940;
► Wild and Scenic Rivers Act;
► Executive Order 11990, Protection of Wetlands; and
► Sustainable Fisheries Act.

3.7.1.2 STATE

California Endangered Species Act

Pursuant to the California Endangered Species Act (CESA), a permit from the California Department of Fish and Game (DFG) is required for projects that could result in the take of a plant or animal species that is state-listed as threatened or endangered. Under CESA, “take” is defined as an activity that would directly or indirectly kill an individual of a species, but the CESA definition of take does not include “harming” or “harassing,” as the Federal ESA definition does. As a result, the threshold for take is higher under CESA than under ESA. The project proponent(s) will coordinate with DFG to discuss CESA compliance requirements and will apply to DFG for take authorization under Section 2081 of the California Fish and Game Code. Similar to previous NLIP phases, the project proponent(s) will obtain a Section 2081 permit prior to Phase 4b Project construction and comply with its conditions.

California Fish and Game Code Section 1602—Streambed Alteration Agreement

All diversions, obstructions, or changes to the natural flow or bed, channel, or bank of any river, stream, or lake in California that supports wildlife resources are subject to regulation by DFG under Section 1602 of the California Fish and Game Code. Under Section 1602, it is unlawful for any person, governmental agency, or public utility to do the following without first notifying DFG:

► substantially divert or obstruct the natural flow of, or substantially change or use any material from, the bed, channel, or bank of any river, stream, or lake; or
► deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake.

A stream is defined as a body of water that flows at least periodically or intermittently through a bed or channel that has banks and supports fish or other aquatic life. This definition includes watercourses with a surface or subsurface flow that supports or has supported riparian vegetation. DFG’s jurisdiction within altered or artificial waterways is based on the value of those waterways to fish and wildlife. A DFG streambed alteration agreement must be obtained for any project that would affect a river, stream, or lake. Similar to previous NLIP phases, the project proponent(s) will apply for a Section 1602 Streambed Alteration Agreement for the Phase 4b Project.
California Fish and Game Code Sections 3503 and 3503.5—Protection of Bird Nests and Raptors

Section 3503 of the California Fish and Game Code states that it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird. Section 3503.5 specifically states that it is unlawful to take, possess, or destroy any raptors (i.e., species in the orders Falconiformes and Strigiformes), including their nests or eggs. Typical violations of these codes include destruction of active nests resulting from removal of vegetation in which the nests are located. Violation of Section 3503.5 could also include failure of active raptor nests resulting from disturbance of nesting pairs by nearby project construction. This statute does not provide for the issuance of any type of incidental take permit.

California Fish and Game Code—Fully Protected Species

Protection of fully protected species is described in Sections 3511, 4700, 5050, and 5515 of the California Fish and Game Code. These statutes prohibit take or possession of fully protected species and do not provide for authorization of incidental take of fully protected species. DFG has informed non-Federal agencies and private parties that their actions must avoid take of any fully protected species.

Porter-Cologne Water Quality Control Act

See discussion under Section 3.6, “Water Quality.”

California Wild and Scenic Rivers Act

See discussion under Section 3.13, “Recreation.”

3.7.1.3 REGIONAL AND LOCAL

Sutter County General Plan

The Conservation/Open Space and Natural Resources Element of the Sutter County General Plan (Sutter County 1996a) addresses the conservation, development, and use of natural resources, including water and its hydraulic force, forests, soils, rivers and other waters, fisheries, wildlife, minerals and other natural resources. The following conservation resource goals and policies may be relevant to the project:

► Goal 4.A: To preserve and protect the water resources of the County.
  • Policy 4.A-1: The County shall require development setbacks from all water courses.

► Goal 4.B. To protect wetland and riparian areas throughout Sutter County.
  • Policy 4.B-1: The County shall require new development to fully mitigate the loss of federally regulated wetlands to achieve a “no net loss” through any combination of avoidance, minimization, or compensation.
  • Policy 4.B-2: The County shall discourage direct discharge of surface runoff into wetland areas. New development shall be designed in such a manner that pollutants and siltation will not significantly affect wetlands.
  • Policy 4.B-3: The County encourages the preservation and restoration of natural wetland environments when feasible and practical as part of the development review process. Additionally, the County shall encourage and support the Resource Conservation District programs that facilitate these objectives if the programs do not significantly affect agricultural operations.
• **Policy 4.B-4:** The County will encourage the creation and use of wetland mitigation banks as long as their creation and existence will not adversely impact existing and/or planned agriculture or urban development.

► **Goal 4.C:** To protect and enhance habitats that support fish and wildlife species.

• **Policy 4.C-1:** The County shall strive to preserve those areas of wildlife habitat designated “high habitat value” as shown on the biological sensitivity map in Chapter 9 of the Background Report.

• **Policy 4.C-2:** The County shall encourage preservation and proper management of those areas designated “moderate habitat value” on the biological sensitivity map in Chapter 9 of the background report.

• **Policy 4.C-3:** The County shall support the preservation and re-establishment of fisheries in the rivers and streams within the County.

• **Policy 4.C-4:** The County should participate in the process of developing mitigation programs for threatened and endangered species to ensure that Sutter County’s agricultural, economic, fiscal, and future urbanization and natural resource goals and policies are met.

• **Policy 4.C-5:** The County supports the preservation and protection of waterfowl resources and their habitat.

• **Policy 4.C-6:** The County encourages the preservation of existing wildlife corridors between natural habitat areas to maintain biodiversity and prevent the creation of biological islands. This would also include promoting the re-establishment of previous corridors where feasible.

• **Policy 4.C-7:** The County encourages the preservation of rare, threatened or endangered animal species.

► **Goal 4.D:** To preserve and protect the vegetation resources of Sutter County.

• **Policy 4.D-1:** The County shall encourage the preservation of important areas of natural vegetation, including, but not limited to, oak woodlands, riparian areas, and vernal pools.

• **Policy 4.D-2:** The County encourages the preservation of rare, threatened, or endangered plant species.

• **Policy 4.D-3:** The County shall require that new development projects avoid, to the maximum extent possible, ecologically-fragile areas (e.g., areas of rare, threatened or endangered species of plants, riparian areas, vernal pools).

• **Policy 4.D-4:** The County shall strive to protect major groves of native trees located in the unincorporated areas of the County.

• **Policy 4.D-5:** The County shall encourage the use of native and drought tolerant plant materials in all public and private revegetation/landscaping projects.

► **Goal 4.E:** To conserve, protect and enhance open space lands and natural resources in Sutter County.

• **Policy 4.E-1:** The County shall support the preservation of natural land forms, natural vegetation, and natural resources as open space to the maximum extent feasible.
Sacramento County General Plan

The Sacramento County General Plan is currently being updated (the DEIR was issued in spring 2009), but is not yet adopted. The Conservation Element of the existing Sacramento County General Plan (Sacramento County 1993) provides overall guidance for resource conservation in Sacramento County and includes several resource conservation goals and objectives. It includes a specific goal to preserve and protect fisheries in county waterways and describes policies and programs under four objectives:

1. Water flows monitored and maintained, when climatic conditions allow, to promote fish propagation and migration.

2. Maintenance of channelized areas to reduce detritus accumulation and increase fish populations.

3. Water quality and runoff levels maintained to provide a healthy aquatic environment for fisheries.

4. Riparian vegetation and topographic diversity maintained by stream channel and bank stabilization projects.

The policies associated with the four objectives above are:

► CO-151: Provide unobstructed water flows throughout the network of natural waterways by prohibiting blockage, tunneling, or obstruction of contiguous stream channels.

► CO-152: Protect and preserve migratory route for anadromous species.

► CO-153: Reduce mortality of migrating fish by requiring screens or similar bypass apparatus on diversion pumps.

The Conservation Element of the existing Sacramento County General Plan (Sacramento County 1993) includes policies concerning native trees, flood channels, stream courses, and waterways. Policies CO-130 through CO-136, which apply to discretionary projects, are intended to conserve native oaks and other native tree species. To preserve the natural characteristics of these areas, policies in the Conservation Element call for maintenance of riparian vegetation, buffer zones adjacent to stream corridors that contain riparian vegetation, and unlined watercourses. Policy CO-107 requires that topographic diversity and variation be retained when channels are realigned or modified, including maintaining meandering characteristics, varied berm width, and naturalized side slope. In addition, the Open Space Element contains general policies related to the protection of open space areas. Policy OS-1 calls for the permanent protection, as open space, of areas of natural resource value, including wetland preserves, riparian corridors, woodlands, and floodplains. Policy OS-2 promotes the maintenance of open space and natural areas that are interconnected and of sufficient size to protect biodiversity, accommodate wildlife movement, and sustain ecosystems (Sacramento County 1993).

City of Sacramento General Plan

The City of Sacramento General Plan 2030, adopted on March 3, 2009, contains goals and policies related to the protection and enhancement of open space, natural areas, and significant wildlife and vegetation in the City as integral parts of a sustainable environment within a larger regional ecosystem (City of Sacramento 2009). The City has a program with USACE and SAFCA in which it works with SAFCA and other responsible agencies to resolve floodplain restrictions. The following Natural and Open Space Protection policies from the City of Sacramento General Plan 2030 may be relevant to the NLIP, including the Phase 4b Project:

► ER 2.1.2 Conservation of Open Space: The City shall continue to preserve, protect, and provide access to designated open space areas along the American and Sacramento Rivers, floodways, and undevelopable floodplains.
ER 2.1.2 Conservation of Open Space: The City shall continue to preserve, protect, and provide access to designated open space areas along the American and Sacramento Rivers, floodways, and undevelopable floodplains.

ER 2.1.3 Natural Lands Management: The City shall promote the preservation and restoration of contiguous areas of natural habitat throughout the city and support their integration with existing and future regional preserves.

ER 2.1.4 Retain Habitat Areas: The City shall retain plant and wildlife habitat areas where there are known sensitive resources (e.g., sensitive habitats, special-status, threatened, endangered, candidate species, and species of concern). Particular attention shall be focused on retaining habitat areas that are contiguous with other existing natural areas and/or wildlife movement corridors.

ER 2.1.5 Riparian Habitat Integrity: The City shall preserve the ecological integrity of creek corridors, canals, and drainage ditches that support riparian resources by preserving native plants and, to the extent feasible, removing invasive nonnative plants. If not feasible, adverse impacts on riparian habitat shall be mitigated by the preservation and/or restoration of this habitat at a 1:1 ratio, in perpetuity.

ER 2.1.6 Wetland Protection: The City shall preserve and protect wetland resources including creeks, rivers, ponds, marshes, vernal pools, and other seasonal wetlands, to the extent feasible. If not feasible, the mitigation of all adverse impacts on wetland resources shall be required in compliance with State and Federal regulations protecting wetland resources, and if applicable, threatened or endangered species. Additionally, the City shall require either on- or off-site permanent preservation of an equivalent amount of wetland habitat to ensure no-net loss of value and/or function.

ER 2.1.7 Annual Grasslands: The City shall preserve and protect grasslands and vernal pools that provide habitat for rare and endangered species. If not feasible, the mitigation of all adverse impacts on annual grasslands shall comply with State and Federal regulations protecting foraging habitat for those species known to utilize this habitat.

ER 2.1.8 Oak Woodlands: The City shall preserve and protect oak woodlands, and/or significant stands of oak trees in the city that provide habitat for common native, and special status wildlife species. If not feasible, the mitigation of all adverse impacts on oak woodlands shall comply with the standards of the Oak Woodlands Conservation Act.

ER 2.1.9 Wildlife Corridors: The City shall preserve, protect, and avoid impacts to wildlife corridors. If corridors are adversely affected, damaged habitat shall be replaced with habitat of equivalent value.

ER 2.1.10 Habitat Assessments: The City shall consider the potential impact on sensitive plants for each project requiring discretionary approval and shall require pre-construction surveys and/or habitat assessments for sensitive plant and wildlife species. If the pre-construction survey and/or habitat assessment determines that suitable habitat for sensitive plant and/or wildlife species is present, then either (1) protocol-level or industry-recognized (if no protocol has been established) surveys shall be conducted; or (2) presence of the species shall be assumed to occur in suitable habitat on the project site. Survey Reports shall be prepared and submitted to the City and DFG or USFWS (depending on the species) for further consultation and development of avoidance and/or mitigation measures consistent with state and federal law.

ER 2.1.11 Agency Coordination: The City shall coordinate with State and Federal resource agencies (e.g., DFG, U.S. Army Corps of Engineers, and USFWS) to protect areas containing rare or endangered species of plants and animals.
► **ER 2.1.12 Natomas Basin Habitat Conservation Plan:** The City shall continue to participate in and support the policies of the Natomas Basin Habitat Conservation Plan for the protection of biological resources in the Natomas Basin.

► **ER 2.1.13 Support Habitat Conservation Plan Efforts:** The City shall encourage and support regional habitat conservation plans such as the South Sacramento Habitat Conservation Plan to conserve and manage habitat for special-status species.

**Natomas Basin Habitat Conservation Plan**

The 2003 *Natomas Basin Habitat Conservation Plan* was prepared and adopted by the City of Sacramento, Sutter County, and TNBC (City of Sacramento, Sutter County, and TNBC 2003). An HCP is a planning document required under Section 10 of the Federal ESA and was developed in consultation and coordination with USFWS to promote biological conservation in conjunction with economic and urban development in the Natomas Basin. 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 authorizes incidental take associated with 17,500 acres of urban development in southern Sutter County and within the City and County of Sacramento (i.e., 8,050 acres for the City of Sacramento, 7,467 acres for Sutter County, and 1,983 acres of Metro Air Park in Sacramento County).

The NLIP, including the Phase 4b Project, is required to comply with the NBHCP. The potential for the Phase 4b Project to conflict with this adopted plan is addressed in this EIS/EIR.

**Local Tree Ordinances**

**Sacramento County**

The Tree Preservation Ordinance of Sacramento County (Sacramento County Code 480 Section 1, 1981) requires the protection of native oak trees within Sacramento County. This ordinance requires a permit for the removal of trees or for grading, excavating, or trenching within the dripline of a tree within the jurisdictional boundaries of the ordinance. A “tree” is defined as any living native oak tree having at least one trunk of 6 inches or more in diameter or a multi-trunked native oak tree having an aggregate diameter of 10 inches or more. Removing woodlands during the NLIP, including the Phase 4b Project, would adversely affect native oaks within this size range as well as other trees that occur within Sacramento County; however, the NLIP, including the Phase 4b Project is not located within the jurisdictional boundaries of the ordinance and, therefore, a permit is not required. The *Sacramento County General Plan* (Sacramento County 1993), described above, contains policies related to the conservation of native trees, with which the NLIP, including the Phase 4b Project, would be required to comply.

**City of Sacramento**

Title 12 of the City of Sacramento Municipal Code addresses the protection of trees within the city boundaries, including general protection of all trees on city property and specific protection of heritage trees. Heritage trees include any tree of any species that has a trunk circumference of 100 inches or more and is in good health; any native oak, California buckeye, or western sycamore that has a circumference of 36 inches or greater when a single trunk, or a cumulative circumference of 36 inches or greater when a multi-trunk tree; and any tree 36 inches in circumference or greater in a riparian zone. The NLIP, including the Phase 4b Project, would be required to comply with this ordinance for project components located within the city of Sacramento.
3.7.2 **ENVIRONMENTAL SETTING**

3.7.2.1 **GENERAL BIOLOGICAL RESOURCES**

**Land Use and Vegetation**

Before 1850, vegetation in the Natomas Basin and the remainder of the Sacramento Valley bore little resemblance to its current state. The Sacramento River dominated the area, its banks lined by a riverine growth of oak, western sycamore, Fremont cottonwood, willow, and Oregon ash, up to a mile in width. Drainage from the western slopes of the Sierra Nevada resulted in regular flooding of the Sacramento Valley, rendering the Natomas Basin an area of highly fertile, alluvial soils. The southern portion of the Basin was part of the overlapping American and Sacramento River floodplains. This large floodplain supported large tracts of riparian woodland and scrub, permanent freshwater marsh, and seasonal wetland. It is likely that vernal pools also existed historically in the Natomas Basin, particularly in upland areas in the eastern portion (USFWS, City of Sacramento, and Sutter County 2003).

Currently, the Natomas Basin supports a wide array of land uses and habitat types, including urban, suburban, and rural development; agricultural fields; and remnant and restored native habitat ([Plate 3-3](#)). Table 3.7-1 summarizes information compiled for the most recent (2007) categorization of land cover types in the Natomas Basin conducted for TNBC and also identifies the habitat types in the Phase 4b Project area. Plates 3-4a through 3-4d identify the habitat types within the Phase 4b Project area.

<table>
<thead>
<tr>
<th>Table 3.7-1</th>
<th>Land Cover Types in the Natomas Basin, Including the Phase 4b Project Area</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Habitat Type</strong></td>
<td><strong>Natomas Basin (Acres)</strong></td>
</tr>
<tr>
<td>Alfalfa</td>
<td>1,189</td>
</tr>
<tr>
<td>Fallow rice</td>
<td>7,970</td>
</tr>
<tr>
<td>Fallow row and grain crops</td>
<td>2,065</td>
</tr>
<tr>
<td>Fresh emergent marsh</td>
<td>154</td>
</tr>
<tr>
<td>Fresh emergent marsh (created)</td>
<td>674</td>
</tr>
<tr>
<td>Grass hay</td>
<td>2,212</td>
</tr>
<tr>
<td>Grassland (created)</td>
<td>68</td>
</tr>
<tr>
<td>Irrigated grassland and annual grassland</td>
<td>451</td>
</tr>
<tr>
<td>Nonhabitat land uses (developed, disturbed/bare, ruderal)</td>
<td>14,226</td>
</tr>
<tr>
<td>Nonnative annual grassland</td>
<td>5,192</td>
</tr>
<tr>
<td>Nonriparian woodland</td>
<td>51</td>
</tr>
<tr>
<td>Open water</td>
<td>340</td>
</tr>
<tr>
<td>Orchard</td>
<td>184</td>
</tr>
<tr>
<td>Rice</td>
<td>14,590</td>
</tr>
<tr>
<td>Riparian scrub</td>
<td>114</td>
</tr>
<tr>
<td>Riparian woodland</td>
<td>357</td>
</tr>
<tr>
<td>Row and grain crops (milo, tomatoes, sunflower, wheat)</td>
<td>4,067</td>
</tr>
<tr>
<td>Seasonal wetland</td>
<td>108</td>
</tr>
<tr>
<td>Vernal pools ¹</td>
<td>&gt;0.23</td>
</tr>
<tr>
<td>Valley oak woodland ²</td>
<td>192</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>54,207</strong></td>
</tr>
</tbody>
</table>

Notes:

¹ Vernal pools are not identified in the Jones & Stokes data set; however, wetland delineations conducted by EDAW/AECOM (now AECOM) in 2007 and 2008 identified this habitat type along the landside of the NEMDC. Jones & Stokes data identifies 85 acres of vernal pool habitat within the Triangle Properties Borrow Area.

² Valley oak woodland in the Phase 4b Project area is included with the nonriparian woodland.

Source: Habitat mapping by Jones & Stokes in 2007; data compiled by AECOM in 2009
The southern portion of the Natomas Basin is largely developed, particularly south of Elkhorn Boulevard and east of El Centro Road. The western and northern portions, in contrast, are dominated by agricultural lands. The primary crops produced in the Natomas Basin are rice, corn, grain, and tomatoes. Rice, the most common crop, is generally grown over large areas of contiguous land north of Elkhorn Boulevard, although the amount of land in active rice production has greatly diminished in recent years and many former rice fields are now fallow or support grain crops, such as wheat. Agricultural lands in the southern and western portions support other crops and urban land uses (City of Sacramento, Sutter County, and TNBC 2003).

Only small fragments of native habitat persist in the Natomas Basin. Riparian habitat is primarily restricted to a narrow strip along the levees of the Natomas Basin perimeter levee system. Small patches of woodland, scrub, and wetland habitats dominated by native species are scattered throughout the Natomas Basin, most relatively close to the Natomas Basin perimeter levee system or adjacent to other features that support surface water. An extensive network of irrigation and drainage ditches also traverses the Natomas Basin and a growing number of restored marsh habitat patches are being created, primarily in the north. Most of these are owned and managed by TNBC; others are separately managed as Airport mitigation sites.

Residential properties are scattered along the PGCC and NEMDC and increase in density along the Sacramento River east levee Reach A:19A–20 and along and the American River north levee. Levee slope maintenance zones along the landside levee toe are dominated by weedy ruderal vegetation that is regularly maintained via mowing and/or burning. Irrigation/drainage ditches and canals are present along many levee reaches, landward of the vegetation maintenance zones. These ditches generally support little native vegetation and are regularly maintained. Within the Phase 4b Project area, the Riverside Canal (a concrete-lined canal with earthen embankments) runs parallel to the Sacramento River east levee along the landside levee toe in Reach A:16–17. The canal flows south to approximately Bryte Bend Road. The Riverside Canal south of Bryte Bend Road is abandoned. Lateral ditches and canals also extend into the Phase 4b Project area. Native valley riparian vegetation is found along the Sacramento River east levee, American River north levee, NCC, and NEMDC. To the west of Fisherman’s Lake lie several TNBC tracts that comprise the TNBC’s Fisherman’s Lake preserve; these tracts include the Natomas Farms, Souza, Rosa East, Rosa Central, Cummings, and Alleghany tracts. The South Fisherman’s Lake Borrow Area and the West Lakeside School Site in the Phase 4b Project area include parcels that lie adjacent to and between TNBC Fisherman’s Lake tracts and private parcels that include a mix of rice and row/field crops and managed marshland. TNBC parcels are present within NEMDC North; these reserves include Betts and Kismat. Bolen West, Frazer, and Lucich North are TNBC parcels that are adjacent to the NCC. Agriculture is the dominant habitat landward of the Sacramento River east levee Reach A:16–18B, NCC, PGCC, and NEMDC North. Urbanized areas are located along the Sacramento River east levee Reach A:19A–20, American River north levee, and NEMDC South.

**Wildlife**

Before European settlement, the Sacramento area floodplains supported a wide variety and large numbers of wildlife species associated with its riparian habitats, permanent and seasonal wetlands, and oak woodlands and savannas. Much of this habitat has been lost, locally and regionally. Initially, land within the Natomas Basin was converted to agriculture, though more recent land use conversions have been to urban development. As a result, there have been shifts in wildlife use as land uses and habitats have changed. With the conversion to agriculture, the abundance of species restricted to natural habitats likely decreased, and in some cases particular species ceased to occur (City of Sacramento, Sutter County, and TNBC 2003). However, remnant native habitat patches and created habitat associated with drainage and agricultural supply ditches and habitat reserves have allowed remnant wildlife populations to persist within the Natomas Basin. Wildlife species common within the Natomas Basin include black-tailed jackrabbit, Audubon’s cottontail, raccoon, striped skunk, California ground squirrel, mule deer, coyote, and river otter. Reptile species that are routinely encountered in the Natomas Basin include gopher snake, common garter snake, and racer snake. Amphibian species that are routinely encountered in the Natomas Basin include Pacific chorus frog and bullfrog.
Habitats in the Natomas Basin

Plate 3-3
Pre-construction Habitat in the Phase 4b Project Area

Source: Project footprint (AECOM, December 2009); habitats (Jones & Stokes 2007)
Pre-construction Habitat in the Phase 4b Project Area

Plate 3-4b

Source: Project footprint (AECOM, December 2009); habitats (Jones & Stokes 2007)
Pre-construction Habitat in the Phase 4b Project Area

Source: Project footprint (AECOM, December 2009); habitats (Jones & Stokes 2007)

Plate 3-4c
Pre-construction Habitat in the Phase 4b Project Area
The presence of ditches among the mosaic of agricultural fields and remnant riparian and wetland patches provides important nesting, feeding, and migration corridor habitat for a variety of wildlife species that inhabit the Natomas Basin. Wildlife use is also linked to the Natomas Basin’s position in the Pacific Flyway, the westernmost of North America’s four flyways, or migration routes. These flyways are defined as geographic regions with breeding grounds in the north, wintering grounds in the south, and a system of migration routes in between. The Central Valley lies at the southerly end of the Pacific Flyway migratory route. Historically, the Central Valley contained approximately 4 million acres of wetlands, including permanent marshes and seasonal wetlands created by winter rains and spring snowmelt from the Sierra Nevada. Today, approximately 300,000 acres remain, providing wintering habitat for 60% of the Pacific Flyway’s current waterfowl population and migration habitat for an additional 20% of the population. All together, approximately 10–12 million ducks and geese, along with millions of other water birds, winter in or pass through the Central Valley each year (City of Sacramento, Sutter County, and TNBC 2003). Although most marshes and seasonal wetlands in the Natomas Basin have been converted to agricultural and urban uses, flooded rice fields continue to attract and support migrant waterfowl. Some species also use pasture, harvested rice, and other croplands for foraging (USFWS, City of Sacramento, and Sutter County 2003). Birds common within the Natomas Basin include red-tailed hawk, red-shouldered hawk, American kestrel, barn owl, Brewer’s blackbird, red-winged blackbird, western scrub-jay, northern mockingbird, yellow-billed magpie, house finch, and house sparrow.

The NLIP, including the Phase 4b Project, area provides habitat for a variety of wildlife species, ranging from those that use the widely distributed agricultural fields and levee maintenance zones to species that are restricted to remnant patches of native vegetation and the system of irrigation/drainage ditches and canals. Many common wildlife species use the NLIP, including the Phase 4b Project, area and a number of sensitive species also have potential to occur within and adjacent to the levee improvement areas. These sensitive species are discussed further in Section 3.7.2.2, “Sensitive Biological Resources.”

**Fisheries**

Primary waterways supporting fish habitat that occur in the NLIP, including the Phase 4b Project, area include: the NCC, NEMDC, and the lower Sacramento River. The NCC is a tributary to the lower Sacramento River near Verona. The NEMDC is a tributary to the lower Sacramento River immediately upstream of its confluence with the lower American River. All of these waterways are indirectly connected to the irrigation and drainage canals and ditches in the Phase 4b Project area by a number of pumping facilities. These waterways provide important habitat for native anadromous and resident Central Valley fishes, including species that are listed under ESA and CESA, and perform other important ecological functions, as described in Section 3.7.2.2, “Sensitive Biological Resources.”

The lower Sacramento River, NEMDC, and NCC provide fish spawning, rearing, and/or migratory habitat for a diverse assemblage of native and nonnative species (Table 3.7-2). The use of different areas of these waterways by fish species is influenced by variations in habitat conditions, each species’ habitat requirements, life history, and daily and seasonal movements and behavior.

Anthropogenic changes to the flow regimes of the lower Sacramento River have had an effect on many aspects of the habitat quality for fish. Altered flow regimes have resulted in reduced physical processes (e.g., sediment transport and deposition) and artificial seasonal flows (i.e., generally decreased water in winter and increased water in summer) relative to natural conditions. Past modifications of channels for agricultural water conveyance and flood damage reduction purposes have resulted in homogenous, trapezoidal channels lacking instream structure with narrow and sparse bands of riparian vegetation that provide only limited shaded riverine aquatic

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3 The lowermost segment of the NEMDC is adjacent to the waterside of the lower American River north levee and is within the Phase 4b Project area; however, the lower American River is outside of the Phase 4b Project area.
(SRA)\(^4\) habitat functions. The alterations to the lower Sacramento and American Rivers have resulted in marginal conditions that provide only limited habitat functions for most native fish species.

### Table 3.7-2

**Fish Present in the Natomas Basin, Including the Phase 4b Project Area: Lower Sacramento River, Natomas East Main Drainage Canal, and Natomas Cross Canal**

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Native (N) or Introduced (I)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sacramento River winter-run Chinook salmon</td>
<td><em>Oncorhynchus tshawytscha</em></td>
<td>N</td>
</tr>
<tr>
<td>Central Valley spring-run Chinook salmon</td>
<td><em>Oncorhynchus tshawytscha</em></td>
<td>N</td>
</tr>
<tr>
<td>Central Valley fall-/late fall-run Chinook salmon</td>
<td><em>Oncorhynchus tshawytscha</em></td>
<td>N</td>
</tr>
<tr>
<td>Central Valley steelhead/rainbow trout</td>
<td><em>Oncorhynchus mykiss</em></td>
<td>N</td>
</tr>
<tr>
<td>Green sturgeon</td>
<td><em>Acipenser medirostris</em></td>
<td>N</td>
</tr>
<tr>
<td>White sturgeon</td>
<td><em>Acipenser transmontanus</em></td>
<td>N</td>
</tr>
<tr>
<td>Pacific lamprey</td>
<td><em>Lampetra tridentate</em></td>
<td>N</td>
</tr>
<tr>
<td>Sacramento pikeminnow</td>
<td><em>Ptychocheilus grandis</em></td>
<td>N</td>
</tr>
<tr>
<td>Sacramento splittail</td>
<td><em>Pogonichthys macrolepidotus</em></td>
<td>N</td>
</tr>
<tr>
<td>Sacramento sucker</td>
<td><em>Catostomus occidentalis</em></td>
<td>N</td>
</tr>
<tr>
<td>Hardhead</td>
<td><em>Mylopharodon conocephalus</em></td>
<td>N</td>
</tr>
<tr>
<td>California roach</td>
<td><em>Lavinia symmetricus</em></td>
<td>N</td>
</tr>
<tr>
<td>Striped bass</td>
<td><em>Morone saxatilis</em></td>
<td>I</td>
</tr>
<tr>
<td>American shad</td>
<td><em>Alosa sapidissima</em></td>
<td>I</td>
</tr>
<tr>
<td>Largemouth bass</td>
<td><em>Micropterus salmoides</em></td>
<td>I</td>
</tr>
<tr>
<td>Smallmouth bass</td>
<td><em>Micropterus dolomieui</em></td>
<td>I</td>
</tr>
<tr>
<td>White crappie</td>
<td><em>Pomoxis annularis</em></td>
<td>I</td>
</tr>
<tr>
<td>Black crappie</td>
<td><em>Pomoxis nigromaculatus</em></td>
<td>I</td>
</tr>
<tr>
<td>Channel catfish</td>
<td><em>Ictalurus punctatus</em></td>
<td>I</td>
</tr>
<tr>
<td>White catfish</td>
<td><em>Ameiurus catus</em></td>
<td>I</td>
</tr>
<tr>
<td>Brown bullhead</td>
<td><em>Ictalurus nebulosus</em></td>
<td>I</td>
</tr>
<tr>
<td>Bluegill</td>
<td><em>Lepomis macrochirus</em></td>
<td>I</td>
</tr>
<tr>
<td>Green sunfish</td>
<td><em>Lepomis cyanellus</em></td>
<td>I</td>
</tr>
<tr>
<td>Golden shiner</td>
<td><em>Notemigonus crysoleucas</em></td>
<td>I</td>
</tr>
</tbody>
</table>

Source: Moyle 2002

---

\(^4\) SRA vegetation and instream tree and shrub debris provide important riverine fish habitat along the lower Sacramento River and its tributaries. 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 overhang or protrude into the water; and (2) water that contains variable amounts of woody debris, such as leaves, logs, branches, and roots and has variable depths, velocities, and currents. Riparian habitat provides structure (through SRA habitat) and food for fish species. Shade decreases water temperatures, while low overhanging branches can provide sources of food by attracting terrestrial insects. As riparian areas mature, the vegetation sloughs off into the rivers, creating structurally complex habitat consisting of large woody debris that furnishes refugia from predators, creates higher water velocities, and provides habitat for aquatic invertebrates. For these reasons, many fish species are attracted to SRA habitat.
Native species present in the lower Sacramento River, NEMDC, and/or NCC can be separated into anadromous species (i.e., species that spawn in fresh water after migrating as adults from marine habitat) and resident species. Native anadromous species include four runs of Chinook salmon (*Oncorhynchus tshawytscha*), steelhead trout (*O. mykiss*), green and white sturgeon (*Acipenser medirostris* and *A. transmontanus*), and Pacific lamprey (*Lampetra tridentata*). All of these anadromous species are expected to use habitats in the lower Sacramento River. Of these species, Chinook salmon and steelhead seasonally use the Sacramento River during adult upstream and juvenile downstream migrations. The Sacramento River also provides limited rearing habitat functions for juvenile salmon and steelhead during seasonal out-migration periods. Within the NEMDC, only fall-/late fall-run Chinook salmon and steelhead trout are expected to occur. Use of the NEMDC by these species is similar to that in the Sacramento River. Habitat values in the NCC are more degraded due to lack of structure and cover and reduced water quality. Use of this waterway by these species would be limited to occasional strays entering the waterway during periods of migration.

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*). Pikeminnow, splittail, sucker, hardhead, and roach may be present in relatively low numbers in all channels year-round, while resident rainbow trout is generally expected to be found primarily in the lower Sacramento River.

Nonnative anadromous species include striped bass (*Morone saxatilis*) and American shad (*Alosa sapidissima*). Striped bass and American shad are known to use the lower Sacramento River. Nonnative resident species include largemouth bass (*Micropterus salmoides*), smallmouth bass (*M. dolomieu*), white and black crappie (*Pomoxis annularis* and *P. nigromaculatus*), channel catfish (*Ictalurus punctatus*), white catfish (*Ameiurus catus*), brown bullhead (*Ictalurus nebulosus*), bluegill (*Lepomis macrochirus*), green sunfish (*L. cyanellus*), and golden shiner (*Notemigonus crysoleucas*). With the exception of the lower Sacramento River, habitat conditions in channels bordering the Natomas Basin, including the NEMDC and NCC, are most favorable for nonnative warm water resident species; therefore, these species are anticipated to be the most abundant in these channels.

### 3.7.2.2 SENSITIVE BIOLOGICAL RESOURCES

Sensitive biological resources include those that are afforded special protection through CEQA, the California Fish and Game Code (including but not limited to CESA), ESA, and CWA. Special-status species include plants and animals that are legally protected or that are otherwise considered sensitive by Federal, state, or local resource conservation agencies and organizations. These include:

- plant and wildlife species that are listed by CESA and/or ESA as rare, threatened, or endangered;
- plant and wildlife species considered candidates for listing or proposed for listing;
- wildlife species identified by DFG as California Species of Special Concern; and
- plants considered by CNPS to be rare, threatened, or endangered.

Sensitive habitats include those that are of special concern to resource agencies or are afforded specific consideration through CEQA, Section 1602 of the California Fish and Game Code, Section 404 of the CWA, and the Porter-Cologne Water Quality Control Act.

### Sensitive Woodland Habitat

Riparian and landside woodlands in the Natomas Basin provide important nesting and roosting habitat for a wide variety of wildlife species (including special-status species such as Swainson’s hawk) and serve as movement corridors for these species within the Basin. As such, they are considered sensitive habitats. Riparian woodlands in particular are rich in biological fauna and flora and provide valuable resources and protection for aquatic habitats. They are considered sensitive habitats subject to DFG jurisdiction California Fish and Game Code Section 1602. Other habitats considered sensitive by DFG include those identified as “rare and worthy of...
consideration” in natural communities recognized by the California Natural Diversity Data Database (CNDDB). These sensitive communities provide essential habitat to special-status species that are often restricted in distribution or decreasing throughout their range. Some woodland patches within the Phase 4b Project area could be categorized as Great Valley cottonwood riparian forest, which is a natural community documented in the CNDDB. Trees protected by county and city policies and ordinances, including native oaks, are also considered sensitive.

**Sensitive Aquatic Habitat**

Sensitive aquatic habitat includes those habitats 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 and 401 of the CWA, or the Sustainable Fisheries Act (as amended). These habitats are of special concern because they may be of high value to plant, wildlife, and fish species and may have a higher potential to support special-status species. They also provide other important ecological functions, such as enhancing flood and erosion control and maintaining water quality. Other sensitive aquatic habitats, including Essential Fish Habitat, are described below.

Irrigation/drainage canals and ditches in the Phase 4b Project area are anticipated to be considered waters of the United States and subject to regulation under CWA Section 404. Other permanently and/or seasonally wet habitats, such as freshwater marsh, seasonal wetland, and vernal pool, could qualify as jurisdictional waters of the United States subject to Section 404 regulation if they are adjacent or abutting other jurisdictional waters of the United States. In the Phase 4b Project area, vernal pools are known to occur along the NEMDC, the Triangle Properties Borrow Area, and along Lower Dry Creek.

Previous wetland delineation reports verified by USACE that cover portions of the Phase 4b Project footprint are include a delineation completed in 2008 that covers the PGCC and the NEMDC South (USACE Reference ID #20081039), a 2007 delineation that covers areas on the landside of the Sacramento River east levee Reaches 1–20 (C:1–4B, B:5A–15, and A:16–20) (USACE Reference ID #200700211), a delineation completed in 2006 for the NCC within the NLIP footprint (USACE Reference ID #200600795), and a delineation for the proposed woodland planting area at Lower Dry Creek east of the NEMDC (USACE Reference ID #200900238). These delineations identified the following features that fall within the Phase 4b Project area as jurisdictional: irrigation/drainage ditches and canals along the landside toe of the levee, irrigated wetlands in rice fields, freshwater marsh habitat, seasonal wetlands, and vernal pools. A delineation of jurisdictional waters of the United States covering the South Fisherman’s Lake Borrow Area, the landside of the American River north levee, and the NEMDC North was verified by USACE in April 2010 (USACE Reference ID #200801039); a separate delineation for the West Lakeside School Site has also been submitted to USACE and is currently under review. A delineation has not yet been completed for the West Drainage Canal east of Powerline Road, nor for the Triangle Properties Borrow Area (these will be completed by USACE). Jurisdictional features within these areas are expected to include primarily irrigation/ drainage ditches and irrigated wetlands in rice fields; seasonal wetlands and vernal pools are known to occur in the Triangle Properties Borrow Area.

In addition, the installation of an outfall at City of Sacramento Sump Pump No. 160 in Reach A:19B along the Sacramento River east levee would be within USACE jurisdictional areas. Discharge pipes and outfalls conveying filtered stormwater drainage from the east levee to the east bank of the Sacramento River under the Adjacent Levee Alternative (Proposed Action) might extend to areas within the jurisdiction of CWA Section 404 and/or Section 10 of the Rivers and Harbors Act.

The functional quality of an aquatic resource is considered by USACE as part of the CWA Section 404 regulatory process. Habitat quality may be generally categorized as low, moderate, or high, defined herein as follows:

- **Low**: High levels of disturbance (e.g., vegetation disking for fire clearance purposes, dominance of monotypic stands of nonnative vegetation, presence of human-made structures).
Moderate: Moderate levels of disturbance (e.g., natural plant communities intact with some evidence of nonnative vegetation, low-intensity developments such as trails, selective vegetation management for flood damage reduction purposes).

High: Natural structure and function of biotic community exists, with minimal changes in structure or function evident—i.e., zero to low levels of human disturbance (e.g., natural plant communities intact, no artificial structures present, sensitive plant and/or wildlife species utilization).

All of the aquatic habitats described above are also anticipated to qualify as waters of the state and be regulated under the Porter-Cologne Water Quality Control Act. In addition, waterways and associated riparian habitats are likely subject to regulation under Section 1600 et seq. of the California Fish and Game Code. Within the Phase 4b Project area, riparian habitat occurs in continuous bands along the Sacramento River east levee and American River north levee; scattered patches are present along the NCC waterside levee and the NEMDC.

**Special-Status Plant Species**

Nine special-status plant species were evaluated for their potential to occur in the NLIP, including the Phase 4b Project, area. These nine special-status plant species are covered under the NBHCP and/or are considered by the California Native Plant Society (CNPS) to be rare, endangered, or threatened and are considered to have suitable habitat in the project region. The CNDDB identifies a total of 11 special status plant species that have been identified within the USGS 7.5-minute quadrangles on which the Natomas Basin is located; however, the habitat within the Natomas Basin is not suitable for the following six of the species identified by the CNDDB because these species require alkaline soils or habitats which are not present within the NLIP area: alkali milk-vetch, brittlescale, San Joaquin spearscale, palmate-bracted bird’s-beak, Heckard’s pepper-grass, and stinkbells. Table 3.7-3 summarizes for each species the regulatory or CNPS listing status, including coverage in the NBHCP; habitat association; and potential for occurrence in the Natomas Basin, including the Phase 4b Project, area.

Focused surveys were conducted by AECOM botanists in July 2009 for the Phase 4a and 4b Projects. The survey was conducted within the flowering period of rose mallow, Delta tule pea, and Sanford’s arrowhead. No special-status species were found during the survey. Due to the timing of the survey, protocol-level surveys were not conducted for dwarf downingia, Bogg’s Lake hedge-hyssop, and legenere. The survey followed protocol outlined in DFG’s Guidelines for Assessing the Effects of Proposed Development on Rare, Threatened, and Endangered Plants and Plant Communities (DFG 2000).

The Triangle Properties Borrow Area, which is part of the Phase 4b Project, was not surveyed during the July 2009 effort; however, as described in Section 2.3.3.5, “Environmental Commitments for Borrow Sites,” before earthmoving activities are conducted in this area, a wetland delineation, and any necessary habitat creation components and management agreements, would be completed to ensure compensation for any fill of waters of the United States.

Six of the nine species were determined to have the potential to occur in the Phase 4b Project area: dwarf downingia, Bogg’s Lake hedge-hyssop, rose mallow, Delta tule pea, legenere, and Sanford’s arrowhead. Rose mallow, Delta tule pea, and Sanford’s arrowhead occur in freshwater habitats, including marshes, swamps, sloughs, and ditches. Potentially suitable habitat for these species is provided by irrigation and drainage canals within the Phase 4b Project area. In general, these areas provide low-quality habitat and are unlikely to support these three special-status plants. Sanford’s arrowhead, rose mallow, and Delta tule pea are not known to occur in the Phase 4b Project area (CNDDB 2009).
<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Status</th>
<th>Habitat</th>
<th>Potential for Occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dwarf downingia</td>
<td>Downingia pusilla</td>
<td>CNPS: 2</td>
<td>Vernal pools and lakes</td>
<td>Low potential to occur in vernal pools along existing waterside levee toe of NEMDC South, landside levee toe of the NEMDC, and Triangle Properties Borrow Area; no suitable habitat present in vernal pools along the landside NEMDC</td>
</tr>
<tr>
<td>Bogg’s Lake hedge-hyssop</td>
<td>Gratiola heterosepala</td>
<td>CA: endangered CNPS: 1B NBHCP: covered</td>
<td>Vernal pools and lake margins</td>
<td>Low potential to occur in vernal pools along existing waterside levee toe of NEMDC South, landside levee toe of the NEMDC, and Triangle Properties Borrow Area; no suitable habitat present in vernal pools along the landside NEMDC</td>
</tr>
<tr>
<td>Rose mallow</td>
<td>Hibiscus lasiacarpus</td>
<td>CNPS: 2</td>
<td>Freshwater marshes and swamps</td>
<td>Low potential to occur in ditches and ponds</td>
</tr>
<tr>
<td>Delta tule pea</td>
<td>Lathyrus jepsonii jepsonii</td>
<td>CNPS: 1B NBHCP: covered</td>
<td>Freshwater and brackish marshes and sloughs</td>
<td>Low potential to occur in ditches and ponds</td>
</tr>
<tr>
<td>Legenere</td>
<td>Legenere limosa</td>
<td>CNPS: 1B</td>
<td>Vernal pools</td>
<td>Low potential to occur in vernal pools along existing waterside levee toe of NEMDC South, landside levee toe of the NEMDC, and Triangle Properties Borrow Area; no suitable habitat present in vernal pools along the landside NEMDC</td>
</tr>
<tr>
<td>Colusa grass</td>
<td>Neostapfia colusana</td>
<td>Federal: threatened CA: endangered CNPS: 1B NBHCP: covered</td>
<td>Deep vernal pools</td>
<td>No suitable habitat is present</td>
</tr>
<tr>
<td>Slender Orcutt grass</td>
<td>Orcuttia tenuis</td>
<td>Federal: threatened CA: endangered CNPS: 1B NBHCP: covered</td>
<td>Deep vernal pools</td>
<td>No suitable habitat is present</td>
</tr>
<tr>
<td>Sacramento Orcutt grass</td>
<td>Orcuttia viscida</td>
<td>Federal: endangered CA: endangered CNPS: 1B NBHCP: covered</td>
<td>Deep vernal pools</td>
<td>No suitable habitat is present</td>
</tr>
<tr>
<td>Sanford’s arrowhead</td>
<td>Sagittaria sanfordii</td>
<td>CNPS: 1B</td>
<td>Freshwater ponds, marshes and ditches</td>
<td>Low potential to occur in ditches and ponds</td>
</tr>
</tbody>
</table>

Notes: CA = California; CNPS = California Native Plant Society; NBHCP = Natomas Basin Habitat Conservation Plan; NEMDC = Natomas East Main Drainage Canal
California Native Plant Society Listing Categories:
- 1B Plants considered rare, threatened, or endangered in California and elsewhere
- 2 Plants considered rare, threatened, or endangered in California but more common elsewhere
Source: CNPS 2009; CNDDDB 2009; City of Sacramento, Sutter County, and TNBC 2003; USFWS 2005; Data compiled by AECOM in 2009
A number of special-status plants known to occur in the vicinity of the Phase 4b Project area are restricted to vernal pool habitat. Vernal pools are present along the waterside toe of the NEMDC South west levee, along the landside of the NEMDC, in the Triangle Properties Borrow Area, and along Lower Dry Creek. Documented occurrences of dwarf downingia are known along the landside of the NEMDC (CNDDB 2009). However, the vernal pools within the Phase 4b Project area provide low-quality habitat as evidenced by a high percentage of nonnative plant species and abundance of nonnative annual grasses, which decrease the wet phase of the vernal pools; therefore, the vernal pools within the Phase 4b Project area are unlikely to support these three special-status plants due to high levels of disturbance. The remaining three species included in Table 3.7-3, Colusa grass, slender Orcutt grass, and Sacramento Orcutt grass, are not addressed further in this section because the Phase 4b Project area does not support the deep vernal pools that they require.

### Special-Status Wildlife Species

A programmatic Biological Opinion (BO) was issued by USFWS for the NLIP in October 2008; amended BOs were issued in May 2009, September 2009, May 2010, and October 2010 for project-level elements of the NLIP (Appendix D1).

All special status species that have documented occurrences within the CNDDB, or appropriate habitat within the Natomas Basin were evaluated for potential to occur. Twenty special-status wildlife species, including all species covered by the NBHCP, were evaluated for their potential to occur in the Natomas Basin, including the Phase 4b Project area. Table 3.7-4 summarizes for each species the regulatory status, including coverage in the NBHCP; habitat association; and potential for occurrence in the Phase 4b Project area. Two amphibian species are not addressed further in this section because the Phase 4b Project area does not support the habitats in which they occur. Three of the bird species listed in Table 3.7-4 have been documented in the area in the past but are not known to nest in the Phase 4b Project area and are not discussed further. The remaining eleven species were determined to have potential to occur in the Phase 4b Project area during at least part of the year and are discussed below.

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Status</th>
<th>Habitat</th>
<th>Potential for Occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invertebrates</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Valley elderberry longhorn</td>
<td>Desmocerus californicus dimorphus</td>
<td>Federal: threatened</td>
<td>Elderberry shrubs, typically in riparian</td>
<td>Known to occur along the American River north levee; elderberry shrubs are present within</td>
</tr>
<tr>
<td>beetle</td>
<td></td>
<td>NBHCP: covered</td>
<td>habitats</td>
<td>and adjacent to the Sacramento River east levee and the American River north levee</td>
</tr>
<tr>
<td>California linderiella</td>
<td>Linderiella occidentalis</td>
<td>NBHCP: covered</td>
<td>Vernal pools and other seasonal wetlands</td>
<td>Known occurrence along the NEMDC; potential to occur in Triangle Properties Borrow Area and</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lower Dry Creek woodland mitigation area</td>
</tr>
<tr>
<td>Vernal pool tadpole shrimp</td>
<td>Lepidurus packardi</td>
<td>Federal: endangered</td>
<td>Vernal pools and swales</td>
<td>Known occurrence along the NEMDC and in vicinity of Triangle Properties Borrow Area; could</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NBHCP: covered</td>
<td></td>
<td>occur in Lower Dry Creek woodland mitigation area</td>
</tr>
<tr>
<td>Midvalley fairy shrimp</td>
<td>Branchinecta mesovallensis</td>
<td>NBHCP: covered</td>
<td>Vernal pools</td>
<td>Not likely to occur</td>
</tr>
<tr>
<td>Common Name</td>
<td>Scientific Name</td>
<td>Status</td>
<td>Habitat</td>
<td>Potential for Occurrence</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>----------------------------------</td>
<td>-------------------------</td>
<td>-------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Vernal pool fairy shrimp</td>
<td><em>Branchinecta lynchi</em></td>
<td>Federal: threatened</td>
<td>Vernal pools and other seasonal wetlands</td>
<td>Known occurrence along the NEMDC; potential to occur in Triangle Properties Borrow Area and Lower Dry Creek woodland mitigation area</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NBHCP: covered</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>CA: species of special</td>
<td>Vernal pools and seasonal wetlands in upland with burrows and other</td>
<td>No suitable habitat is present</td>
</tr>
<tr>
<td>Amphibians</td>
<td></td>
<td>concern</td>
<td>belowground refuge</td>
<td></td>
</tr>
<tr>
<td>California tiger salamander</td>
<td><em>Ambystoma californiense</em></td>
<td>Federal: threatened</td>
<td></td>
<td>No suitable habitat is present</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CA: species of special</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>concern</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Western spadefoot</td>
<td><em>Spea hammondii</em></td>
<td>CA: species of special</td>
<td></td>
<td>No suitable habitat is present</td>
</tr>
<tr>
<td></td>
<td></td>
<td>concern</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>NBHCP: covered</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reptiles</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Giant garter snake</td>
<td><em>Thamnophis gigas</em></td>
<td>Federal: threatened</td>
<td>Streams, sloughs, ponds, and irrigation/ drainage ditches; also require</td>
<td>Known to occur; the Natomas Basin supports a key population; rice fields, ditches, and ponds</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CA: threatened</td>
<td>upland refugia not subject to flooding during the snake’s inactive season</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>NBHCP: covered</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northwestern pond turtle</td>
<td><em>Actinemys marmorata marmorata</em></td>
<td>CA: species of special</td>
<td>Ponds, marshes, rivers, streams, sloughs; nest in nearby uplands with</td>
<td>Known to occur in ditches and ponds</td>
</tr>
<tr>
<td></td>
<td></td>
<td>concern</td>
<td>suitable soils</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>NBHCP: covered</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Birds</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White-faced ibis</td>
<td><em>Plegadis chihi</em></td>
<td>CA: species of special</td>
<td>Forage and roost in shallow water and flooded fields; nest in freshwater</td>
<td>Rice fields provide foraging habitat; the only nesting colony in the Natomas Basin is approximately 3 miles from the nearest levee improvement area</td>
</tr>
<tr>
<td></td>
<td></td>
<td>concern</td>
<td>marshes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>NBHCP: covered</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aleutian Canada goose</td>
<td><em>Branta canadensis leucopareia</em></td>
<td>NBHCP: covered</td>
<td>Forage in agricultural fields and roost in aquatic habitats</td>
<td>Could be a winter visitor, but no recent documented occurrences</td>
</tr>
<tr>
<td>White-tailed kite</td>
<td><em>Elanus leucurus</em></td>
<td>CA: fully protected</td>
<td>Forage in grasslands and agricultural fields; nest in isolated trees or</td>
<td>Known to nest and forage in the area</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>small woodland patches</td>
<td></td>
</tr>
<tr>
<td>Northern harrier</td>
<td><em>Circus cyaneus</em></td>
<td>CA: species of special</td>
<td>Forage and nest in grassland, agricultural fields, and marshes</td>
<td>Known to nest and forage in the area</td>
</tr>
<tr>
<td></td>
<td></td>
<td>concern</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooper’s hawk</td>
<td><em>Accipiter cooperii</em></td>
<td>CA: species of special</td>
<td>Forage and nest in open woodlands and woodland margins</td>
<td>Known to nest and forage in the area</td>
</tr>
<tr>
<td></td>
<td></td>
<td>concern</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swainson’s hawk</td>
<td><em>Buteo swainsoni</em></td>
<td>CA: threatened</td>
<td>Forage in grasslands and agricultural fields; nest in open woodland or</td>
<td>Known to nest and forage in the area</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NBHCP: covered</td>
<td>scattered trees</td>
<td></td>
</tr>
</tbody>
</table>
### Table 3.7-4
Special-Status Wildlife Species Evaluated for Potential to Occur in the Natomas Basin, Including the Phase 4b Project Footprint

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Status</th>
<th>Habitat</th>
<th>Potential for Occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>American peregrine falcon</td>
<td><em>Falco peregrinus anatum</em></td>
<td>CA: endangered and fully protected</td>
<td>Forage in a variety of open habitats, particularly marshes and other wetlands</td>
<td>Likely to occasionally forage in the area, but no suitable nesting habitat is present</td>
</tr>
<tr>
<td>Burrowing owl</td>
<td><em>Athene cunicularia</em></td>
<td>CA: species of special concern</td>
<td>Grasslands and agricultural fields</td>
<td>Known to nest and forage in the area</td>
</tr>
<tr>
<td>Bank swallow</td>
<td><em>Riparia riparia</em></td>
<td>CA: threatened</td>
<td>Forage in various habitats; nest in banks or bluffs, typically adjacent to water</td>
<td>Could forage in the area, but no colonies have been documented nearby within the past 10 years</td>
</tr>
<tr>
<td>Loggerhead shrike</td>
<td><em>Lanius ludovidianus</em></td>
<td>CA: species of special concern</td>
<td>Forage in grasslands and agricultural fields; nest in scattered shrubs and trees</td>
<td>Known to nest and forage in the area</td>
</tr>
<tr>
<td>Tricolored blackbird</td>
<td><em>Agelaius tricolor</em></td>
<td>CA: species of special concern</td>
<td>Forage in grasslands and agricultural fields; nest in freshwater marsh, riparian scrub, and other dense shrubs and herbs</td>
<td>Known to nest and forage in the area</td>
</tr>
</tbody>
</table>

Notes: CA = California; NBHCP = Natomas Basin Habitat Conservation Plan; NEMDC = Natomas East Main Drainage Canal
Source: CNDDB 2009; City of Sacramento, Sutter County, and TNBC 2003; USFWS, 2005, 2006; Data compiled by AECOM in 2009

► **Vernal Pool Tadpole Shrimp and Vernal Pool Fairy Shrimp.** The vernal pool tadpole shrimp is Federally listed as endangered and the vernal pool fairy shrimp is Federally listed as threatened; both are covered under the NBHCP. Vernal pool tadpole shrimp and vernal pool fairy shrimp occur in vernal pool habitats. Scattered vernal pool habitat is present along the NEMDC, on the Triangle Properties Borrow Area, and the Lower Dry Creek woodland mitigation planting area. Documented occurrences of vernal pool fairy shrimp and vernal pool tadpole shrimp are located along the landside of the NEMDC along Natomas Road, south of Sankey Road.

While no longer a DFG species of concern, California linderiella and midvalley fairy shrimp are covered by the NBHCP. California linderiella is known to occur within the Phase 4b Project area; occurrences of California linderiella are known from south of Elverta Road to north of Del Paso Road along the NEMDC west levee (CNDDB 2009). Midvalley fairy shrimp are not likely to occur within the Phase 4b Project area; the nearest documented occurrence is approximately 10 miles south of the Natomas Basin. Except for within the Phase 4b Project footprint, there are no other occurrences of these species within the Basin.

► **Valley Elderberry Longhorn Beetle.** The valley elderberry longhorn beetle is Federally listed as threatened and is covered under the NBHCP. These beetles are patchily distributed throughout the remaining riparian forests of the Central Valley, from Redding to Bakersfield, and appear to be only locally common (i.e., found in population clusters that are not evenly distributed across the Central Valley). Valley elderberry longhorn beetles require elderberry shrubs (*Sambucus* sp.) for reproduction and survival, and are rarely seen because they spend most of their life cycle as larvae within the stems of the shrubs. It appears that in order to function as habitat for the valley elderberry longhorn beetle, host elderberry shrubs must have stems that are 1.0 inch or greater in diameter at ground level. Use of the shrubs by the beetle is rarely apparent; often the only exterior evidence is an exit hole created by the larva just before the pupal stage.

USFWS released a 5-year status review for the valley elderberry longhorn beetle on October 2, 2006 (USFWS 2006). This review reported an increase in known beetle locations from 10 at the time of listing in 1980 to
190 in 2006. Because of the presumed increase in the estimated population and the concurrent protection and restoration of several thousand acres of riparian habitat suitable for valley elderberry longhorn beetles, the USFWS status review determined that this species is no longer in danger of extinction, and recommended that the species no longer be listed under ESA. This recommendation is not a guarantee that the species will be delisted, however, because formal changes in the classification of listed species require a separate USFWS rulemaking process distinct from the 5-year review. If valley elderberry longhorn beetles are removed from the ESA list, it will likely be more than a year before this decision is finalized.

Documented occurrences of valley elderberry longhorn beetle are present along the waterside of the American River north levee and on the west bank of the Sacramento River (CNBBD 2009). Elderberry shrubs that could support beetles are relatively scattered throughout the Phase 4b Project area, primarily in riparian vegetation on the waterside of the Natomas Basin perimeter levee system. Elderberry shrubs are also scattered in some remnant riparian and oak woodland clumps on the landside of the levee, but they are relatively uncommon in these locations.

Giant Garter Snake. The giant garter snake is Federally and state-listed as threatened and is a primary covered species under the NBHCP. This species formerly ranged throughout the wetlands of California’s Central Valley but appears to have been extirpated from the southern San Joaquin Valley (Hansen and Brode 1980, USFWS 1999) and has suffered serious declines in other parts of its former range. The primary cause of decline, loss or degradation of aquatic habitat caused by agricultural development, has been compounded by the loss of upland refugia and bankside vegetation cover (Thelander 1994).

Giant garter snakes inhabit agricultural wetlands and other waterways, such as irrigation and drainage canals, rice fields, marshes, sloughs, ponds, small lakes, low-gradient streams, and adjacent uplands in the Central Valley (USFWS 1999). Table 3.7-1 lists the overall acreages of habitat types in the Natomas Basin; ditches and canals are included in the “open water” designation. Rice fields and their adjacent irrigation and drainage canals serve an important role as aquatic habitat for giant garter snake. During summer, giant garter snakes use the flooded rice fields as long as their prey is present in sufficient densities. In late summer, rice fields provide important nursery areas for newborns. In late summer/fall, water is drained from the rice fields and giant garter snake prey items become concentrated in the remaining pockets of standing water, which allow the snakes to gorge before their period of winter inactivity (USFWS 1999). It appears that the majority of giant garter snakes move back into the canals and ditches as the rice fields are drained, although a few may overwinter in the fallow fields, where they hibernate within burrows in the small berms separating the rice checks (Hansen 1998).

Managed marsh in TNBC reserves also provides important habitat for giant garter snake. In contrast to rice, managed marsh provides year-round habitat, and habitat elements to meet all of the giant garter snake’s daily and seasonal needs, such as dense cover, basking sites, and refugia. TNBC reserves have been designed to provide habitat elements throughout the marsh; by contrast, the limited availability of the same elements in rice fields contributes to giant garter snake use occurring primarily around the perimeter of the rice fields. Total acres of created marsh habitat present in the Natomas Basin, are shown in Table 3.7-1.

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 from water, however, and any land within this distance may be important for snake survival in some cases (Hansen 1988). USFWS considers 200 feet to be the width of upland vegetation needed to provide adequate habitat for giant garter snake along the borders of aquatic habitat (USFWS 1997).

The Natomas Basin supports one of the most significant of the remaining giant garter snake populations in California. Recent occurrences of the species have generally been concentrated in the central and northern portions of the Basin, with giant garter snakes becoming increasingly uncommon at Fisherman’s Lake in the
There are a number of likely causes for this disparity, including limited opportunities for exchange of individuals between key populations in the northern concentration of TNBC reserves and the population at Fisherman’s Lake in the south (TNBC 2008). Despite this, habitat provided by Fisherman’s Lake and associated TNBC preserve tracts supports one of the three major population clusters in the Natomas Basin. Irrigation and drainage ditches and canals throughout the Phase 4b Project area provide habitat of varying quality for giant garter snake, depending on the location. Large waterways, such as the Sacramento and American Rivers, do not provide suitable habitat for giant garter snake.

**Northwestern Pond Turtle.** Northwestern pond turtle is a DFG species of special concern and is covered under the NBHCP. This species is generally associated with permanent or near-permanent aquatic habitats, such as lakes, ponds, streams, freshwater marshes, and agricultural ditches. They require still or slow-moving water with instream emergent woody debris, rocks, or similar features for basking sites. Pond turtles are highly aquatic but can venture far from water for egg laying. Nests are typically located on unshaded upland slopes in dry substrates with clay or silt soils (Jennings and Hayes 1994).

Ditches, ponds, and marshes throughout the Natomas Basin provide potential habitat for northwestern pond turtle. Basinwide acreages of these habitats are shown in Table 3.7-1 in the categories “Open water” and “Fresh emergent marsh.” Potential breeding habitat is very limited because of the predominance of agriculture and development, but turtles could occur along ditches and margins of other aquatic habitat. Limited information is available on the status and distribution of the northwestern pond turtle in the Basin. Surveys conducted in 2004–2007 for TNBC documented only 17 occurrences of northwestern pond turtle in the Natomas Basin; nearly half of these were in the Fisherman’s Lake area (TNBC 2008).

**Swainson’s Hawk.** Swainson’s hawk is state listed as threatened and is a primary covered species under the NBHCP. As many as 17,000 Swainson’s hawk pairs may have nested in California at one time (DFG 1994). Currently, there are 700–1,000 breeding pairs in California, of which 600–900 are in the Central Valley (Estep 2003). Swainson’s hawks typically occur in California only during the breeding season (March–September) and winter in Mexico and South America. The Central Valley population migrates only as far south as central Mexico. Swainson’s hawks begin to arrive in the Central Valley in March; nesting territories are usually established by April, with incubation and rearing of young occurring through June (Estep 2003).

Swainson’s hawks are found most commonly 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, Bechard, and Houston 1997; Estep 1984; Schlorrff 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 prey animals in these habitats are accessible during and soon after harvest.

Swainson’s hawks feed primarily on small rodents but also consume insects and birds. Although the most important foraging habitat for Swainson’s hawks lies within a 1-mile radius of each nest (City of Sacramento, Sutter County, and TNBC 2003), Swainson’s hawks have been recorded foraging up to 18.6 miles from nest sites (Estep 1989). Any habitat within the foraging distance may provide food at some time in the breeding season that is necessary for reproductive success. In a dynamic agricultural environment such as the Natomas Basin, the area required for Swainson’s hawk foraging habitat depends on time of season, crop cycle, crop type, and disking/harvesting schedule, as these factors affect the abundance and availability of prey (City of Sacramento, Sutter County, and TNBC 2003).
The most recent survey published by TNBC (2008) documented that 44 of the 103 known nesting territories in the Natomas Basin and along adjacent waterways were active in 2007. Most nest sites are located in the western portion of the Basin along the Sacramento River. Along the Sacramento River, the majority of nest sites are located on the waterside of the levees, and the relatively few nest sites on the landside of the Sacramento River east levee are typically located at least several hundred feet or more from the levee.

In addition to the scattered nest sites adjacent to the Phase 4b Project area, agricultural fields and levee maintenance zones throughout the Phase 4b Project area provide suitable foraging habitat for Swainson’s hawk. Basinwide acres of grasslands and alfalfa, row, and grain crops that may provide foraging habitat for Swainson’s hawks are shown in Table 3.7-1.

The Phase 4b Project area is within a densely populated and important component of the Central Valley Swainson’s hawk population. Nesting pairs in the Natomas Basin may represent as much as 10% of the Swainson’s hawks that are found in the Central Valley. Most nest sites are located in the western portion of the Basin along the Sacramento River; nest sites are also known to occur in trees in the vicinity of the Fisherman’s Lake area. Nesting habitat includes riparian and non-riparian woodlands. In addition to nest sites that are adjacent to the Phase 4b Project area, there are agricultural fields and grassland habitats (including levee and canal maintenance zones) throughout the Phase 4b Project area that provide suitable foraging habitat for Swainson’s hawk.

Alfalfa and other irrigated field crops can generally provide higher-quality foraging habitat than uncultivated annual grasslands and ruderal areas due to prey abundance and availability. The crops can provide abundant cover and food for prey populations. Periodic disturbances such as harvesting, tilling, and flooding can increase prey availability. Certain crops provide better foraging than others due to crop height and the frequency of the disturbance regime. Generally, alfalfa crops are considered the highest value foraging habitat for Swainson’s hawk. Next in order of preference is grass hay, fallow crops, row and grain crops, and finally annual grasslands (Estep 2007, Woodbridge 1998).

► **Burrowing Owl.** Burrowing owl is a DFG species of special concern and is covered under the NBHCP. Burrowing owls and their nests are also protected under Section 3503.5 of the California Fish and Game Code, which states that it is unlawful to take, possess, or destroy any raptors, including their nests or eggs. Burrowing owls typically inhabit grasslands and other open habitats with low-lying vegetation. They are also known to nest and forage in idle agricultural fields, ruderal fields, and the edges of cultivated fields, although these areas provide lower-quality habitat than native grasslands. Burrow availability is an essential component of suitable habitat. Burrowing owls are capable of digging their own burrows in areas with soft soil, but they generally prefer to adopt those excavated by other animals, typically ground squirrels. In areas where burrows are scarce, they can use pipes, culverts, debris piles, and other artificial features.

Burrowing owl sightings are generally in the eastern half of the Natomas Basin, with the highest concentration along the far eastern edge (TNBC 2008). Potentially suitable burrowing owl burrows and foraging habitat occurs within the Phase 4b Project area along the NEMDC.

► **Northern Harrier.** Northern harrier is a California Species of Special Concern and a year-round resident in California. This species is not covered under the NBHCP. Northern harriers are likely to nest in grain crops and fallow agricultural fields in and adjacent to the Phase 4b Project area.

► **Other Nesting Birds.** Several bird species identified in Table 3.7-4 have the potential to nest in or adjacent to the Phase 4b Project area. Species associated with riparian and other woodland habitats, such as Cooper’s hawk and white-tailed kite, are most likely to nest along the Sacramento River, American River, NEMDC South (Cooper’s hawk), and in remnant woodland and suitable trees on the landside of the levees (white-tailed kite). In general, these two raptor species are relatively uncommon in the Phase 4b Project area. Loggerhead shrikes are known to nest at several TNBC reserves and elsewhere in the Natomas Basin (TNBC...
2008) and are likely to nest in small trees and shrubs within the Phase 4b Project area, particularly on the landside of the Sacramento River east levee and along Fisherman’s Lake.

Tricolored blackbirds have been known to nest on a preserve in TNBC’s Central Basin Reserve Area and in the extreme northeast corner of the Basin (TNBC 2008). There is also potential for this species to nest in areas of suitable habitat elsewhere adjacent to the Phase 4b Project area, including several TNBC reserves. White-faced ibis were not known to nest anywhere in the Natomas Basin until 2007, when a new nesting colony became established at a preserve in TNBC’s Central Basin Reserve. Although foraging tricolored blackbird and white-faced ibis have been observed in the Fisherman’s Lake area, occurrences of these species are uncommon in the southern portion of the Natomas Basin and no known nesting sites occur near the Phase 4b Project area.

Special-Status Fish

Seven special-status fish species have the potential to occur in the lower Sacramento River, NEMDC, and/or NCC as described below (Table 3.7-5). Of the seven species, Central Valley steelhead distinct population segment (DPS; formerly Evolutionarily Significant Unit [ESU]), Sacramento River winter-run Chinook salmon ESU, Central Valley spring-run Chinook salmon ESU, and the Southern DPS of North American green sturgeon 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. The National Marine Fisheries Service (NMFS) determined that listing is not warranted for Central Valley fall-/late fall-run Chinook salmon. However, this species is still designated a species of concern by NMFS and a species of special concern by DFG because of concerns about specific risk factors. The remaining two species, hardhead and Sacramento splittail, are considered species of special concern by DFG. Delta smelt, which is Federally and state-listed as threatened, and longfin smelt, which was recently state listed as threatened, are found in the tidally influenced reaches of the Sacramento River downstream of the confluence with the American River, and therefore are not expected to be found in the Sacramento River near the Phase 4b Project area, in the NEMDC, or in the NCC. Summary descriptions for those species that have the potential to occur in the Natomas Basin, including the Phase 4b Project area, are provided below.

► Fall-/Late Fall-Run Chinook Salmon ESU. Adult fall-/late fall-run Chinook salmon enter the Sacramento and San Joaquin River systems from July through April and spawn from October through February. During spawning, the female digs a redd (gravel nest) in which she deposits her eggs, which are then fertilized by the male. Optimal water temperatures for egg incubation are 6.7 degrees Celsius (ºC) to 12.2ºC. Newly emerged fry remain in shallow, lower-velocity edgewaters, particularly where debris congregates and makes the fish less visible to predators (DFG 1998). The duration of egg incubation and time of fry emergence depends largely on water temperature. In general, eggs hatch after a 3- to 5-month incubation period, and alevins (yolk-sac fry) remain in the gravel until their yolk-sacs are absorbed (2–3 weeks).

Cover structures, space, and food are necessary components for Chinook salmon rearing habitat. Suitable habitat includes areas with instream and overhead cover in the form of undercut banks; downed trees; and large, overhanging tree branches. The organic materials forming fish cover also help provide sources of food, in the form of both aquatic and terrestrial insects. Growth of juvenile Chinook salmon in floodplain habitat is fast relative to growth in river habitat. Juvenile salmon have been found to have growth rates in excess of 1 millimeter (mm) per day when they rear in flooded habitat and as much as 20 mm in 2–3 weeks (Jones & Stokes 2001). The water temperature in floodplain habitat is typically higher than that in main channel habitats. Although increased temperature increases metabolic requirements, the productivity in flooded habitat is also increased, resulting in higher growth rates (Sommer et al. 2001). The production of drift invertebrates in the Yolo Bypass
### Table 3.7-5

**Special-Status Fish Species Potentially Occurring in the Natomas Basin, Including the Phase 4b Project**

**Area:** Lower Sacramento River, Natomas East Main Drainage Canal, and/or Natomas Cross Canal

<table>
<thead>
<tr>
<th>Species</th>
<th>Status1</th>
<th>Habitat</th>
<th>Potential to Occur</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Valley fall-/late fall-run Chinook salmon ESU <em>Oncorhynchus tshawytscha</em></td>
<td>SC</td>
<td>SSC</td>
<td>Requires cold, freshwater streams with suitable gravel for spawning; rears in seasonally inundated floodplains, rivers, and tributaries, and in the Delta</td>
</tr>
<tr>
<td>Sacramento River winter-run Chinook salmon ESU <em>Oncorhynchus tshawytscha</em></td>
<td>E</td>
<td>E</td>
<td>Requires cold, freshwater streams with suitable gravel for spawning; rears in seasonally inundated floodplains, rivers, and tributaries, and in the Delta</td>
</tr>
<tr>
<td>Central Valley spring-run Chinook salmon ESU <em>Oncorhynchus tshawytscha</em></td>
<td>T</td>
<td>T</td>
<td>Requires cold, freshwater streams with suitable gravel for spawning; rears in seasonally inundated floodplains, rivers, and tributaries, and in the Delta</td>
</tr>
<tr>
<td>Central Valley steelhead DPS <em>Oncorhynchus mykiss</em></td>
<td>T</td>
<td>–</td>
<td>Requires cold, freshwater streams with suitable gravel for spawning; rears in seasonally inundated floodplains, rivers, and tributaries, and in the Delta</td>
</tr>
<tr>
<td>North American Green sturgeon Southern DPS <em>Acipenser medirostris</em></td>
<td>T</td>
<td>–</td>
<td>Requires cold, freshwater streams with suitable gravel for spawning; rears in seasonally inundated floodplains, rivers, tributaries, and Delta</td>
</tr>
<tr>
<td>Sacramento splittail <em>Pogonichthys macrolepidotus</em></td>
<td>–</td>
<td>SSC</td>
<td>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</td>
</tr>
<tr>
<td>Hardhead <em>Mylopharodon conocephalus</em></td>
<td>SC</td>
<td>SSC</td>
<td>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</td>
</tr>
</tbody>
</table>

Notes: Delta = Sacramento–San Joaquin Delta; DFG = California Department of Fish and Game; ESU = Evolutionarily Significant Unit; DPS = Distinct Population Segment; NCC = Natomas Cross Canal; NEMDC = Natomas East Main Drainage Canal; NMFS = National Marine Fisheries Service; USFWS = U.S. Fish and Wildlife Service

1. **Legal Status Definitions**
   - **Federal Listing Categories (USFWS and NMFS)**
     - **E** Endangered (legally protected)
     - **T** Threatened (legally protected)
     - **SC** Species of Concern
   - **State Listing Categories (DFG)**
     - **E** Endangered (legally protected)
     - **T** Threatened (legally protected)
     - **SC** Species of Concern (no formal protection)

Source: Data compiled by AECOM in 2009
has been found to be one to two times greater than production in the river (Sommer et al. 2001). Also, grasses
that are flooded support invertebrates that are also a substantial source of food for rearing juveniles. Increased
areas resulting from flooded habitat can also reduce the competition for food and space and potentially
decrease the possible encounters with predators (Sommer et al. 2001). Juvenile Chinook salmon that grow
faster are likely to migrate downstream sooner, which helps to reduce the risks of predation and competition
in freshwater systems.

Juvenile Chinook salmon in the Sacramento River system move out of upstream spawning areas into
downstream habitats in response to many factors, including inherited behavior, habitat availability, flow,
competition for space and food, and water temperature. The number of juveniles that move and the timing of
movement are highly variable. Storm events and the resulting high flows appear to trigger movement of
substantial numbers of juvenile Chinook salmon to downstream habitats. In general, juvenile abundance in the
Delta increases as flow increases (USFWS 1993a).

Fall-/late fall-run Chinook salmon emigrate as fry and subyearlings and remain off the California coast during
their ocean migration (63 Federal Register [FR] 11481, March 9, 1998). Fall-/late fall-run Chinook salmon
occur in the lower Sacramento River and NEMDC, and could also occur in the NCC.

► Winter-Run Chinook Salmon ESU. Adult winter-run Chinook salmon leave the ocean and migrate through
the Delta into the Sacramento River system from November through July. These salmon migrate upstream
past the Red Bluff Diversion Dam (RBDD) on the Sacramento River from mid-December through July, and
most of the spawning population has passed RBDD by late June. Winter-run Chinook salmon spawn from
mid-April through August, and incubation continues through October. The primary spawning grounds in the
Sacramento River are above RBDD. Adult winter-run Chinook salmon generally do not enter the American
River.

Juvenile winter-run Chinook salmon rear and emigrate in the Sacramento River from July through March
(Hallock and Fisher 1985). Juveniles descending the Sacramento River above RBDD from August through
October and possibly November are mostly pre-smolts (smolts are juveniles that are physiologically ready to
enter seawater) and probably rear in the Sacramento River below RBDD. Juveniles have been observed in the
Delta between October and December, especially during high Sacramento River discharge caused by fall and
early-winter storms.

Triggers for downstream movement are similar to those described above for fall-run Chinook salmon. Winter-
run salmon smolts may migrate through the Delta and bay to the ocean from December through as late as June
(Stevens 1989 cited in USFWS 1993b). The Sacramento River channel is the main migration route through
the Delta. Adult winter-run Chinook salmon spend 1–4 years in the ocean. Winter-run Chinook salmon occur
in the lower Sacramento River adjacent to the Natomas Basin, including the Phase 4b Project, area.

► Spring-Run Chinook Salmon ESU. Spring-run Chinook salmon historically were the second most abundant
run of Central Valley Chinook salmon (Fisher 1994). They occupied the headwaters of all major river systems
in the Central Valley where there were no natural barriers. Adults returning to spawn ascended the tributaries
to the upper Sacramento River, including the Pit, McCloud, and Little Sacramento Rivers. They also occupied
Cottonwood, Battle, Antelope, Mill, Deer, Stony, Big Chico, and Butte Creeks and the Feather, Yuba,
American, Mokelumne, Stanislaus, Tuolumne, Merced, San Joaquin, and Kings Rivers. Spring-run Chinook
salmon migrated farther into headwater streams where cool, well-oxygenated water is available year round.

Surveys indicate that remnant, nonsustaining spring-run Chinook salmon populations may be found in
Cottonwood, Battle, Antelope, and Big Chico Creeks (DWR 1997). More sizable, consistent runs of naturally
produced fish are found only in Mill and Deer Creeks. The Feather River Fish Hatchery sustains the spring-
run population on the Feather River, but the genetic integrity of that run is questionable (DWR 1997).
Estimates since 1953 on the Feather River indicate that numbers returning to the hatchery average around
2,115, although the estimates have increased dramatically since 1990 (DFG 2006).
Historical records indicate that adult spring-run Chinook salmon enter the mainstem Sacramento River in February and March and continue to their spawning streams, where they then hold in deep, cold pools until they spawn. Spring-run Chinook salmon are sexually immature during their spawning migration. Some adult spring-run Chinook salmon start arriving in the Feather River below the Fish Barrier Dam in June. They remain there until the fish ladder is opened in early September. Spawning and rearing requirements for the species are similar to those identified above for fall-run Chinook salmon.

Spawning occurs in gravel beds from late August through October, and emergence takes place in March and April. Spring-run Chinook salmon appear to emigrate at two different life stages: fry and yearlings. Fry move between February and June, while the yearling spring-run emigrate October to March, peaking in November (Cramer and Demko 1997).

Juveniles display considerable variation in stream residence and migratory behavior. Juvenile spring-run Chinook salmon may leave their natal streams as fry soon after emergence or rear for several months to a year before migrating as smolts or yearlings (Yoshiyama et al. 1998). Triggers for downstream movement are similar to those described above for fall-run Chinook salmon.

On March 9, 1998 (63 FR 11481), NMFS issued a proposed rule to list Central Valley spring-run Chinook salmon ESU as endangered; however, it designated the species as threatened on September 16, 1999 (64 FR 50393). On February 5, 1999, the California Fish and Game Commission listed it as threatened under CESA. Critical habitat originally had been designated for Central Valley spring-run Chinook salmon by NMFS (65 FR 7764, February 16, 2000). However, following a lawsuit (National Association of Home Builders et al. v. Donald L. Evans, Secretary of Commerce, et al.), NMFS rescinded the listing. After further review, critical habitat for the Central Valley spring-run Chinook salmon ESU was designated on August 12, 2005. Critical habitat is designated to include select waters in the Sacramento and San Joaquin River basins. Spring-run Chinook salmon occur in the lower Sacramento River adjacent to the Natomas Basin, including the Phase 4b Project area.

Central Valley Steelhead DPS. Historically, steelhead spawned and reared in most of the accessible upstream reaches of Central Valley rivers, including the Sacramento and American Rivers and many of their tributaries. Compared with Chinook salmon, steelhead generally migrated farther into tributaries and headwater streams where cool, well-oxygenated water is available year-round. In the Central Valley, steelhead are now restricted to the upper Sacramento River downstream of Keswick Reservoir; the lower reaches of large tributaries downstream of impassable dams; small, perennial tributaries of the Sacramento River mainstem; and the San Francisco Bay/Sacramento–San Joaquin Delta (Bay-Delta) system.

The upstream migration of adult steelhead in the mainstem Sacramento River historically started in July, peaked in September, and continued through February or March. Central Valley steelhead spawn mainly from January through March, but spawning has been reported from late December through April (McEwan and Jackson 1996). During spawning, the female digs a redd (gravel nest) in which she deposits her eggs, which are then fertilized by the male. Egg incubation time in the gravel is determined by water temperature, varying from approximately 19 days at an average water temperature of 15.5ºC to approximately 80 days at an average temperature of 14.5ºC (McEwan and Jackson 1996).

Steelhead fry usually emerge from the gravel 2–8 weeks after hatching, between February and May, sometimes extending into June (Barnhart 1986, Reynolds et al. 1993). Newly emerged steelhead fry move to shallow, protected areas along streambanks but move to faster, deeper areas of the river as they grow. Juvenile steelhead feed on a variety of aquatic and terrestrial insects and other small invertebrates.

Juvenile steelhead rear throughout the year and may spend 1–3 years in freshwater before emigrating to the ocean. Smoltification, the physiological adaptation that juvenile salmonids undergo to tolerate saline waters, occurs in juveniles as they begin their downstream migration. Smolting steelhead generally emigrate from March to June (Barnhart 1986, Reynolds et al. 1993).
NMFS completed a status review of steelhead populations in Washington, Oregon, Idaho, and California and identified 15 DPSs in this range. On August 9, 1996, NMFS issued a proposed rule to list five of these DPSs (including the Central Valley steelhead) as endangered and five as threatened under the ESA (61 FR 155). The Central Valley steelhead DPS was later listed as threatened (downgraded from its proposed status of endangered) (63 FR 13347, March 19, 1998), and critical habitat (which included the lower Feather and Yuba Rivers) was designated for this DPS (65 FR 7764, February 16, 2000). However, after the lawsuit referenced above (National Association of Home Builders et al. v. Donald L. Evans, Secretary of Commerce, et al.), NMFS rescinded the listing. After further review, critical habitat for the Central Valley steelhead DPS was designated on August 12, 2005. This habitat includes select waters in the Sacramento and San Joaquin River basins. Steelhead occur in the lower Sacramento River and NEMDC, and could occur in the NCC.

North American Green Sturgeon Southern DPS. On April 7, 2006 NMFS listed the Southern DPS of the North American green sturgeon as threatened under the ESA (71 FR 17757). The Southern DPS includes individual reproductive populations south of the Eel River. The populations north of the Eel River, grouped as the Northern DPS, currently do not warrant listing. Green sturgeon are found in the lower reaches of large rivers, including the Sacramento–San Joaquin River basin, and in the Eel, Mad, Klamath, and Smith Rivers. Green sturgeon adults and juveniles are found throughout the upper Sacramento River, as indicated by observations incidental to winter-run Chinook monitoring at RBDD in Tehama County (NMFS 2005). Green sturgeon spawn predominantly in the upper Sacramento River and are found primarily in the mainstem Sacramento River.

The green sturgeon is a primitive, bottom-dwelling fish found from Ensenada, Mexico, to the Bering Sea and Japan (Wang 1986). It is characterized by its large size (up to 7 feet long and 350 pounds), a long, round body, and “scutes,” or plates along dorsal and lateral sides. It is known to migrate up to 600 miles between freshwater and saltwater environments and is commercially caught in the Columbia River and coastal Washington (Pacific States Marine Fisheries Commission [PSMFC] 1996). Very little is known about the life history of the green sturgeon relative to other fish species. It is an anadromous fish that spends most of its life in salt water and returns to spawn in freshwater. It is slow growing and late maturing and may spawn as little as every 4–11 years. Individuals congregate in the bays of these systems in summer, while some may travel upstream to spawn in spring and summer.

Spawning occurs in the lower reaches of large rivers with swift currents and large cobble. In the Sacramento River, they spawn in the upper river and are thought to spawn every 3–5 years (Tracy 1990). Their spawning period is March to July, with a peak in mid-April to mid-June (Moyle et al. 1992). Adults broadcast spawn in the water column and fertilized eggs sink and attach to bottom substrate until they hatch (PSMFC 1996). Flow has been identified as the key determinant to larval survival; therefore, water diversions and low dam releases may negatively impact green sturgeon survival rates (PSMFC 1996). Juveniles feed on algae and small invertebrates and migrate downstream before they enter their third year of life. Juveniles inhabit the estuary until they are approximately 4–6 years old, when they migrate to the ocean to feed on benthic invertebrates and fish (Kohlhorst et al. 1991).

NMFS proposed critical habitat for the Southern DPS of North American green sturgeon on September 8, 2008 and extended the comment period until December 22, 2008. On October 9, 2009, NMFS issued its final rule on critical habitat, which includes the lower Sacramento River adjacent to the Sacramento River east levee. North American green sturgeon are found primarily in the Sacramento River and occasionally in the Feather River.

Sacramento Splittail. Recent data indicate that Sacramento splittail occur in the Sacramento River as far upstream as RBDD (Sommer et al. 1997) and that some adults spend the summer in the mainstem Sacramento River rather than returning to the estuary (Baxter 1999). The distribution and extent of spawning and rearing along the mainstem Sacramento River is unknown.
Sacramento splittail spawn over flooded terrestrial or aquatic vegetation (Moyle 2002, Wang 1986). Sacramento splittail spawn in early March and May in lower reaches of the Sacramento River (Moyle et al. 1995). Spawning has been observed to occur as early as January and to continue through July (Wang 1986). Larval splittail are commonly found in the shallow, vegetated areas where spawning occurs. Larvae eventually move into deeper, open-water habitats as they grow and become juvenile. During late winter and spring, young-of-year juvenile splittail (i.e., those less than 1 year old) are found in floodplain habitat, sloughs, rivers, and Delta channels near spawning habitat. Juvenile splittail gradually move from shallow, nearshore habitats to the deeper, open-water habitats of Suisun and San Pablo Bays (Wang 1986). In areas upstream of the Delta, juvenile splittail can be expected to be present in the flood basins (i.e., Sutter and Yolo Bypasses and the Sacramento River) when these areas are flooded during winter and spring.

In 1999, after 4 years of candidate status, the splittail was listed as threatened under the ESA (64 FR 25, March 10, 1999). On September 22, 2003, USFWS withdrew splittail from the list of threatened species, indicating that habitat restoration actions implemented through the CALFED Bay-Delta Program and the Central Valley Project Improvement Act are likely to keep the splittail from becoming endangered in the foreseeable future (68 FR 55139, September 22, 2003). Sacramento splittail occur in the lower Sacramento River and could also occur in the NEMDC and NCC.

**Hardhead.** Hardhead are widely distributed throughout the low- to mid-elevation streams in the main Sacramento–San Joaquin drainage, including the Sacramento River system. Undisturbed portions of larger streams at low to middle elevations are preferred by hardhead. Hardhead are able to withstand summer water temperatures above 20ºC; however, they will select lower temperatures when they are available. Hardhead are fairly intolerant of low-oxygenated waters, particularly at higher water temperatures. Pools with sand-gravel substrates and slow water velocities are the preferred habitat; adult fish inhabit the lower half of the water column, while the juvenile fish remain in the shallow water closer to the stream edges. Hardhead typically feed on small invertebrates and aquatic plants at the bottom of quiet water (Moyle 2002). Hardhead is a Federal species of concern and a state species of special concern. Hardhead occur in the lower Sacramento River and could also occur in the NEMDC and NCC.

**Designated Essential Fish Habitat**

The lower Sacramento River, NCC, and the lowermost segment of the NEMDC have also been designated as Essential Fish Habitat by the Pacific Fishery Management Council to protect and enhance habitat for coastal marine fish and macroinvertebrate species that support commercial fisheries. Essential Fish Habitat is defined as waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity. Under the Pacific Coast Salmon Fisheries Management Plan (Pacific Fishery Management Council 2003), the NCC and the lower segment of the NEMDC (i.e., below confluence with Dry Creek) have been designated as Essential Fish Habitat for fall-run Chinook salmon, and the Sacramento River has been designated as Essential Fish Habitat for spring-, fall-, late fall-, and winter-run Chinook salmon ESU.

### 3.8 CULTURAL RESOURCES

#### 3.8.1 REGULATORY SETTING

##### 3.8.1.1 FEDERAL

The following Federal law related to cultural resources is relevant to this analysis and is described in detail in Chapter 6, “Compliance with Federal Environmental Laws and Regulations”:

- National Historic Preservation Act of 1966, as Amended.
3.8.1.2 STATE

California Register of Historic Places

The California Register of Historic Resources (CRHR) includes resources that are listed in or formally determined eligible for listing in the National Register of Historic Places (NRHP) as well as some California State Landmarks and Points of Historical Interest (California PRC Section 5024.1, 14 CCR Section 4850). Properties of local significance that have been designated under a local preservation ordinance (local landmarks or landmark districts) or that have been identified in a local historical resources inventory may be eligible for listing in the CRHR and are presumed to be significant resources for purposes of CEQA unless a preponderance of evidence indicates otherwise (State CEQA Guidelines CCR Section 15064.5[a][2]). The eligibility criteria for listing in the CRHR are similar to those for NRHP listing, but focus on the importance of the resources to California history and heritage. A cultural resource may be eligible for listing in the CRHR if it (see 14 CCR Section 4852):

(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.

Numerous historical resources are located within the Natomas Basin, including resources that are located near to the Phase 4b Project area. For a listing of these sites, refer to Tables 3.8-3 and 3.8-4, below.

California Law Governing Discoveries of Human Remains

California Health and Safety Code Section 7050.5(b) requires that the project proponent(s) notify the relevant County Coroner in the event of a discovery of human remains outside of a dedicated cemetery. In the event of a discovery the coroner shall determine if an investigation regarding the cause of death is required. If the discovered remains consist of a prehistoric Native American burial the coroner shall contact the Native American Heritage Commission (NAHC) within 24 hours after determining that the remains are subject to the jurisdiction of the NAHC (California Health and Safety Code Section 7050.5[c]).

Upon notification of a discovery the NAHC is required to identify a most likely descendant (MLD) within 48 hours, to provide the MLD with the opportunity to reinter the remains with appropriate dignity (California PRC Section 5097.98[a]). Mr. John Tayaba of the Shingle Springs Band of Miwok Indians (Tribe) has been designated MLD for the NLIP. It is assumed that he would decide how to reinter the discovered remains.

Native American Heritage Commission

The NAHC also identifies and catalogs places of special religious or social significance to Native Americans and known graves and cemeteries of Native Americans on private lands, and performs other duties regarding the preservation and accessibility of sacred sites and burials and the disposition of Native American human remains and burial items. Section 7.2.2, “Native American Consultation under CEQA,” details correspondence between SAFCA and the NAHC.

3.8.1.3 REGIONAL AND LOCAL

There are no regional or local laws, regulations, policies, or ordinances related to cultural resources that are relevant to the NLIP, including the Phase 4b Project.
3.8.2 ENVIRONMENTAL SETTING

This section describes the prehistoric, ethnographic, and historic setting for the NLIP, including the Phase 4b Project, area. Known cultural resources identified in previous studies are also described. Section 3.8.1, above, “Regulatory Setting,” describes the regulatory setting for the project.

3.8.2.1 PREHISTORIC AND ETHNOGRAPHIC SETTING

The Natomas Basin, is situated within the lands traditionally occupied by the Nisenan, or Southern Maidu. The language of the Nisenan, which includes several dialects, is classified within the Maiduan family of the Penutian linguistic stock (Kroeber 1925). The western boundary of Nisenan territory was the western bank of the Sacramento River and the area between present-day Sacramento and Marysville. In the Sacramento Valley, the tribelet, consisting of a primary village and a few satellite villages, served as the basic political unit (Moratto 1984). Valley Nisenan territory was divided into three tribelet areas, each populated with several large villages (Wilson and Towne 1978), generally located on low, natural rises along streams and rivers or on slopes with a southern exposure. One important village, Pusune, near Discovery Park, appears to have been recorded as CA-Sac-26. Other villages—Wollok, Leuchi, Wishuna, Totola, and Nawrean—were located east of the confluence of the Feather and Sacramento Rivers, near the northwestern portion of the Natomas Basin. Available data for the location of these villages is not precise enough to determine if they occur on or near components of the Phase 4b Project, but the proximity of these resources suggests sensitivity for undiscovered habitation sites.

Euro-American contact with the Nisenan began with infrequent excursions by Spanish explorers and Hudson Bay Company trappers traveling through the Sacramento and San Joaquin Valleys in the early 1800s. In general, Nisenan lifeways remained stable for centuries until the early to middle decades of the 19th century. With the coming of Russian trappers and Spanish missionaries, cultural patterns began to be disrupted as social structures were stressed. An estimated 75% of the Valley Nisenan population died in the malaria epidemic of 1833 (Wilson and Towne 1978). With the influx of Europeans during the Gold Rush era, the population was further reduced by disease and violent relations with the miners. However, today the Maidu are reinvesting in their traditional culture and, through newfound political, economic, and social influence, now constitute a growing and thriving native community in California.

The Tribe is descended from the Nisenan and Maidu people and attaches special cultural significance to the Natomas Basin because the Basin is situated in the Tribe’s aboriginal territory. John Tayaba, a member of the Tribe, has been designated MLD pursuant to California PRC Section 5097.98, and is empowered to reinter Native American human remains that may be discovered on the project with appropriate dignity, subject to the limitations in that section as described above.

3.8.2.2 HISTORIC SETTING

In what is now known as the Sacramento and Sutter County region, agriculture and ranching were the primary industries 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 in the 1850s and 1860s, as ranchers and farmers realized handsome returns from supplying food and other goods to miners.

In 1911, the California Legislature established The Reclamation Board (now the CVFPB) to exercise jurisdiction over reclamation districts and levee plans. Subsequently, the state authorized the Sacramento River Flood Control Project (SRFCP). The ambitious project included the construction of levees, weirs, and bypasses along the river to channel floodwaters away from population centers. Under the SRFCP, new reclamation districts were created, including RD 1000, consisting of approximately 55,000 acres in the Natomas Basin. RD 1000 was largely controlled by the Natomas Company, which had access to more money than any individual landowner. The infrastructure of RD 1000 was completed in the 1920s. It includes levees, drainage canals, pumps, irrigation systems, agricultural fields, roads, and remnant natural features. The originally constructed features included
levees and exterior drainage canals, an interior drainage canal system, nine pumping plants, a series of levee and interior roads, and unpaved rights-of-way between the farm fields.

RD 1000 has been previously evaluated as a Rural Historic Landscape District on behalf of USACE and was found eligible for NRHP and CRHR listing (Dames & Moore 1994a). 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 of the NRHP. The area of significance is reclamation and the historical context is flood damage reduction and reclamation of the Sacramento River basin within the SRFCP as an important part of the history of reclamation and flood damage reduction. The district retains much of its historic integrity, including location, design, setting, materials, workmanship, feeling, and association. The contributing and noncontributing elements of the district were defined as part of this effort. Contributing elements were described as follows:

- **Drainage System:** East Levee, River Levee, NCC Levee; NEMDC; NCC; PGCC; Pumping Plant Nos. 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 NCC; East Levee/Natomas Road; Sankey Road; Riego Road; Elverta Road; Elkhorn Boulevard from Garden Highway to the western boundary of the 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 road rights-of-way 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 Sorento 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 Sacramento River Levee; east of the Sacramento River Levee; and south of the NCC Levee.

### 3.8.2.3 Records Search Results

Records searches for recorded cultural resources and studies were conducted by EDAW/AECOM (now AECOM) in 2006 and 2007. Most of the searches were conducted at the North Central Information Center (NCIC) of the California Historical Resources Information System, located at California State University, Sacramento. The NCIC records search covered portions of the project area in Sacramento County. Records searches were also conducted at the Northeast Information Center (NEIC), which maintains cultural resource records for Sutter County. The records searches included the levee ring around the Basin as well as all the lands inside the Natomas Basin so that changing project needs (e.g., the identification of alternate borrow sites) would be covered by the records searches.

The NEIC and NCIC reported that several cultural resource inventories have been conducted within the Natomas Basin. These are listed in Tables 3.8-1 and 3.8-2, respectively.

Numerous archaeological investigations have covered portions of the Natomas Basin. These have generally focused on areas closest to the rivers and levees. There has been very little archaeological inventory of lands more than 100 feet from the levee toes, and ground surface visibility has frequently been poor even in surveyed areas.

Numerous cultural resources were identified in the course of previous survey efforts, including ranches and farms; agricultural, transportation, and reclamation features; and debris scatters, as well as prehistoric occupation and burial sites, frequently seen as mounds or the disturbed remnants of mounds.

The most comprehensive of these investigations were completed by Dames & Moore and Far Western Anthropological Research Group (Far Western). In 1994, Dames & Moore (1994b) conducted a broad survey in
the Natomas Basin as part of the American River Watershed Investigation. A survey of selected parcels along the Sacramento River identified 17 primarily historic sites. During the same effort, Dames & Moore visited an additional 10 previously identified cultural resources to update site records for those locations. At the same time, Dames & Moore (1994a) prepared a draft historic property treatment plan that explored the history and elements of RD 1000. In 1996, Dames & Moore completed its evaluation of RD 1000, concluding that it appeared to be eligible for listing on the NRHP under Criterion A at a state level of significance as an example of reclamation and flood damage reduction in the Sacramento River basin during the period 1911–1939 (see Section 3.8.2.2, above). This report extensively documents both the contributing and noncontributing resources of RD 1000. Previously, in 1990, Far Western had conducted surveys of areas along the same route surveyed by Dames & Moore in 1994 (Dames & Moore 1994b), as well as of additional areas (Bouey and Herbert 1990). Far Western (Bouey, Berg, and Hunter 1991) followed up with limited test excavations of two sites south of the Airport.

3.8.2.4 **PREVIOUSLY RECORDED CULTURAL RESOURCE SITES IN THE SUTTER COUNTY PORTION OF THE NATOMAS BASIN (AS OF SEPTEMBER 2006)**

This section and Table 3.8-3 describe cultural resources identified in previous studies on file at the NEIC within the Sutter County portion of the Natomas Basin. Table 4.8-1 in Section 4.8, “Cultural Resources,” lists cultural resources identified on or near the different components of the Phase 4b Project. Archaeological deposits identified on the landside of the Sacramento River east levee have the potential to extend underneath the existing levee and thus may be affected by landside and waterside activities.

<table>
<thead>
<tr>
<th>NEIC Report No.</th>
<th>Author(s)</th>
<th>Title</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1135</td>
<td>Bass, H. O.</td>
<td>Department of Transportation Negative Archaeological Survey Report: State Route 99</td>
<td>1983</td>
</tr>
<tr>
<td>7173</td>
<td>Cultural Resources Unlimited</td>
<td>A Cultural Resources Study for Sutter Bay Project, Sutter County, California</td>
<td>1992</td>
</tr>
<tr>
<td>7175</td>
<td>Cultural Resources Unlimited</td>
<td>A Cultural Resources Study for Sutter Bay Project Highway 99/70 Interchange/Crossroad Improvements Sutter County, California</td>
<td>1992</td>
</tr>
<tr>
<td>3469B</td>
<td>Dames &amp; Moore</td>
<td>Rural Historic Landscape Report for Reclamation District 1000 for the Cultural Resources Inventory and Evaluations for the American River Watershed Investigation, Sacramento and Sutter Counties, California</td>
<td>1996</td>
</tr>
<tr>
<td>5777</td>
<td>Dames &amp; Moore</td>
<td>Historic Property Treatment Plan for Reclamation District 1000 Rural Historic Landscape District for the Cultural Resources Inventory and Evaluations for the American River Watershed Investigation, Sacramento and Sutter Counties, California</td>
<td>1994</td>
</tr>
<tr>
<td>4197</td>
<td>Dames &amp; Moore</td>
<td>Archaeological Inventory Report, Natomas Locality, Cultural Resources Inventory and Evaluation, American River Watershed Investigation, El Dorado, Placer, Sacramento, and Sutter Counties, California</td>
<td>1994</td>
</tr>
<tr>
<td>6892</td>
<td>Derr, E. H.</td>
<td>American Basin Fish Screen and Habitat Improvement Project, Feasibility Study: Alternative 1C, 2C, 3, Sacramento and Sutter Counties, California</td>
<td>2002</td>
</tr>
<tr>
<td>6944</td>
<td>Ebasco Environmental</td>
<td>Cultural Resources Survey of the Sacramento Energy Project Sacramento County, California</td>
<td>1992</td>
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<tr>
<td>5655</td>
<td>Egherman, R., and B. Hatoff</td>
<td>Roseville Energy Facility Cultural Resources Appendix J-1 of Application for Certification</td>
<td>2002</td>
</tr>
<tr>
<td>6945</td>
<td>Foster, J. W., and D. G. Foster</td>
<td>An Archaeological Survey of the South Sutter Industrial Center Property, Sutter County, California</td>
<td>1992</td>
</tr>
</tbody>
</table>
### Table 3.8-1

Previous Cultural Resources Surveys Conducted in the Natomas Basin in Sutter County

<table>
<thead>
<tr>
<th>NEIC Report No.</th>
<th>Author(s)</th>
<th>Title</th>
<th>Date</th>
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</thead>
<tbody>
<tr>
<td>2987</td>
<td>Jensen, P.</td>
<td><em>Historic Properties Survey Report for the Proposed Fifield Road at Pleasant Grove Creek Canal, Caltrans District 3, Sutter County, California</em></td>
<td>1999</td>
</tr>
<tr>
<td>6893</td>
<td>Kaptain, N.</td>
<td><em>Historic Property Survey Report for the State Route 99/Riego Road Interchange Project Sutter and Sacramento Counties</em></td>
<td>2005</td>
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<tr>
<td>3469A</td>
<td>Peak &amp; Associates</td>
<td><em>Historic American Engineering Record Reclamation District 1000 HAER No. CA-187</em></td>
<td>1997</td>
</tr>
<tr>
<td>1141</td>
<td>Wilson, K. L.</td>
<td><em>Sacramento River Bank Protection Unit 34 Cultural Resources Survey Final Report</em></td>
<td>1978</td>
</tr>
</tbody>
</table>

Note: NEIC = Northeast Information Center; HAER = Historic American Engineering Record
Source: Data provided by the NEIC in 2007 and compiled by EDAW/AECOM (now AECOM) in 2007

### Table 3.8-2

Previous Cultural Resources Surveys Conducted in the Natomas Basin in Sacramento County

<table>
<thead>
<tr>
<th>NCIC Report No.</th>
<th>Author(s)</th>
<th>Title</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>–</td>
<td>Banek, B.</td>
<td><em>An Archaeological Reconnaissance of the South Natomas Area for the River Bank Holding Company, Sacramento County, California</em></td>
<td>1982</td>
</tr>
<tr>
<td>4188</td>
<td>Billat, L. B.</td>
<td><em>Nextel Communications Wireless Telecommunications Service Facility—Sacramento County</em></td>
<td>2001</td>
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<tr>
<td>–</td>
<td>Bouey, P. D.</td>
<td><em>Cultural Resources Inventory and Evaluation: Sacramento River Bank Protection (Unit 44) Project</em></td>
<td>1989</td>
</tr>
<tr>
<td>4457</td>
<td>California Department of Transportation</td>
<td><em>Negative Historic Property Survey Report for the Proposed Installation of Automatic Vehicle Census Systems on Interstate 80 East of the West El Camino Over-Crossing and on Highway 51 East of the “E” Street Ramps, Sacramento County, California</em></td>
<td>2003</td>
</tr>
<tr>
<td>4194</td>
<td>Chavez, D., L. H. Shoup, C. Desgrandchamp, and W. G. Slater</td>
<td><em>Cultural Resources Evaluations for the North Natomas Community Plan Study Area, Sacramento, California</em></td>
<td>1984</td>
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<tr>
<td>4193</td>
<td>County of Sacramento Department of Environmental Review and Assessment</td>
<td><em>Draft Environmental Impact Report for Teal Bend Golf Course Use Permit</em></td>
<td>1995</td>
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<td>NCIC Report No.</td>
<td>Author(s)</td>
<td>Title</td>
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<td>4190</td>
<td>CRS Archaeological Consulting and Research Services</td>
<td><em>Sacramento Metro Airport Airmail Facility</em>—letter report</td>
<td>1988</td>
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<tr>
<td>3409</td>
<td>Cultural Resources Unlimited</td>
<td><em>A Cultural Resources Study for Sacramento Area Flood Control Agency Borrow Sites</em> Project Sacramento County</td>
<td>1993</td>
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<td>4463</td>
<td>Cultural Resources Unlimited</td>
<td><em>A Cultural Resources Survey and Archival Review for the Arden-Garden Connector Project</em> Sacramento County, California</td>
<td>1992</td>
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<td>3469B</td>
<td>Dames &amp; Moore</td>
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<td>1996</td>
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<td>4195</td>
<td>Derr, E.</td>
<td><em>Cultural Resources Report: North Natomas Comprehensive Drainage Plan; Levee Improvements, Canal Widening and Additional Pumping Capacity</em></td>
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<td>3489B</td>
<td>Far Western Anthropological Research Group</td>
<td><em>Addendum to the Report on the First Phase of Archaeological Survey for the Proposed SMUD Gas Pipeline Between Winters and Sacramento Yolo and Sacramento Counties, California</em></td>
<td>1993</td>
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<tr>
<td>–</td>
<td>Foster, J. W.</td>
<td><em>A Cultural Resource Investigation of the Blue Oaks Skilled Nursing Facility Site Auburn, California</em></td>
<td>1995</td>
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<td>–</td>
<td>Glover, L. C., and P. D. Bouey</td>
<td><em>Sacramento River Flood Control System Evaluation, Mid-Valley Area Cultural Resources Survey, Colusa, Sacramento, Sutter, Yolo, and Yuba Counties, California</em></td>
<td>1990</td>
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<tr>
<td>5803</td>
<td>Herbert, R. F.</td>
<td><em>Report on the National Register Eligibility of the Sacramento River Dock Complex including Building 4635 (Dock) and Building 4637 (Warehouse) McClellan Air Force Base, Sacramento, California</em></td>
<td>1995</td>
</tr>
<tr>
<td>4202</td>
<td>Humphreys, S., and L. McBride</td>
<td><em>A Review of the Work Carried Out at Sacramento 16, the Bennett Mound</em></td>
<td>1966</td>
</tr>
<tr>
<td>4178</td>
<td>Jones &amp; Stokes</td>
<td><em>Archaeological Survey Report for the North Natomas Drainage System’s San Juan Pump Station</em></td>
<td>1992</td>
</tr>
<tr>
<td>2956</td>
<td>Nadolski, J. A.</td>
<td><em>Archaeological Survey Report for the Jibboom Street Bridge Project Sacramento, California</em></td>
<td>2001</td>
</tr>
<tr>
<td>5810</td>
<td>PAR Environmental Services, Inc.</td>
<td><em>Northgate Boulevard/Arden-Garden Intersection Cultural Resources Investigation, City of Sacramento, Sacramento County, California</em></td>
<td>n.d.</td>
</tr>
<tr>
<td>173</td>
<td>Peak, A. S.</td>
<td><em>American River Parkway An Archaeological Perspective</em></td>
<td>1973</td>
</tr>
<tr>
<td>2764</td>
<td>Peak &amp; Associates</td>
<td><em>Historic Property Survey Report and Finding of No Adverse Effect for the Proposed American River Parkway Bike Trail Improvement Project, City and County of Sacramento, California</em></td>
<td>2001</td>
</tr>
<tr>
<td>2765</td>
<td>Peak &amp; Associates</td>
<td><em>Archaeological Survey Report for the Proposed American River Parkway Bike Trail Improvement Project, City and County of Sacramento, California</em></td>
<td>2001</td>
</tr>
<tr>
<td>3469A</td>
<td>Peak &amp; Associates</td>
<td><em>Historic American Engineering Record Reclamation District 1000 HAER No. CA-187</em></td>
<td>1997</td>
</tr>
<tr>
<td>4173</td>
<td>Peak &amp; Associates</td>
<td><em>Report on the Archaeological Testing Within the Riverbend Classics Project Area, City of Sacramento, California</em></td>
<td>1999</td>
</tr>
<tr>
<td>4181</td>
<td>Peak &amp; Associates</td>
<td><em>Cultural Resources Overview for the North Natomas Long-Term Planning Area, Sacramento County, California</em></td>
<td>2000</td>
</tr>
<tr>
<td>6830</td>
<td>Peak &amp; Associates</td>
<td><em>Determination of Eligibility and Effect for the Natomas Panhandle Annexation Project Area Sacramento County, California</em></td>
<td>2005</td>
</tr>
<tr>
<td>4456</td>
<td>Ritchie, M.</td>
<td><em>Finding of Effect for the Proposed Safety Improvements and Rehabilitation of the Jibboom Street Bridge on Jibboom Street, Bridge No. 24C-022, Sacramento, Sacramento County, California</em></td>
<td>2001</td>
</tr>
</tbody>
</table>
### Table 3.8-2
**Previous Cultural Resources Surveys Conducted in the Natomas Basin in Sacramento County**

<table>
<thead>
<tr>
<th>NCIC Report No.</th>
<th>Author(s)</th>
<th>Title</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>–</td>
<td>Snyder, J. W.</td>
<td><em>Historic Property Survey Report (Positive) for the Jibboom Street Bridge Safety Improvements and Rehabilitation Project Jibboom Street, Sacramento County, California</em></td>
<td>2003</td>
</tr>
<tr>
<td>4441</td>
<td>Sonoma State Anthropological Studies Center</td>
<td><em>Archaeological Surface Reconnaissance and Backhoe Testing for the South Natomas Projects (P92-122, P92-160) Sacramento County, California</em></td>
<td>1992</td>
</tr>
<tr>
<td>3408</td>
<td>Theodoratus Cultural Research</td>
<td><em>Discovery Park Construction Site Examination for Archaeological Resources in the Area of CA-Sac-26—letter report</em></td>
<td>1981</td>
</tr>
<tr>
<td>4458</td>
<td>True, D. L.</td>
<td><em>8-Acre Survey at 1801 Garden Highway, Sacramento, California</em></td>
<td>1983</td>
</tr>
<tr>
<td>1141</td>
<td>Wilson, K. L.</td>
<td><em>Sacramento River Bank Protection Unit 34 Cultural Resources Survey Final Report</em></td>
<td>1978</td>
</tr>
</tbody>
</table>

Note: NCIC = North Central Information Center; SMUD = Sacramento Municipal Utility District; SHPO = State Historic Preservation Officer; HAER = Historic American Engineering Record

Source: Data provided by the NCIC and compiled by EDAW/AECOM (now AECOM) in 2007

### Table 3.8-3
**Cultural Resources in the Sutter County Portion of the Natomas Basin**

<table>
<thead>
<tr>
<th>Trinomial or Temporary Designation</th>
<th>P-No.</th>
<th>Historic/Prehistoric</th>
<th>Description</th>
<th>Date Recorded</th>
<th>Quadrangle</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA-Sut-84H</td>
<td>51-000084</td>
<td>Historic</td>
<td>NCC/PGCC levees</td>
<td>1994</td>
<td>Pleasant Grove, Verona</td>
</tr>
<tr>
<td></td>
<td>51-000096H</td>
<td>Historic</td>
<td>1950s-era ranch</td>
<td>2002</td>
<td>Taylor Monument</td>
</tr>
<tr>
<td>CA-Sut-80H</td>
<td>51-000080H</td>
<td>Historic</td>
<td>Debris scatter</td>
<td>2009</td>
<td>Pleasant Grove</td>
</tr>
</tbody>
</table>

Notes: NCC = Natomas Cross Canal; PGCC = Pleasant Grove Creek Canal

Source: Data provided by the NCIC and compiled by EDAW/AECOM (now AECOM) in 2007

- **CA-Sut-84H (P-51-000084)**. This trinomial includes both the NCC south levee and the PGCC west levee, the northernmost contributing resources to RD 1000. The NCC levee measures approximately 25 feet wide at the top and 75 feet wide at the base, and is 15 feet high. The top has been graded and graveled for vehicle traffic. The PGCC west levee is smaller, measuring approximately 20 feet wide at the top, 60 feet wide at the base, and 10 feet high.

Archaeologists reported that one of the levees was raised and strengthened twice, after flooding during 1938–1939 and after flooding in RD 1001 during 1955. However, records fail to specify if the changes were made to the NCC or the PGCC. RD 1000 modified the NCC south levee and its adjacent canals in 1987 and SAFCA modified them in 1996. SAFCA completed installation of the cutoff wall in the NCC south levee and reconstruction of most of the levee embankment, including raising the levee in fall 2009.

- **P-51-000096H**. Located on the Sacramento/Sutter County line and at the edge of a proposed borrow area, this resource consists of a historic ranch complex that includes two residences, four sheds or barns, and a trailer. The archaeological survey crew was not allowed on the property to record updates to the existing records.
CA-Sut-80H (P-51-00000080H). Located just north of the Sacramento-Sutter County line and just east of the NEMDC this resource consists of a trash scatter that was determined ineligible for listing on the NRHP (EBASCO 1992a, 1992b).

In addition to the resources in the Sutter County portion of the Natomas Basin, the Pleasant Grove Cemetery District cemetery occurs on the northern edge of the proposed Triangle Properties Borrow Area. Although the cemetery is not recorded as a cultural resource, it contains human remains subject to management required under CEQA. The cemetery occurs on the south side of Howsley Road east of the intersection with Pacific Avenue. This resource would be excluded from the footprint of borrow activities.

3.8.2.5 PREVIOUSLY RECORDED CULTURAL RESOURCE SITES IN THE SACRAMENTO COUNTY PORION OF THE NATOMAS BASIN (AS OF MAY 2008)

This section describes cultural resource sites identified in previous studies on file at the NCIC in the Sacramento County portion of the Natomas Basin (listed in Table 3.8-4 and described below). For a discussion of specific resources identified near or within the Phase 4b Project area, see Table 4.8-1 in Section 4.8, “Cultural Resources”). Archaeological deposits identified on the landside of the Sacramento River east levee have the potential to extend underneath the existing levee and thus may be affected by landside and waterside activities.

CA-Sac-15/H. This site, near the Sacramento River east levee south of I-5, consists of a prehistoric occupation midden mound with a concentration of debitage, flaked stone tools, shell artifacts, faunal remains, fire-cracked rock, and baked clay objects. The mound has been heavily affected by farming and ranching activities. There is a ranch complex including a bunkhouse, garden, shed, chicken coop, water tower, garage, and driveway on the mound; historic debris on the site includes glass and broken ceramic fragments. A limited auger testing program was carried out west of the mound along the Sacramento River east levee and found no cultural materials along that transect (Bouey and Herbert 1990).

CA-Sac-16/H (P-34-000043). CA-Sac-16/H is in the Airport north bufferlands south of the Airport Operations Area. This site has been variously called the Bennett Mound, Mound Ranch, Willey Mound, and S-16. It includes the remains of a prehistoric occupation mound, possibly the largest in the Sacramento Valley, but has been leveled in stages by agricultural activities. The site location corresponds to the ethnographic village of Nawrean. What remains today consists of dark midden soils in plowed fields with fragments of human remains, shell, fire-cracked rock, baked clay objects, ground stone, faunal bone, flaked stone artifacts, and debitage. A few historic artifacts, such as brick and ceramic fragments, are also on this site. Today, two separate loci have been identified and recorded as CA-Sac-16/H; the larger, Locus 1, represents the approximate original location of the mound. Locus 2 is an area of redeposited soil taken from the mound in the past. There is also a historic-era component of the site from the remnants of a slaughterhouse and brick factory present before the 1930s. Historic artifacts noted include bricks, sawed mammal bone, a filled-in privy, bottles, ceramic and metal fragments, and glass.

The site was originally described as very large, up to 7 acres in area, and 20 feet high. The earliest investigations were conducted in 1923 by Zallio, who excavated at the site a number of times and recovered projectile points, bone tools, Haliotis ornaments, and other artifacts (Bouey, Berg, and Hunter 1991). It was first formally recorded in 1934 by Heizer, who identified it as a large mound with stone artifacts and freshwater shell on the surface. Sacramento Junior College (now Sacramento Community College) excavated pits and trenches up to 18 feet deep in 1936–1937. The main focus of this effort was on recovery of mortuary remains; however, considerable quantities of nonburial associated artifacts were also documented. More excavations were conducted by Sacramento State College in 1953 and by American River College between 1966 and 1971, and more artifacts and burials were salvaged by Peak, Crew, and Gerry (1984) when what was left of the mound was leveled. At that time, Peak, Crew, and Gerry estimated that as much as 13 feet of the mound might still be present below the plowed surface. As an interesting side note—and as an indication
Table 3.8-4
Cultural Resources in the Sacramento County Portion of the Natomas Basin

<table>
<thead>
<tr>
<th>Trinomial</th>
<th>P-No.</th>
<th>Historic/Prehistoric</th>
<th>Description</th>
<th>Date Recorded</th>
<th>Quadrangle</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA-Sac-15/H</td>
<td>34-000042</td>
<td>Both</td>
<td>Occupation mound with historic debris</td>
<td>1934, 1990, 1993</td>
<td>Taylor Monument</td>
</tr>
<tr>
<td>CA-Sac-17</td>
<td>34-000044</td>
<td>Prehistoric</td>
<td>May have been destroyed</td>
<td>1934, 1990</td>
<td>Taylor Monument</td>
</tr>
<tr>
<td>CA-Sac-18</td>
<td>34-000045</td>
<td>Prehistoric</td>
<td>Lithic scatter</td>
<td>1934, 1994</td>
<td>Taylor Monument</td>
</tr>
<tr>
<td>CA-Sac-160/H</td>
<td>34-000187</td>
<td>Both</td>
<td>Occupation/burial mound with historic farm</td>
<td>1947, 1949, 1994</td>
<td>Taylor Monument</td>
</tr>
<tr>
<td>CA-Sac-430H</td>
<td>34-000457</td>
<td>Historic</td>
<td>West drainage canal</td>
<td>1991, 1993, 1997</td>
<td>Taylor Monument</td>
</tr>
<tr>
<td>CA-Sac-483/H</td>
<td>34-000510</td>
<td>Historic</td>
<td>Krumenacher Ranch complex and relocated prehistoric artifacts</td>
<td>1994</td>
<td>Rio Linda</td>
</tr>
<tr>
<td>CA-Sac-484H</td>
<td>34-000511</td>
<td>Historic</td>
<td>Historic debris</td>
<td>1994</td>
<td>Rio Linda</td>
</tr>
<tr>
<td>CA-Sac-485/H</td>
<td>34-000512</td>
<td>Both</td>
<td>Occupation/burial mound and historic home site</td>
<td>1994</td>
<td>Taylor Monument</td>
</tr>
<tr>
<td>CA-Sac-486H</td>
<td>34-000513</td>
<td>Historic</td>
<td>Historic home site</td>
<td>1994</td>
<td>Taylor Monument</td>
</tr>
<tr>
<td>CA-Sac-487H</td>
<td>34-000514</td>
<td>Historic</td>
<td>Historic debris and vegetation</td>
<td>1994</td>
<td>Taylor Monument</td>
</tr>
<tr>
<td>CA-Sac-488H</td>
<td>34-000515</td>
<td>Historic</td>
<td>Historic debris and vegetation</td>
<td>1994</td>
<td>Taylor Monument</td>
</tr>
<tr>
<td>CA-Sac-489H</td>
<td>34-000516</td>
<td>Historic</td>
<td>Historic debris and vegetation</td>
<td>1994</td>
<td>Taylor Monument</td>
</tr>
<tr>
<td>CA-Sac-490H</td>
<td>34-000517</td>
<td>Historic</td>
<td>Historic debris and vegetation</td>
<td>1994</td>
<td>Taylor Monument</td>
</tr>
<tr>
<td>CA-Sac-491H</td>
<td>34-000518</td>
<td>Historic</td>
<td>Historic debris and vegetation</td>
<td>1994</td>
<td>Taylor Monument</td>
</tr>
<tr>
<td>CA-Sac-492H</td>
<td>34-000519</td>
<td>Historic</td>
<td>Historic well, pipes and vegetation</td>
<td>1994</td>
<td>Taylor Monument</td>
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<tr>
<td>CA-Sac-493H</td>
<td>34-000520</td>
<td>Historic</td>
<td>Historic debris</td>
<td>1994</td>
<td>Taylor Monument</td>
</tr>
<tr>
<td>CA-Sac-494H</td>
<td>34-000521</td>
<td>Historic</td>
<td>Historic debris</td>
<td>1994</td>
<td>Taylor Monument</td>
</tr>
<tr>
<td>CA-Sac-517H</td>
<td>34-000641</td>
<td>Historic</td>
<td>Historic debris</td>
<td>2001</td>
<td>Rio Linda</td>
</tr>
<tr>
<td>CA-Sac-518H</td>
<td>34-000647</td>
<td>Historic</td>
<td>Concrete bridge abutment</td>
<td>2001</td>
<td>Rio Linda</td>
</tr>
<tr>
<td>CA-Sac-569H</td>
<td>34-000741</td>
<td>Historic</td>
<td>Paved road</td>
<td>1994, 1998</td>
<td>Taylor Monument, Rio Linda</td>
</tr>
<tr>
<td>CA-Sac-836H</td>
<td>34-001354</td>
<td>Historic</td>
<td>Farm Complex</td>
<td>2005</td>
<td>Taylor Monument</td>
</tr>
<tr>
<td>34-000883</td>
<td>Historic</td>
<td>Paved road</td>
<td>1998</td>
<td>Taylor Monument</td>
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<tr>
<td>34-000884</td>
<td>Historic</td>
<td>Paved road</td>
<td>1998</td>
<td>Taylor Monument</td>
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<tr>
<td>34-000886</td>
<td>Historic</td>
<td>Paved road</td>
<td>1998</td>
<td>Rio Linda, Taylor Monument</td>
<td></td>
</tr>
<tr>
<td>34-001552</td>
<td>Historic</td>
<td>House</td>
<td>2002</td>
<td>Taylor Monument</td>
<td></td>
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<tr>
<td>34-001557</td>
<td>Historic</td>
<td>Pumping plant</td>
<td>2006</td>
<td>Taylor Monument</td>
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<tr>
<td>34-001558</td>
<td>Historic</td>
<td>Pumping plant</td>
<td>2006</td>
<td>Taylor Monument</td>
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<tr>
<td>34-001559</td>
<td>Historic</td>
<td>Pumping plant</td>
<td>2006</td>
<td>Taylor Monument</td>
<td></td>
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</tbody>
</table>

Note: NRHP = National Register of Historic Places
Source: Data provided by the NCIC and compiled by EDAW/AECOM (now AECOM) in 2007 and 2008
of the original CA-Sac-16/H mound’s prominence—Peak, Crew, and Gerry mention that Heinrich Schliemann (an amateur archaeologist and later the discoverer of Troy) visited the site in 1851–1852.

More recently, Bouey and Herbert (1990) completed a surface survey and excavated two auger holes at the toe of the levee that forms the western boundary of the site; they reported evidence of subsurface cultural deposits, including shell midden. Larger-scale excavations (Bouey, Berg, and Hunter 1991), dug within 100 feet of the levee toe and the ramp leading up to Garden Highway, confirmed that midden deposits still exist; however, agricultural activity seems to have destroyed any stratigraphic integrity the deposits might have had that close to the levee. It may be that Bouey and Herbert were looking strictly at redistributed mound soils.

The summary of the research done by 1991 (Bouey, Berg, and Hunter 1991) agreed with the conclusions of Derr (1983) that the site was a large, permanent habitation locus occupied from the Upper Archaic (ca. 1000 B.P.) to just after the beginning of European contact. Derr found that the upper 20–60 centimeters of soil (in the areas he examined near the levee) consisted of redistributed midden with artifacts and isolated human remains. What appears to be missing from any of these analyses is an attempt to define the original mound or to find intact elements of the site that may have been located beyond the original mound. If there are intact subsurface deposits associated with CA-Sac-16/H, then the site may be eligible for listing on the CRHR or NRHP because of the potential information contained in those deposits.

The earliest documentation, Heizer’s site record from 1934, does not give dimensions for the mound and does not contain specific enough information to provide for relocation of the original boundaries of the mound. It is presumed that the dispersed midden from the mound now covers a larger surface area than the mound used to occupy. However, it is unclear exactly how large an area that is because various investigations have reported Locus 1 (the larger site deposit) as measuring 110 meters by 185 meters (Bouey and Herbert 1990), 250 meters by 250 meters (Kauffman and Kauffman 1987), and 450 meters by 850 meters (Dames & Moore 1993). The Dames & Moore site record form appears to be the only one that maps out the secondary Locus 2 area, northeast of the main deposit and east of a drainage ditch (as of 1993).

► **CA-Sac-17 (P-34-000044).** This is the location of a mound site reported by Heizer in 1934 west of Fisherman’s Lake; however, none of the mound remains. In 1990, Bouey and Herbert attempted to locate any cultural remains but could not find any evidence of cultural deposits on the surface or in auger holes.

► **CA-Sac-18 (P-34-000045).** This site, landward of the Sacramento River east levee located north of San Juan Road, consists of a sparse scatter of basalt debitage, one cryptocrystalline biface fragment, a polished stone, and possible fire-cracked rock. It was originally described by Heizer as a mound 30 yards in diameter and 5 feet high; however, Heizer may have misinterpreted a natural rise in the landscape as a mound. CA-Sac-18 appears to be lacking the intensive cultural deposits that are the hallmark other nearby known mound sites (Dames & Moore 1994b).

► **CA-Sac-160/H (P-34-000187).** This is a multicomponent site near the Sacramento River east levee located north of San Juan Road. It includes a prehistoric occupation mound with a farm complex situated on top. Excavations in the 1940s removed numerous burials and artifacts, including ground stone, flaked stone tools, shell beads and ornaments, fire-cracked rock, baked clay objects, stone beads, faunal remains, bone awls, bird bone tubes and whistles, obsidian drills, quartz crystals, charmstones, and historic glass trade beads, as well as historic debris related to farming and occupation of the top of the mound.

► **CA-Sac-164 (P-34-000191).** CA-Sac-164 is a very large, deeply stratified prehistoric occupation and burial mound near Sand Cove Park on the Sacramento River that has been explored a number of times using archaeological techniques; however, in spite of these efforts, the true boundaries of the site remain unknown. The site includes shell midden with abundant cultural materials including fire-cracked rock, flaked and ground stone tools, charmstones, polished bone implements, debitage, quartz crystals, bone and shell beads,
baked clay objects, and plentiful faunal remains. Large fire-cracked rock features and hearths have also been noted. Because of its significant scientific value and the integrity, CA-Sac-164 was nominated for NRHP listing in 2001.

The site was first recorded in 1951, after a newspaper article reported that human remains and stone tools were eroding out of the cutbank and into the Sacramento River. Observers who walked along the edge of the cutbank in summer and fall when the river was at its lowest noted that site deposits, interspersed with flood-deposited silt, extended at least 4 meters below the current-day surface. Excavations in the 1970s, 1980s, and 1990s confirmed the depth of intact and resource-bearing cultural strata at the site. Work on the landside of the Sacramento River levee indicated that downward-trending cultural strata might be found there as well, beginning well over a meter below the ground surface.

Annual river height fluctuation, wave action resulting from boat wakes, and looting combined to cause continual erosion and collapse of the cutbank. This resulted in artifacts and remains falling onto the beach area below, where they either washed into the river or collected by the public. To address this issue, a site stabilization program was implemented in 2005 that included placing dirt and plantings over the cutbank and creating a wave break near the river’s edge of the site.

► CA-Sac-430H (P-34-000457). This feature is the West Drainage Canal, a relatively unmodified canal that originates at Fisherman’s Lake and flows southeast to the NEMDC.

► CA-Sac-483/H (P-34-000510). This site consists of two loci containing a historic ranch complex with a small prehistoric component. The ranch complex (Locus 1) includes barns, sheds, shops and residences, farm equipment, and glass, ceramic, and metal debris. The prehistoric component consists of a relocated collection of mortars, pestles, and a mano located in a flower garden. The property owner reported that the prehistoric artifacts may have been collected from an eroding knoll near Locus 2.

► CA-Sac-484H (P-34-000511). This site comprises a light scatter of historic debris located along the north side of a small knoll. The debris is associated with a house that was built for a security guard; the house has been demolished. The debris includes fragments of water pipe, concrete, milled lumber, metal, and glass.

► CA-Sac-485/H (P-34-000512). This site, between the Sacramento River’s east levee and the proposed location of the relocated Elkhorn Canal, was once a prehistoric occupation and burial mound that has been leveled by agricultural activities and was documented by Dames & Moore in 1994. The remains of a historic-era homestead, consisting mainly of ornamental vegetation, driveway, and historic debris, were noted on top of the prehistoric site. Dames & Moore archaeologists noted that the prehistoric component was large, measuring 220 meters by 160 meters with two depositional loci—a larger area near Garden Highway and a smaller deposit to the east. Prehistoric artifacts noted at the time included obsidian and basalt flakes and tools, shell beads and ornaments, faunal remains, ground-stone fragments, charmstones, baked clay, imported exotic tool stone, and shell.

In August 2007, archaeologists undertook a limited shovel testing program at CA-Sac-485/H to determine whether there was an undisturbed subsurface deposit that could be affected by the proposed canal construction near this site. The 2007 investigation began with a survey of the site area where a sparse assortment of artifacts was visible; because no concentrations of artifacts were identified on the surface, the Dames & Moore archaeological site map was used to guide the placement of shovel test pits (STPs). Brian Padilla, of the El Dorado Miwok, was present while the STPs were excavated.

During the course of excavations, archaeologists uncovered artifacts including obsidian and basalt flakes; clamshell disk beads; burned earth; faunal remains, including freshwater mussel shell; and fire-cracked rock. Human remains were uncovered in three of the STPs; the Sacramento County coroner and Native American Heritage Commission were contacted, excavation of each of those three STPs was halted immediately, and
the remains were reburied where they were found. None appeared to be part of a larger, intact burial and all were found in the upper 50 centimeters of soil (SAFCA 2007).

In general, site soils consisted of dry compact silts with a small sand and clay content; excavation and screening were difficult because the soils were very dry and hard. If artifacts were recovered, excavation generally proceeded to 100 centimeters below surface (cmbs); where no artifacts were found, excavations terminated around 80 cmbs. A deeply buried midden layer was identified in each of the four STPs (Numbers 4, 6, 21, and 24) closest to the levee, beginning anywhere from 55 cmbs to 80 cmbs. Excavation halted at approximately 100 cmbs in these STPs without reaching the bottom of the midden deposit; a split-spoon probe was used in STP No. 21 to find the bottom of the deposit, which was reached at approximately 160 cmbs. Although the northern and southern edges of the midden deposit were not located, the STP program was halted on the assumption that a more formal testing program, using a combination of test units and additional STPs, would be implemented as part of more detailed design of the proposed project.

The site has subsequently been capped under a seepage berm that was constructed with methods designed to minimize impacts on the resource, pursuant to consultation between USACE, SAFCA, and the Tribe.

► **CA-Sac-486H (P-34-000513).** This site near the Sacramento River east levee located south of the North Drainage Canal consists of the remains of a historic-era homestead. The structure that once stood on the site has been demolished. Remnant landscape plantings and debris consisting of ceramic fragments, bottle glass, ceramic, bricks, mortar, and metal fragments were noted. The structures were visible in a 1937 aerial photograph and were depicted on the 1967 U.S. Geological Survey topographic quadrangle map. The archaeologists who identified the site in 1994 noted that some of the trees appeared to be less than 30 years old, although a fragment of amethyst glass (generally associated with the turn of the century) was noted.

► **CA-Sac-487H (P-34-000514).** Like CA-Sac-486H, this location near the Sacramento River east levee located south of the North Drainage Canal includes historic debris, such as concrete fragments, milled lumber, metal fence posts, wire, farm machinery parts, clear and green glass, window glass, and ornamental plantings, all of which indicate that a structure existed at the site at one point but has since been demolished. Also like the previous site, a structure was visible in this location in a 1937 aerial photograph; several structures were indicated on the 1950 and 1975 topographic quadrangle maps for the area.

► **CA-Sac-488H (P-34-000515).** This is another site near the Sacramento River east levee located south of the North Drainage Canal where a structure appeared on a 1937 aerial photograph and 1950 topographic quadrangle map, although no building is on the site today. Historic debris, ornamental vegetation, and a fence line remain. The debris included various concrete fragments, corrugated metal, wire, culvert pipe, and a large section of iron pipe.

► **CA-Sac-489H (P-34-000516).** This is another site near the Sacramento River east levee located south of the North Drainage Canal where a structure appeared on a 1937 aerial photograph and 1950 topographic quadrangle map, although no building is on the site today. The associated debris includes a fenced-off well head, concrete fragments, lumber, window glass, wooden posts, galvanized pipes, old fencing overgrown by an oak tree, an enamelware bucket, tires, ceramic fragments, bottle glass, and a metal bucket. Ornamental landscaping plants were also noted.

► **CA-Sac-490H (P-34-000517).** This site, near the south end of Powerline Road, had three structures that appeared on a 1937 aerial photograph and 1950 topographic quadrangle map, although no building is on the site today. The historic debris is similar to the debris found at sites CA-Sac-486H through CA-Sac-489H, including concrete, brick, iron piping, a fence post, bottle glass, ceramic fragments, and galvanized metal pipe, as well as remnant ornamental vegetation.

► **CA-Sac-491H (P-34-000518).** This site, near the south end of Powerline Road, was likely used in association with four structures that appeared on the 1950 topographic quadrangle map. The 1937 aerial photograph
associated with other sites listed here includes coverage of this property; however, only trees are clearly
visible in the photograph. The artifacts consist of a sparse scatter, including a wood fence, concrete fragments,
bricks, and metal fence posts. Ornamental vegetation was noted nearby.

► **CA-Sac-492H (P-34-000519).** This site, near the south end of Powerline Road, consists of a concrete-capped
well, associated water pipes, and remnant ornamental vegetation and fruit trees that were likely associated
with a structure visible on the 1950 topographic quadrangle map of the area. A cluster of trees is visible in the
1937 aerial photograph, but no structures are clearly visible. The site is now used to keep honeybees.

► **CA-Sac-493H (P-34-000520).** The 1950 topographic quadrangle map and 1937 aerial photograph of the
region indicate that there was once a large barn and associated structure at this location near the Sacramento
River east levee located south of I-5. Today, scattered historic debris—clear and colored glass, porcelain and
earthenware, iron pipe, bone fragments, brick, and a white ceramic insulator—is all that remains.

► **CA-Sac-494H (P-34-000521).** This is another site, west of Fisherman’s Lake, where a structure appeared on
a 1937 aerial photograph and 1950 topographic quadrangle map, although no building is present today.
Associated debris documented by an archaeological team in 1994 included concrete and brick fragments, an
iron water pipe, white ceramic insulators, and clear bottle glass. In addition, the archaeologists noted abundant
modern debris on the site, making it difficult to distinguish between modern and historic artifacts.

► **CA-Sac-517H (P-34-000641).** This is an historic trash scatter exposed on both the east and west sides of the
NEMDC. Components include milk glass fragments, electric insulator fragments, and candy dish fragments.

► **CA-Sac-518H (P-34-000647).** This is a concrete bridge abutment located just north of the Silver Eagle Road
crossing of the NEMDC. The abutments have cobblestone facing over concrete.

► **CA-Sac-569H (P-34-000741).** This is a segment of Del Paso Road, a two-lane paved road that extends from
Powerline Road to East Levee Road. Del Paso Road likely originated as a dirt farm road and has subsequently
been modernized, paved, and widened.

► **CA-Sac-836H (P-34-001354).** This resource, located near the Sacramento River east levee located south of
West Elverta Road, consists of the Yuki Pear Farm complex with a relocated ranch house, a 1930s barn, a
1940s bunkhouse/workshop/garage, a 1960s bunkhouse, a 1974 residence, and a mid-1970s barn. A 1903 map
shows the Farmers and Merchants Bank as the property owners; no improvements were listed on any maps in
the next several years. By 1939, the property belonged to the California Trust and Savings Band; it later was
owned by Thomas and Nancy McDermott. The McDermotts sold the land to A. R. Galloway, who never lived
on the property but rented it to Masami Yuki as a tenant farmer. The Yuki family originally grew asparagus at
the farm but switched to tomatoes in 1968 and planted the pear orchard in 1969.

► **P-34-000883H.** This is El Centro Road, a north-south, paved two-lane road that dates to the period before
1921. It runs between I-80 to the south and Bayou Road to the north. It is likely that this was originally a dirt
farm road that has been paved a number of times.

► **P-34-000884H.** This is San Juan Road, an east-west, paved two-lane road that dates to the period before
1921. It runs between I-80 and the Sacramento River east levee. It is likely that this was originally a dirt farm
road that has been paved a number of times in the past.

► **P-34-000886H.** This is Elkhorn Boulevard, an east-west, paved two-lane road that dates to the period before
1921. It runs between the Sacramento River east levee and the NEMDC. It is likely that this was originally a
dirt farm road that has been paved a number of times in the past.

► **P-34-001552H.** This site includes a 1950s-era house and shed, surrounded by a chain link fence. The house is
located along Garden Highway, near the northern Sacramento-Sutter County line.
3.9 PALEONTOLOGICAL RESOURCES

Paleontological resources (fossils) are the remains or traces of prehistoric animals and plants that are 11,000 years old or older.

3.9.1 REGULATORY SETTING

3.9.1.1 FEDERAL

There are no Federal laws, regulations, policies, or ordinances related to paleontological resources that are relevant to the NLIP, including the Phase 4b Project.

3.9.1.2 STATE

There are no state laws, regulations, policies, or ordinances related to paleontological resources that are relevant to the NLIP, including the Phase 4b Project. No state or local agencies have specific jurisdiction over paleontological resources on private lands. No state agency requires a paleontological collecting permit to allow for the recovery of fossil remains discovered as a result of construction-related earthmoving on state or private land at a project site.

3.9.1.3 REGIONAL AND LOCAL

There are no regional or local laws, regulations, policies, or ordinances related to paleontological resources that are relevant to the NLIP, including the Phase 4b Project.

Society of Vertebrate Paleontology Guidelines

The Society of Vertebrate Paleontology (1995, 1996), 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. Most practicing professional paleontologists in the nation adhere to the Society of Vertebrate Paleontology assessment, mitigation, and monitoring requirements, as specifically spelled out in its standard guidelines.

3.9.2 ENVIRONMENTAL SETTING

3.9.2.1 PALEONTOLOGICAL RESOURCE INVENTORY

Stratigraphic Inventory

Geologic maps and reports covering the geology of the project site and surrounding study area were reviewed to determine the exposed rock units and to delineate their respective aerial distributions in the project area. Regional and local surficial geologic mapping and correlation of the various geologic units in the vicinity of the project.
area has been provided at a scale of 1:62,500 by Helley and Harwood (1985); and 1:250,000 by Wagner et al. (1987). The rock formations of the project area are shown in Plate 3-5 and described below.

- **Holocene Alluvium.** Sediments adjacent to the Sacramento and American Rivers are composed of Recent (Holocene) alluvial floodplain deposits (Wagner et al. 1987). In general, these deposits consist primarily of unconsolidated sand and silt. Holocene alluvial deposits overlay an older alluvial fan system composed of Pleistocene-age sediments. Construction activities that would occur within alluvial floodplain or basin deposits would be located within Holocene sediments. By definition, sediments associated with Holocene-age alluvium are too young to contain paleontologically sensitive resources.

- **Riverbank and Modesto Formations.** Piper et al. (1939) were the first to publish detailed geologic maps in the southern Sacramento and northern San Joaquin Valley areas, and they designated the older alluvial Pleistocene deposits as the Victor Formation. However, Davis and Hall (1959) proposed a subdivision of the Victor Formation into the Turlock Lake (oldest), Riverbank (middle), and Modesto (youngest) Formations. Marchand and Allwardt (1981) proposed that the Victor Formation be replaced by the Turlock Lake, Riverbank, and Modesto Formations as formal nomenclature for Quaternary deposits in the Sacramento and San Joaquin Valleys. Most researchers have followed this recommendation.

In the Sacramento Valley, the Modesto Formation consists of alluvial terraces, some alluvial fans, and some abandoned channel ridges of the Sacramento River. The Modesto Formation can be divided into upper and lower members. The upper member consists primarily of unconsolidated, unweathered, coarse sand and sandy silt. The age of this member has been placed at approximately 12,000–26,000 years Before Present (B.P.) (Atwater cited in Helley and Harwood 1985). The lower member of the Modesto Formation consists 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 B.P. (Marchand and Allwardt 1981, cited in Helley and Harwood 1985).

Sediments in the Riverbank Formation consist of weathered reddish gravel, sand, and silt that form alluvial terraces and fans. In the Sacramento Valley, this formation tends toward soil-profile developments that are more easily distinguishable from the Modesto Formation (Helley and Harwood 1985). The Riverbank Formation is Pleistocene in age (Wagner et al. 1987), but it is considerably older than the Modesto Formation; estimates place the age of the Riverbank between 130,000 and 450,000 years B.P. (Helley and Harwood 1985). The Riverbank Formation forms alluvial fans and terraces of the Sacramento River. The Riverbank’s fans and terraces are higher in elevation and generally have a more striking topography than those formed by the Modesto Formation.

**Field Survey**

Field reconnaissance of the NLIP area was conducted by EDAW/AECOM (now AECOM) and began in July 2006 to document the presence of any previously unrecorded fossil sites and of strata that might contain fossil remains. The surface topography was nearly flat, and no exposed road cuts or other escarpments were noted where fossils in the Riverbank or Modesto Formations could be exposed. No fossils were observed in the area surveyed, including the Phase 2 and 3 Project areas. Phase 4a and 4b Project surveys are on-going.

3.9.2.2 Paleontological Resource Assessment

**Holocene Alluvium**

By definition, to be considered a fossil, an object must be more than 11,000 years old; therefore, project-related activities in the Holocene alluvium would have no effect on paleontological resources.
Rock Formations in the Project Area

Plate 3-5

Adapted by EDAW/AECOM (now AECOM) in 2007 based on Wagner et al. 1987
Modesto and Riverbank Formations

Surveys of late Cenozoic land mammal fossils in northern California have been provided by Hay (1927), Lundelius et al. (1983), Jefferson (1991a, 1991b), Savage (1951), and Stirton (1939). On the basis of his survey of vertebrate fauna from the nonmarine late Cenozoic deposits of the San Francisco Bay region, Savage (1951) concluded that two major divisions of Pleistocene-age fossils could be recognized: the Irvingtonian (older Pleistocene fauna) and the Rancholabrean (younger Pleistocene and Holocene fauna). These two divisions of Quaternary Cenozoic vertebrate fossils are widely recognized today in the field of paleontology. The age of the later Pleistocene, Rancholabrean fauna was based on the presence of bison and on the presence of many mammalian species that are inhabitants of the same area today. In addition to bison, larger land mammals identified as part of the Rancholabrean fauna include mammoths, mastodons, camels, horses, and ground sloths.

The closest vertebrate fossils to the project area were recovered from the Arco Arena site (Hilton et al. 2000), located within the Natomas Basin, approximately 2.3 miles to the west of Pumping Plant No. 8, 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.

University of California Museum of Paleontology (UCMP) locality V-6426, approximately 16 miles north of the Natomas Basin 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 Natomas Basin, 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 levee, yielded remains from a Pleistocene-age horse in sediments referable to the Riverbank Formation.

Fossil specimens from the Modesto Formation have been reported by Marchand and Allwardt (1981) near the type locality in the city of Modesto. These authors also reported fossil specimens from the Riverbank Formation near its type locality in the city of Riverbank. Other locations are also known throughout the northern and Central Valley (UCMP 2006). For example, there are several sites approximately 10–20 miles from the Natomas Basin in Yolo County, near the cities of Davis and Woodland, which 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).

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

Other than the vertebrate fossils recovered from the Arco Arena site, results of a paleontological records search at the UCMP indicated no fossil remains elsewhere in the Natomas Basin or within the Phase 4b Project area, and no fossils were observed during a cursory field visit. However, the occurrence of Pleistocene vertebrate fossil remains in sediments referable to the Modesto and Riverbank Formations from Sacramento; Yuba City and the town of Sutter in Sutter County; and Davis, Woodland, and numerous other areas throughout the Sacramento and San Joaquin Valleys, suggests there is a potential for uncovering additional similar fossil remains during construction-related earthmoving activities within the NLIP and Phase 4b Project area.