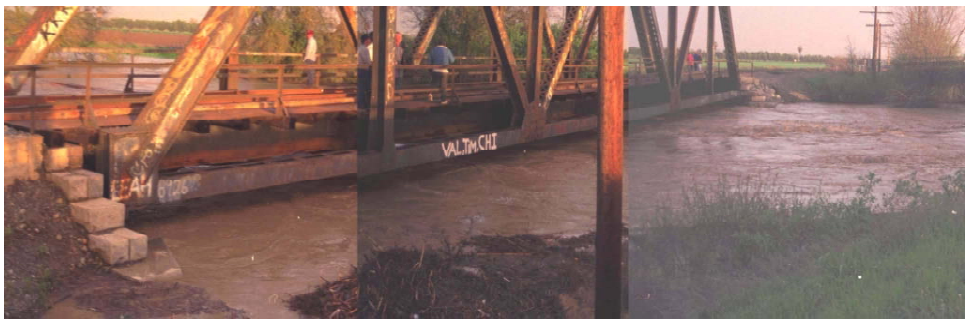
CHAPTER 2
ALTERNATIVE PLANS INCLUDING THE PROPOSED ACTION

Overbank spill upstream of existing project, just west of I-5 in 1995.



Upstream of railroad bridge near town of Yolo in 1995.

CHAPTER 2.0

ALTERNATIVE PLANS INCLUDING THE PROPOSED ACTION

2.1 Introduction

This chapter describes alternative plans and summarizes their potential environmental effects and mitigation requirements.

2.2 Plan Formulation and Evaluation

Plan formulation describes the process of identifying objectives, constraints, and planning criteria in order to establish the most effective project alternatives. The plan formulation process is explained in detail in the "Lower Cache Creek, Yolo County, CA City of Woodland and Vicinity Draft Feasibility Report for Potential Flood Damage Reduction Project".

The City of Woodland, the Board, and the Corps have identified the following objectives for formulating flood damage reduction plans. The objectives were limited to flood damage reduction, not ecosystem restoration. The local sponsor's primary interest at this time is flood damage reduction. Although several agencies and potential sponsors are aware of this project, none have expressed an interest in being an ecosystem restoration project sponsor. The objectives of the Lower Cache Creek Potential Flood Damage Reduction Project are as follows:

- Provide flood damage reduction to the city of Woodland from Cache Creek. Plans were formulated according to the Federal objective of water and related land resource planning, which requires water resources projects to contribute to the national economic benefit while protecting the Nation's environmental resources, consistent with Federal, State, and local laws, regulations, and policies.

- Maximize the use of existing flood damage reduction facilities prior to constructing new facilities.

Plans were formulated to address congressional direction and current applicable laws, regulations, and policies. Constraints to the plan formulation and alternative evaluation process were identified as follows:

- Minimize the associated costs of the flood damage reduction system.

- Minimize adverse effects to the area's residents as well as environmental, cultural, and agricultural resources.

2.3 Flood Damage Reduction Measures and Preliminary Plans

Based on the objectives and constraints, previous studies, local interest, and public comments, a variety of flood reduction measures were identified, screened, and either not considered further or developed/combined into several preliminary plans to reduce flood damages in the project area.

2.3.1 Flood Damage Reduction Measures

Both nonstructural and structural measures were considered and evaluated based on their costs, environmental and socioeconomic effects, and potential for combining with other measures. Nonstructural measures included raising/flood proofing structures, relocating structures, and a flood warning system. Although deemed infeasible on a large scale, raising/floodproofing and relocating structures in sparsely populated areas were considered further to mitigate project-induced effects. In addition, a floodwarning system was considered further as means to reduce flood damages and ensure public safety.

Structural measures included storage, channel improvements, levee modification, setback levees, and backup levee. Previous studies had evaluated several potential dam sites, as well as combinations of storage and downstream objective releases. Among these sites were Bear Creek, Wilson Valley, just downstream from the Capay Diversion Dam, and Blue Ridge. All of these sites were eventually deemed infeasible due to storage limitations, foundation or seismic problems, construction or operational difficulties, high costs, or lack of local support. As a result, this measure was not considered further. Channel improvements such as clearing, reseeding, and slope protection were considered further in response to the interest expressed by some of the landowners adjacent to the creek. Modifying existing levees or constructing new streambank, setback, or backup levees were all considered further as ways to contain floodflows and reduce flood damages.

2.3.2 Preliminary Plans

Based on the screening of measures and public comments, five preliminary flood damage reduction plans were developed for lower Cache Creek. In addition to the no-action plan, they include channel clearing, raising existing levees and construct new levees, channelization and constructing new levees, constructing setback levees and raising existing levees, and constructing a flood barrier levee.

Channel Clearing

This plan would include clearing the existing channel and improving the conveyance of floodwater within the channel by removing riparian vegetation, sediment deposits, and other obstructions. The cleared area would be reseeded with grass, and rock slope protection would be placed where required.

Studies indicated that although this plan would improve the conveyance capacity of the channel, it would still not provide a sufficient level of flood damage reduction and

would also significantly affect the environment. As a result, this plan was not considered further in the feasibility report.

Raising Existing Levees and Construct New Levees

This plan would involve raising the existing levees along approximately 8 miles of Cache Creek from CR 97A to the settling basin. Levees would be raised on both sides of the creek, and new levees would be constructed on the south bank of the levee from CR 97A upstream 2 miles. On the north bank of the levee upstream from CR 97A, 1 mile of project levee would be raised, and approximately 1 mile would be newly constructed. This plan would involve bridge replacement and slope protection where required.

Studies indicated that hydraulic effects associated this plan would include higher channel velocities and increased peak flows entering the settling basin. Requirements for slope protection would result in the significant loss of riparian habitat. The mitigation for the loss of overall habitat would be very extensive. As a result, this plan was not considered further in the feasibility report.

Channelization and Constructing New Levees

This plan would combine (1) excavating a bench along the channel and (2) constructing a new levee adjacent to the bench. These features would be constructed along a 9.3-mile reach of Cache Creek from roughly 1 mile west of CR 97A to the settling basin. The channel bench would be constructed at approximately the water-surface elevation associated with the flood event that has a 1 in 2 chance of occurring in any given year and would be wide enough to maintain the design water-surface elevation at or below the probable non-failure point of the remaining levee. Where required, the existing levee affected by the bench would be removed and reconstructed adjacent to the bench. Bridge replacements and slope protection would be constructed as required.

Although channelization and levee construction would be required for the most part on only one side of the channel, the overall land requirements for this alternative would still be high given the requirement for 500 to 700 feet of terraced land adjacent to the channel. Additionally, high floodflow velocities would require slope protection at various locations and the removal of some riparian habitat. These requirements would cause significant environmental damage to the creek channel. As a result, this plan was not considered further in the feasibility report.

Constructing Setback Levees and Raising Existing Levees

This plan would involve installation of approximately 6.5 miles of setback levees on either one or the other side of Cache Creek and raising existing levees on the opposing side as required. In addition, adjacent to the 6.5-mile area, this plan would include approximately 3 miles of newly constructed levee on both sides of the channel banks downstream from Road 96. Bridge replacements and slope protection would be constructed as required.

Constructing a Flood Barrier Levee

This plan would consist of constructing approximately 6.7 miles of new levee from CR 96 (1.5 miles east of CR 97A) to the west levee of the Cache Creek Settling Basin. Approximately a 4,000-foot section of the west levee of the settling basin levee would be removed. Overflows from Cache Creek would generally flow from west to east over lands currently subject to flooding and discharge by gravity into the settling basin. Culverts would be placed at road and railroad crossings, and closure structures would be constructed as required at all crossings. Provisions would be made to protect homes and structures within the associated flood plain. A flood warning system would also be implemented.

2.4 Alternative Plans Considered in Detail

Based on a comparison of costs and ability to meet the planning criteria, Constructing Setback Levees and Raising Existing Levees (Setback Levees) and the Flood Barrier Levee (Lower Cache Creek Flood Barrier or LCCFB) were selected for further study as final plans. These two plans, as well as the No-Action Plan are considered in detail in this section and retained for effects assessment in this Draft EIS/EIR. For a more complete comparative analysis of the preliminary plans, refer to the "Lower Cache Creek, Yolo County, CA City of Woodland and Vicinity Draft Feasibility Report for Potential Flood Damage Reduction Project".

2.4.1 No-Action Plan

The No-Action Plan is the same as the without-project future condition. This alternative serves as the baseline against which the effects and benefits of the action plans are evaluated. Under the No-Action Plan, the Federal Government would take no action to implement a specific plan to reduce flooding of the city of Woodland, and the existing Cache Creek levee system would continue to provide reliable protection from a flood that has a 1 in 10 chance of occurring in any given year (existing levees have historically contained floods that have up to a 1 in 20 chance of occurrence). Damages to real property from overflows from Cache Creek would be expected to be about $12 million averaged annually. Other loses or adverse effects would continue to include the potential for flood-related loss of life, contamination from sanitary sewage and hazardous materials, and the closure of sections of I-5 located both north and east of the city of Woodland.

This plan would include the stabilization of Cache Creek. (Refer to the Feasibility Report). Over the project life of 50 years, bank stabilization and setbacks from erosion areas as well as flood fighting would be required. Table 2-1 shows the proposed future repairs of the existing Cache Creek levee system. These repairs are not currently agreed upon, but would be likely to occur. Over the 50-year life of the project, repairs would include 2,100 lineal feet of slope protection and 30,750 lineal feet of 150-foot setback levee. Operation and maintenance (O&M) activities also consist of vegetation clearing on the levees and within the stream channel to reduce any hindrances to flow. The repairs and O&M activities would require a subsequent need for environmental mitigation.

Table 2-1. Proposed Future Repairs of the Existing Cache Creek Levee System

Year		Feature	Location
2009		1,400 Lineal Feet of Slope Protection	Through I-5 Bridges
2009		700 Lineal Feet of Slope Protection	Bend near town of Yolo
2011		6,500 Lineal Feet of 150-foot Setback Levee	Upstream from I-5 on Left Bank
2024		1,500 Lineal Feet of 150-foot Setback Levee	Downstream from I-5
2024		4,000 Lineal Feet of 150-foot Setback Levee	Downstream from I-5
2024		3,000 Lineal Feet of 150-foot Setback Levee	Upstream from SH 113
2024		6,000 Lineal Feet of 150-foot Setback Levee	Downstream from SH 113
2024		1,000 Lineal Feet of 150-foot Setback Levee	Upstream from CR 102
2044		8,750 Lineal Feet of 150-foot Setback, Extend Project Levee Upstream	Upstream from I-5 and existing project on right bank

2.4.2 Lower Cache Creek Flood Barrier Plan

Features

The proposed Lower Cache Creek Flood Barrier (LCCFB) Plan would include constructing a levee along the northern urban limit line of the city of Woodland. The LCCFB would extend 6 miles, originating near the intersection of CR 19B and CR 96B and extending to the settling basin, just north of the city of Woodland. The general plan is shown in Figure 2-1.

The LCCFB would vary from 2.5 feet above the road surface at CR 96B to 18 feet in height at the west levee of settling basin. Existing roads would be raised to match the top of levee elevation of the LCCFB where possible. Where roads cannot be raised sufficiently, stoplog structures would be constructed to provide closure in the gap in the levee. Stop log structures would be constructed for CR 102, 101, 99 and SH 113, and at the California Northern Railroad opening in the I-5 embankment. A 350-cfs drainage canal would be constructed on the waterside of the LCCFB to serve internal drainage requirements of normal rainfall events and a 12-foot bench would separate the drainage channel from the LCCFB. Figure 2-2 displays a cross section of the drainage canal and LCCFB. Culverts would be constructed under all roads including I-5, SH 113, and railroads to facilitate drainage underneath these hydraulic barriers.

Five hundred feet north of where the flood barrier intersects the existing west levee of the settling basin, a 3,000-foot section of the west levee would be degraded to

ground level and an inlet weir would be installed to a crest elevation of 45 ft msl (NAVD88), allowing flood flows to drain by gravity from the flood plain into the settling basin. Water below the weir crest elevation would drain into the settling basin though triple (low-level drainage structure) box culverts. Flapgates would be installed to prevent backflow from the settling basin into the area west of the settling basin. Gated culverts would also be installed through the flood barrier levee to convey water to Woodland's pumping station.

In addition, a 5,250-foot section of the training levee within the settling basin would be removed. A haul route across the low-flow channel of Cache Creek would be necessary for removal of the training levee. This haul route would be 30 feet wide, 400 feet long, and located at the southern or downstream end of the existing west levee and training levee. Typically, the channel in this area is shallow with a soft, muddy bottom and patches of emergent vegetation. Surface water may not be present by late summer or early fall. Approximately 1,500 cubic yards of clean rock/cobble would be placed in the channel around three 24 inch CMP culverts. The rock would be capped by 2 feet of earth fill (1,000 cubic yards) and 6 inches of aggregate base. A layer of geotextile fabric would be placed between the culverts and the earth material.

The portion of the west levee of the settling basin east of CR 102 to the new inlet weir would be improved as follows: The sideslope on the west side of this levee would be flattened from 2H:1V to 3H:1V. Slope protection (riprap) would be added north of the intersection of the flood barrier along the western slope of the west levee of the settling basin approximately 12,000 feet and then west along the right bank of the existing Cache Creek levee to CR 102. The slope protection would be placed on the landside of these levees for protection against wave damage. Additionally, slope protection as shown in Figure 2-1 would be placed on the flood barrier (waterside only) from CR 101 to the intersection with the west levee of the settling basin for protection against wave damage during periods of ponding. Slope protection would also be added to the embankment of Interstate 5 where overtopping occurs. A 40-foot-deep slurry wall was also assumed for 15 percent of the flood barrier between CR 101 and the west levee of the settling basin.

Similar to pre-project conditions, under post-project conditions, the existing levee system would still contain flood events within a flow range of 30,000 to 36,000 cfs. (Although 30,000 cfs is the design flow, the levee system has contained events up to 36,000 cfs.) If this range is exceeded (a flood that has a 1 in 20 chance of occurring in any given year), the risk of overtopping and/or levee failure would significantly increase. Upon levee overtopping and/or levee failure, water would spill out of Cache Creek and flow northerly and (within the project area) in a southeast direction. Potential areas of ponding are shown in Figure 2-3.

N

1 0 1 Miles

YOLO

WOODLAND

CACHE CREEK SETTLING BASIN

Cache Creek

I-5

RD 17

RD 18

RD 18A

RD 18B

RD 18C

RD 94B

RD 96B

RD 97A

RD 98

RD 99

RD 99E

RD 101

RD 102

RD 19A

RD 19B

RD 20

RD 24

HWY 16

HWY 113

CALIFORNIA NORTHERN RR

CHURCHILL DOWNS

KENTUCKY AVE

MAIN ST

GIBSON RD

LEGEND

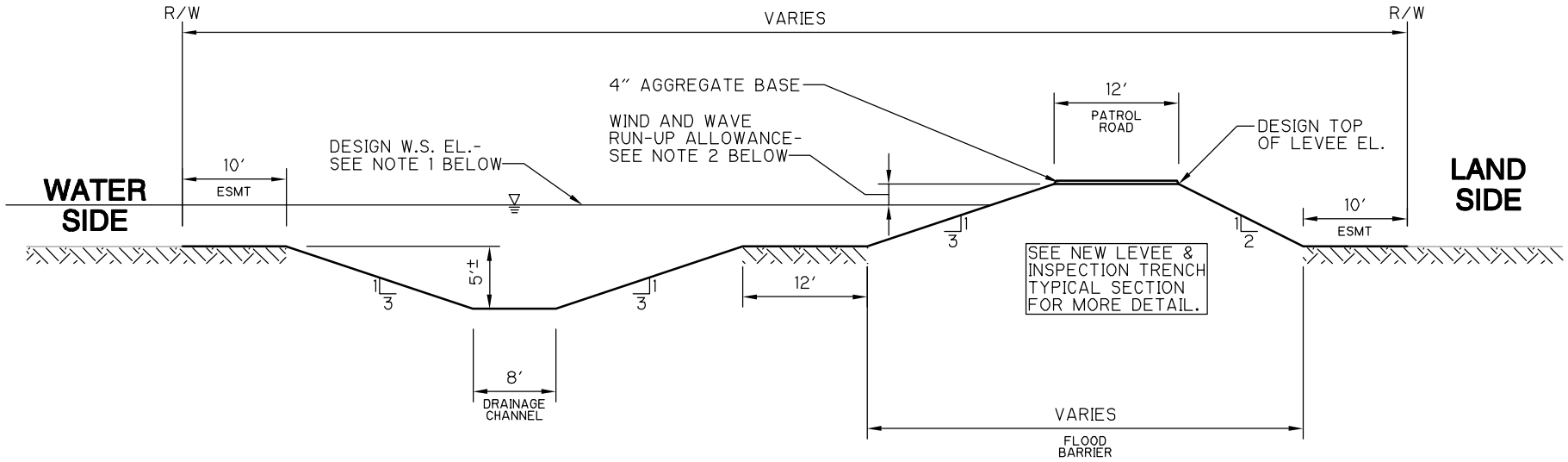
- Cache Creek
- Existing Project Levee
- Lower Cache Creek Flood Barrier
- Road Improvements
- Drainage Canal
- Slope Protection
- Remove Existing Levee
- Stoplog Structure
- Inlet Weir
- Culvert Locations

LOWER CACHE CREEK
FLOOD DAMAGE REDUCTION STUDY EIS/EIR

LOWER CACHE CREEK FLOOD BARRIER PLAN

SACRAMENTO DISTRICT, CORPS OF ENGINEERS
AUGUST 2002

Figure 2-1



LOWER CACHE CREEK
FLOOD BARRIER

NOT TO SCALE

NOTES

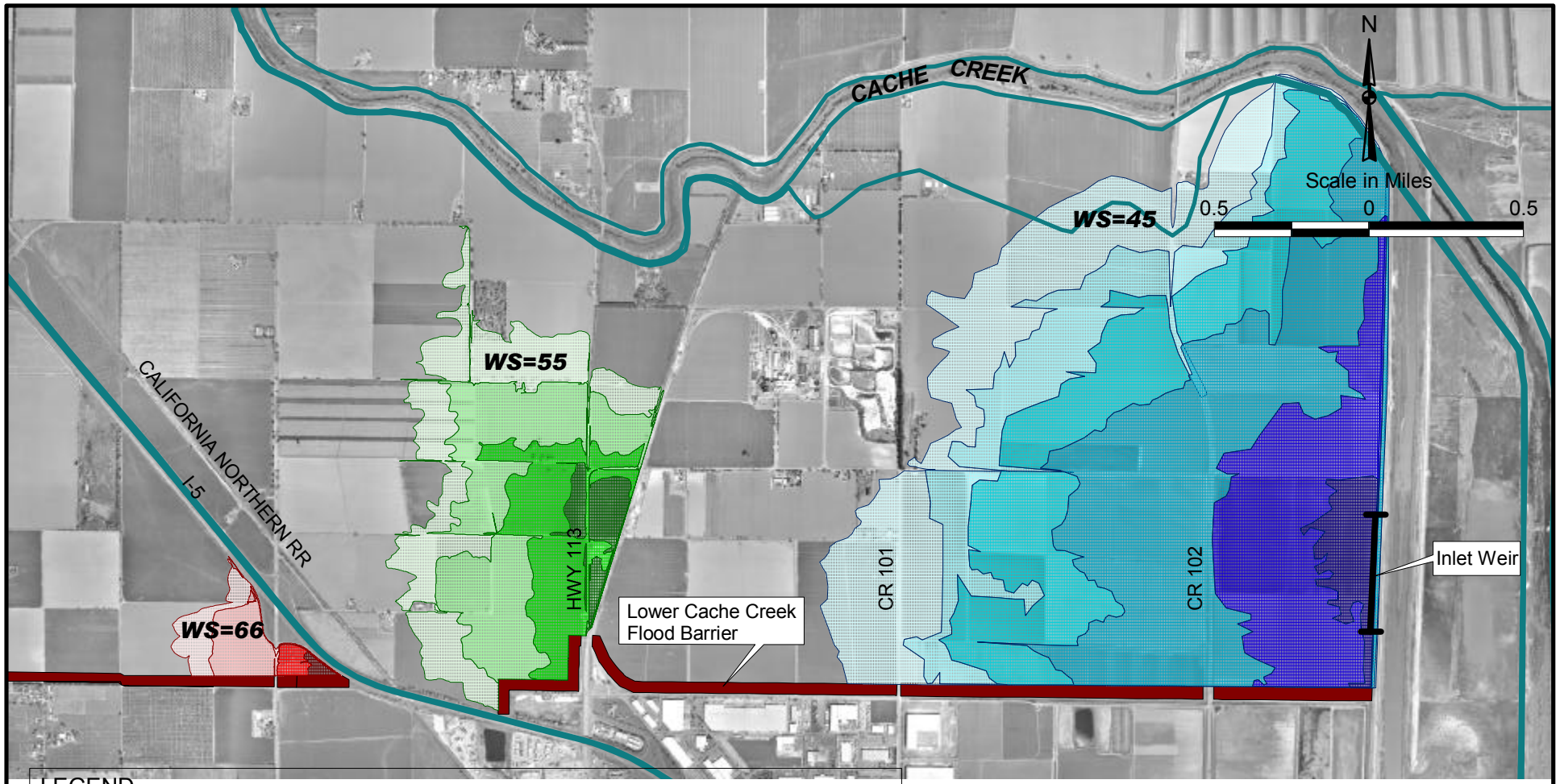
1. REFLECTS A RISK AND UNCERTAINTY APPROACH TO DESIGN.
2. VARIES 1 TO 2.5 FEET.

LOWER CACHE CREEK
FLOOD DAMAGE REDUCTION STUDY EIS/EIR

TYPICAL SECTION
LOWER CACHE CREEK
FLOOD BARRIER

SACRAMENTO DISTRICT, CORPS OF ENGINEERS
SEPTEMBER 2002

FIGURE 2-2



LEGEND

1 in 100 Chance Flood Plain Boundary, taken from the Flood Insurance Rate Map (FIRM) for the City of Woodland, California, Yolo County, dated April 17, 2001, Federal Emergency Management Agency (FEMA)

WS Pond water surface elevation (Feet above mean sea level, NAVD88)

Ponding Depths

I-5	SH113	Northeast Corner
Approx. 6 Feet	Approx. 5 Feet	Approx. 11 Feet
4-6 Feet	3-5 Feet	9-11 Feet
2-4 Feet	1-3 Feet	7-9 Feet
<2 Feet	<1 Feet	5-7 Feet
		3-5 Feet
		< 3 Feet

NOTE: This figure only applies to flows larger than approximately a 1 in 40 chance flow.

LOWER CACHE CREEK
FLOOD DAMAGE REDUCTION STUDY EIS/EIR

LOWER CACHE CREEK FLOOD BARRIER
LONG-TERM FLOODWATER DEPTHS
IN PONDING AREAS

SACRAMENTO DISTRICT, CORPS OF ENGINEERS
OCTOBER 2002

Figure 2-3

The southeast corner, bordered by the LCCFB to the south and the west levee of the settling basin to the east, is of low elevation in the project area and would be prone to flooding and ponding during major flood events. Figure 2-4 indicates flood limits for various Cache Creek flood events in the range of floods that have a 1 in 20 to 1 in 100 chance of occurring in any given year. The drainage of this area would be dependent upon the hydraulic capacity of the pond outlet structures, water levels in the settling basin, and the available pumping capacity of the City's North Canal Pump Station.

Proposed outlet structures necessary to drain the pond consist of a 3,000-foot inlet weir (drains water to the settling basin) installed in the west levee of the settling basin and gated culverts through the west levee of the settling basin and through the flood barrier for low-flow conditions. Figure 2-3 shows the location of the inlet weir. During high ponding conditions, water from the ponding area would flow over the inlet weir into the settling basin, allowing access to CR 101 in about 5 days following a flood event that would have a 1 in 100 chance of occurring in any given year. Maximum ponding extents and depths are shown in Figure 2-3. (Refer to the Feasibility Report.)

The water levels in the settling basin would also influence the drainage. Figure 2-5 displays a representative cross section of the ground elevation, levee heights, and water table elevation for a flood that has a 1 in 200 chance of occurring in any given year. This figure shows that for large storm events, the inlet and outlet weirs to the settling basin may be submerged. However, during these high storm events, the water elevation in the Yolo Bypass would be lower than the settling basin such that backflow would not occur. Floodwaters would continuously drain down gradient from the agriculture land through the settling basin to the Yolo Bypass. At depths below the inlet weir to the settling basin, the drainage through the culvert into the settling basin would occur only under favorable hydraulic head conditions (when the water table elevation in the settling basin is lower than the elevation on the ponding side). This would occur when a sufficient amount of water has drained from the settling basin and Cache Creek is flowing at a rate lower than 400 cfs.

The proposed outlet facility leading to the pump station consists of a reinforced concrete pipe culvert with a slide gate in the middle or at the upstream end of the culvert. The culvert would have a maximum hydraulic capacity of 170 cfs (the same capacity as the pump station). The slide gate would be used to control the flow to the pump station to match the available capacity of the station. If approximately 100 cfs (200 acre-feet per day) of the capacity of the pump station is available, it would take approximately 50 days to drain the pond using only this facility and assuming no additional inflow into the pond (Cache Creek flows are less than 20,000 cfs).

Real estate requirements for the LCCFB Plan would be based on the footprint of the levee, the drainage canal plus 20 feet for maintenance access. Furthermore, flowage easements would be required for an area west of the west levee of the settling basin, due to the increased depth and duration of ponding in this area. Additionally, flowage

easements would be acquired for lands that are not currently within the Cache Creek flood plain, but would be subject to flooding induced by the flood barrier.

Existing homes and structures on the south Cache Creek flood plain could be damaged by flood flows escaping from Cache Creek under both existing conditions and post-project conditions associated with the LCCFB Plan. Pre- and post-project depth duration curves were developed for all groups of structures within the post-project LLCFB flood plain and used to identify homes and structures that may require floodproofing measures or other remedies (refer to Appendix D of the Feasibility Report for depth duration curves at selected locations).

Accomplishments

The LCCFB Plan would remove the city of Woodland and an area of Yolo County south of Woodland from the flood plain. The areas remaining in the flood plain would be protected by the existing levee system that would be maintained to provide protection from floods with a 1 in 10 to 1 in 20 chance of occurring in any given year.

Due to the large flood plain between the creek and the flood barrier, the flood barrier would serve as a reliable flood protection alternative, withstanding floods that have at a minimum a 1 in 100 chance of occurring in any given year.

The proposed LCCFB Plan would improve the existing internal drainage system to protect against local flooding along various flood plain embankments, roadways and against the west levee of the settling basin. East of I-5, the capacity of the system would be increased. West of I-5, capacity is also being increased; however, under existing conditions, where floodwaters would flow into Woodland, the flood barrier would divert these flows easterly via the drainage channel system to the settling basin or the City pump station.

A flood warning system would increase the time to prepare for flood fighting, to evacuate citizens from flood areas, and to close the openings in the flood barrier. The river forecast at the Yolo stream gage would increase warning time for storms centered downstream from the Rumsey stream gage. The acquisition of a storm watch system and a reverse “911” system by the local agencies would save several hours in notifying and evacuating the general public.

Operation and Maintenance

Once the LCCFB is completed, ownership would be transferred to the non-Federal local entity. Operation, maintenance, and rehabilitation of the LCCFB would be in accordance with the operation and maintenance manual provided by the Corps. The Corps has the responsibility to make certain the non-Federal entity inspects, maintains, and rehabilitates the project according to this manual to protect the Federal investment. Maintenance of the levees would include grading and graveling roadways, weed control, rodent control, drainage inspection, maintenance of slope protection, and maintenance of project mitigation features.

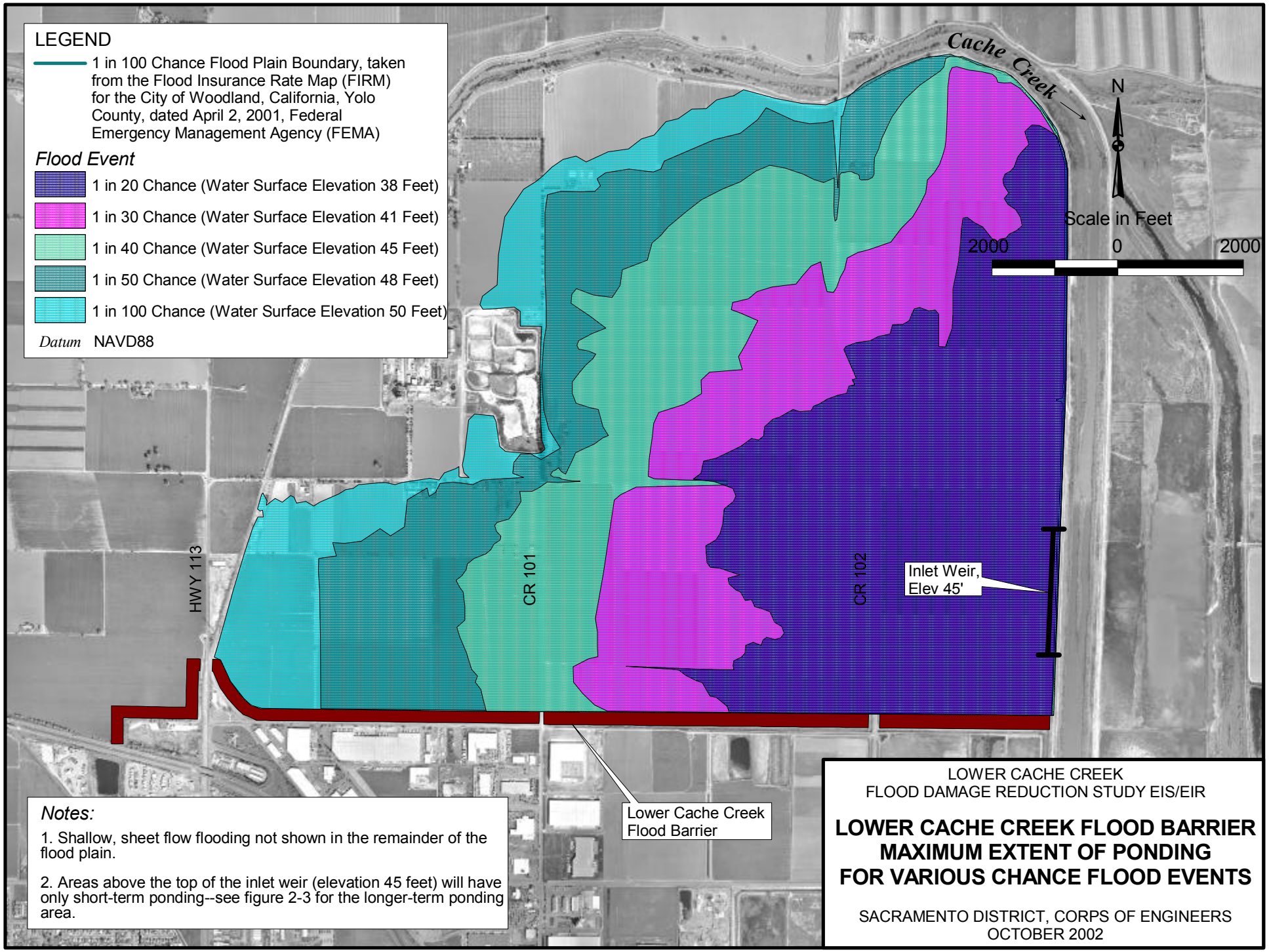
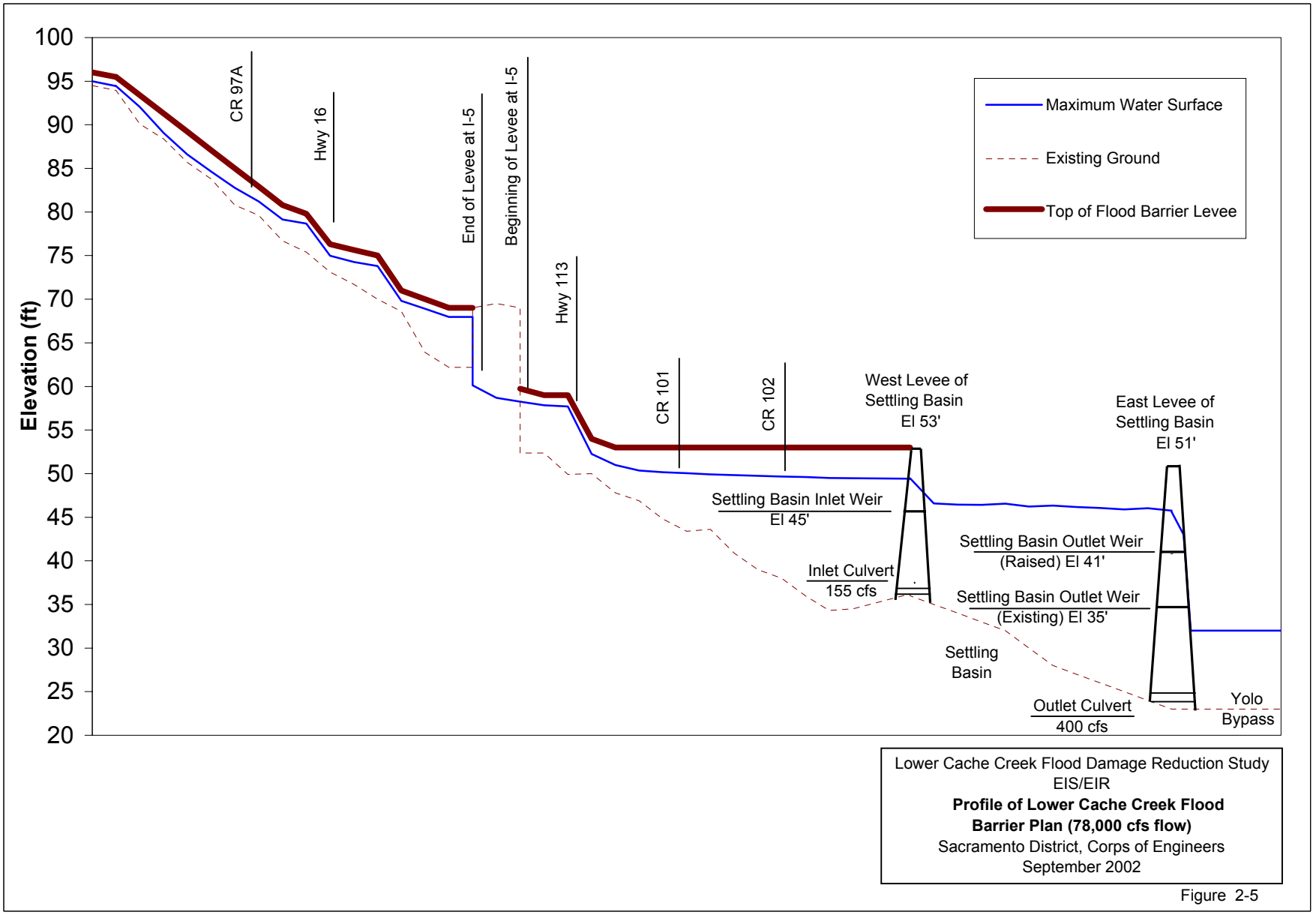

LEGEND
1 in 100 Chance Flood Plain Boundary, taken from the Flood Insurance Rate Map (FIRM) for the City of Woodland, California, Yolo County, dated April 2, 2001, Federal Emergency Management Agency (FEMA)
Flood Event
1 in 20 Chance (Water Surface Elevation 38 Feet)
1 in 30 Chance (Water Surface Elevation 41 Feet)
1 in 40 Chance (Water Surface Elevation 45 Feet)
1 in 50 Chance (Water Surface Elevation 48 Feet)
1 in 100 Chance (Water Surface Elevation 50 Feet)
Datum NAVD88
Cache Creek
N
Scale in Feet
2000
0
2000
HWY 113
CR 101
CR 102
Inlet Weir, Elev 45'
Lower Cache Creek Flood Barrier
Notes:
1. Shallow, sheet flow flooding not shown in the remainder of the flood plain.
2. Areas above the top of the inlet weir (elevation 45 feet) will have only short-term ponding--see figure 2-3 for the longer-term ponding area.
LOWER CACHE CREEK
FLOOD DAMAGE REDUCTION STUDY EIS/EIR
LOWER CACHE CREEK FLOOD BARRIER
MAXIMUM EXTENT OF PONDING
FOR VARIOUS CHANCE FLOOD EVENTS
SACRAMENTO DISTRICT, CORPS OF ENGINEERS
OCTOBER 2002

Figure 2-4



Lower Cache Creek Flood Damage Reduction Study
EIS/EIR
Profile of Lower Cache Creek Flood Barrier Plan (78,000 cfs flow)
Sacramento District, Corps of Engineers
September 2002

Figure 2-5

The LCCFB Plan would require minor changes to the operation and maintenance of the settling basin. DWR is currently operating the settling basin under an operations and maintenance manual provided by the Corps. If and when a new project is authorized, this manual and any other reports and agreements would be updated at that time.

Under the LCCFB Plan, the operation and maintenance of the existing Cache Creek levee system is expected to continue. Although it is not a part of the LCCFB Plan, by State law, operation and maintenance of the existing levee system is the responsibility of DWR.

Construction Details

The flood barrier would be constructed during the dry season over the course of 2 years. The LCCFB would be constructed using standard earth moving equipment and would begin at the east end of the project area at the settling basin and continue westward. Two staging areas would be used during construction to stage equipment and materials, one located at CR 99 and the flood barrier, the other located at the east end of the project area near the settling basin for construction of the weir. During peak construction periods, an additional 90 truck trips and 50 construction worker vehicles per day would be on roads throughout the project area. Haul routes would be on a construction easement along the north side of the proposed flood barrier embankment. For construction west of I-5, borrow material would come from the drainage channel excavation. For construction east of I-5, borrow material would come from the drainage channel excavation, demolition of parts of the training levee and west levee of the settling basin, and directly from the settling basin. Materials that would need to be disposed, such as vegetation, would likely be brought to the Yolo County dump site.

2.4.3 Setback Levee Plans (Three Options)

Two initial plans, the Narrow Setback Levee Plan and the Wide Setback Levee Plan, were evaluated prior to the development of the third plan, the Modified Wide Setback Levee Plan. The physical features, accomplishments, operation and maintenance requirements, and construction details for all three plans are discussed in the following sections. Additionally, the reasons why (significant issues) the Narrow and Wide Setback Levee Plans were not considered further are presented.

Narrow Setback Levee Plan

Features

The major feature of the Narrow Setback Levee Plan would involve the construction of about 19 miles of new setback levees and modifications to the existing levees on Cache Creek. The levee system would extend from the settling basin inlet to high ground near County Road 94B (Figure 2-6). Levee design, construction, and use of portions of the existing levee system would vary between the right (southern) and left

(northern) levees. Downstream from County Road 102, finished levee heights would have a maximum height of approximately 18 feet.

The new setback levees were placed about 500 feet north and south of the creek centerline to avoid channel instability problems. Exceptions to this generalization were made at major structures and significant topographical features such as vertical banks. Also, setbacks were altered in some areas to reduce channel velocities and the need for slope protection, and narrowed in the vicinity of bridges to match existing bridge openings. A toe drain along the waterside levee toe of a newly constructed setback levee would be provided to drain the area between the creek and the levee.

Other major features of this plan include 28,500 feet of slope protection, 10,000 feet of slurry wall, and 4,000 feet of sheet piling. These features were inserted where high velocities were unavoidable, where known erosion problems exist, and where existing structures neighbor the existing levee. Most of the slope protection consisted of stone revetment and gabion structures along the channel banks and a total of 700 linear feet of concrete lining through the bridges. A 40-foot slurry wall was assumed necessary for 15 percent of the total length of levees (10,600 feet). In areas with space constraints, levees would be raised with about 3,600 feet of sheet pile.

The SH 113 and CF 102 bridges would need to be replaced and lengthened and the railroad bridge would be replaced. Additionally, the settling basin training levee would be removed because the training levee was designed for lesser flows than would be conveyed with the new levee system. Also, the increased design flow would cause backwater on the CR 102 bridge, requiring the bridge to be replaced.

Real estate requirements for the Narrow Setback Levee Plan would be based upon the "footprint" of the levee and toe drain, plus 20 feet for maintenance access. A flowage easement would be required on all lands between the levees. In addition, a temporary 40-foot-wide construction easement and a 40-foot-wide drainage easement would be necessary on the waterside of the levee. The temporary construction easement would be acquired for the duration of the construction contracts.

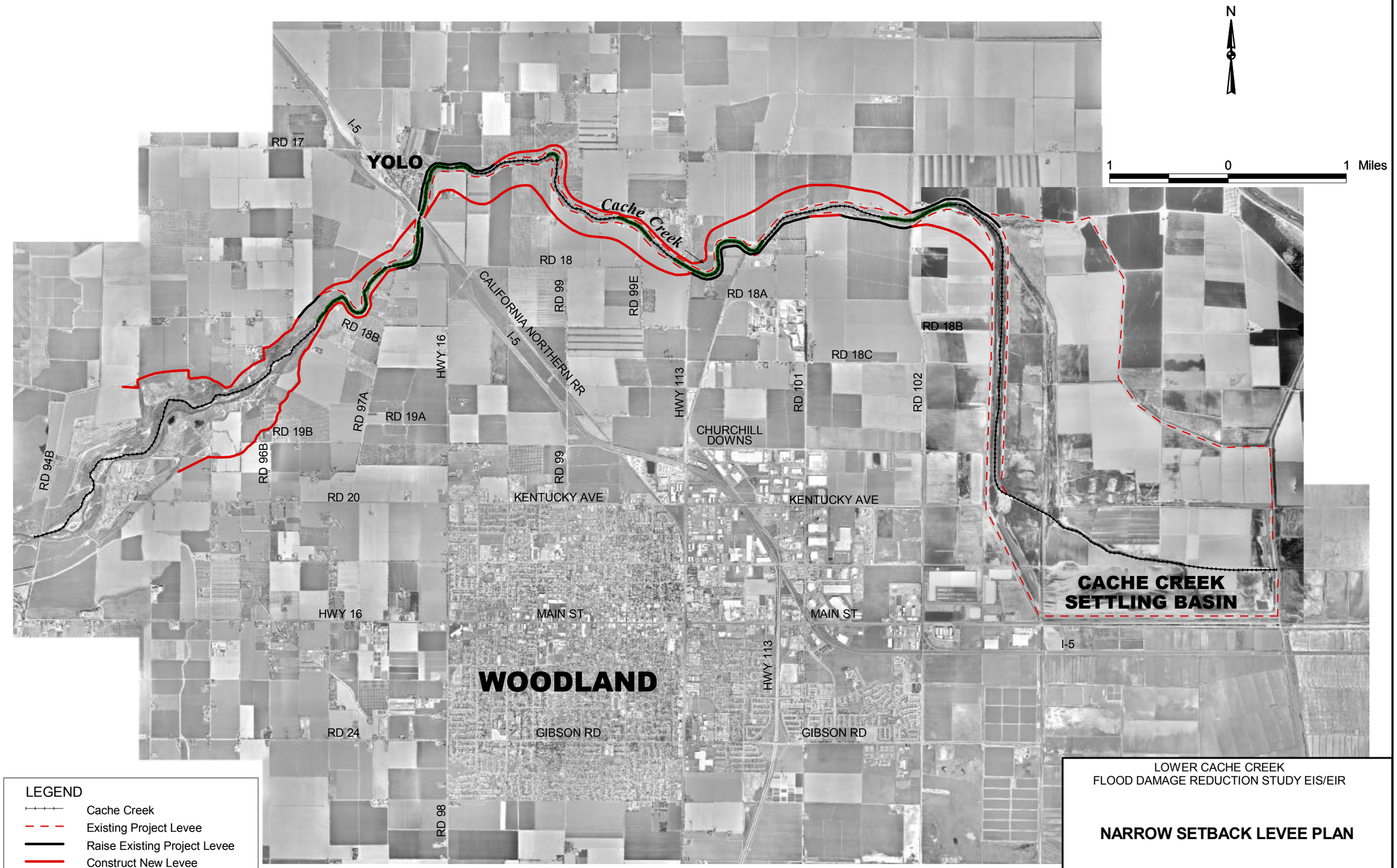
Accomplishments

The main benefit of the Narrow Setback Levee Plan is the reduced frequency of flooding from Cache Creek to lands north and south of the levee system. Flooding of major interstate and State transportation routes would also be reduced.

The Narrow Setback Levee Plan would allow for future restoration of Cache Creek.

Operation and Maintenance

Ownership of the Narrow Setback Levee Project, once completed, would be transferred to the non-Federal sponsor. Operation, maintenance, and rehabilitation of the Narrow Setback Levee Project would be in accordance with the operation and maintenance manual to be provided by the Corps. The Corps would have the



LOWER CACHE CREEK
FLOOD DAMAGE REDUCTION STUDY EIS/EIR

NARROW SETBACK LEVEE PLAN

SACRAMENTO DISTRICT, CORPS OF ENGINEERS
AUGUST 2002

Figure 2-6

responsibility to make certain that the non-Federal sponsor inspects, maintains, and rehabilitates the project according to this manual to provide an operational and a safe project. Maintenance of the existing levees now includes grading and maintenance of patrol roads, weed control, rodent control, and drainage inspection, and would be similar under project conditions.

Construction Details

The Narrow Setback Levee Plan would be constructed during the dry season over the course of 2 to 3 years. The levees would be constructed using standard earth moving equipment and would begin east of CR 102 and continue westward. Due to the elimination of this plan for reasons listed below, a further determination of construction details was not undertaken.

Significant Issues

The Narrow Setback Levee Plan involved minimizing the effects on agricultural lands and residences by having most levee construction performed near or immediately adjacent to the creek. However, this plan would require extensive environmental mitigation due to the large amount of channel armoring necessary for bank erosion protection and excessive direct and indirect effects to the valley elderberry longhorn beetle (VELB) and its habitat due to streambank protection and removal/enlargement of the existing levee system. The magnitude of the mitigation measures required would make this plan extremely difficult to implement. For example, approximately 20 miles of shaded riverine aquatic (SRA) habitat would be needed as mitigation for project effects.

Wide Setback Levee Plan

Features

Many of the features of the Wide Setback Levee Plan are similar to those features of the Narrow Setback Levee Plan. The major features of the Wide Setback Levee Plan are described below. For other features, refer to the section under the heading “Features,” under the description of the Narrow Setback Levee Plan.

The major feature of the Wide Setback Levee Plan would be the construction of about 19 miles of flood control levees, consisting of a combination of new setback levees and modifications to the existing levees on Cache Creek (Figure 2-7). The levees would extend from the settling basin inlet to high ground near CR 94B. Levee design, construction, and use of portions of the existing flood damage reduction system would vary between the right (southern) and left (northern) project flood damage reduction structure. However, maximum levee heights would be approximately 18 feet.

In general, the levees were set back 1,000 to 1,500 feet north and south of the creek centerline except where the levees pinched in at the bridges. The channels would be concrete lined under the bridges, and rock slope protection would be provided both upstream and downstream from these bridges to provide protection. To accommodate the rock slope protection, channel slopes steeper than 2H:1V would be cleared and degraded

to a slope of 2H:1V. In some areas, this would be a combination of both excavation and embankment fill or rock fills. A portion of the right existing levee between Highway 113 and Road 102 would need to be raised.

Real estate requirements for the wide setback levee option were based on the "footprint" of the levee and toe drain, plus 20 feet for maintenance access. A flowage easement would be required between the footprints of the levees. Additionally, a temporary 40-foot-wide construction easement and a 40-foot-wide drainage easement would be necessary on the waterside of the levee. The temporary construction easement would be acquired for the duration of the construction contracts. Many homes and agricultural support structures (approximately 58 structures) would be confined within the wide setback levees and need to be relocated.

Accomplishments

The main benefit of the Wide Setback Levee Plan is the reduced frequency of flooding from Cache Creek to lands north and south of the levee system. Flooding of major interstate and State transportation routes would also be reduced.

The Wide Setback Levee Plan would allow for future restoration of Cache Creek.

Operation and Maintenance

Ownership of the Wide Setback Levee Project, once completed, would be transferred to the non-Federal sponsor. Operation, maintenance, and rehabilitation of the Wide Setback Levee Project would be in accordance with the operation and maintenance manual to be provided by the Corps. The Corps would have the responsibility to make certain that the non-Federal sponsor inspects, maintains, and rehabilitates the project according to this manual to provide an operational and a safe project. Maintenance of the existing levees now includes grading and maintenance of patrol roads, weed control, rodent control, and drainage inspection, and would be similar under project conditions.

Construction Details

The Wide Setback Levee Plan would be constructed during the dry season over the course of 2 to 3 years. The levees would be constructed using standard earth moving equipment and would begin east of CR 102 and continue westward. Due to the elimination of this plan for reasons listed below, a further determination of construction details was not undertaken.

Significant Issues

The Wide Setback Levee Plan involved moving the flood protection levees away from the creek to a distance that would reduce adverse effects on the stream channel. However, the plan would still require extensive environmental mitigation due to the channel armoring near the bridges and the removal of the existing levee system. As compared to the Narrow Setback Levee Plan, the amount of mitigation for SRA habitat would be reduced significantly under this plan, but the direct and indirect effects to the

N

1 0 1 Miles

YOLO

WOODLAND

CACHE CREEK SETTLING BASIN

Cache Creek

I-5

RD 17

RD 18

RD 18A

RD 18B

RD 18C

RD 19A

RD 19B

RD 20

RD 24

RD 94B

RD 96B

RD 97A

RD 98

RD 99

RD 99E

RD 101

RD 102

HWY 16

HWY 113

CALIFORNIA NORTHERN RR

CHURCHILL DOWNS

KENTUCKY AVE

MAIN ST

GIBSON RD

LEGEND

- Cache Creek
- Existing Project Levee
- Raise Existing Project Levee
- Construct New Levee
- Slope Protection

LOWER CACHE CREEK
FLOOD DAMAGE REDUCTION STUDY EIS/EIR

WIDE SETBACK LEVEE PLAN

SACRAMENTO DISTRICT, CORPS OF ENGINEERS
AUGUST 2002

Figure 2-7

VELB due to slope protection and removal of the existing levee system could potentially make this plan difficult to implement. In addition, the Wide Setback Levee Plan would adversely affect a large number of homes and structures.

Modified Wide Setback Levee Plan

Features

Many of the features of the Modified Wide Setback Levee Plan are similar to those features of the Narrow Setback Levee Plan and the Wide Setback Levee Plan. The major features of the Modified Wide Setback Plan are described below. For other features, refer to the section under the heading "Features," under the description of the Narrow Setback Levee Plan.

The plan consists of approximately 19 miles of levees. Levee improvements begin at the west levee of the settling basin and terminate upstream near CR 94B. The maximum levee height would be approximately 18 feet. A portion of the right existing levee between SH 113 and CR 102 would need to be raised 2 feet. Levee design, construction, and use of portions of the existing levee system would vary (Figure 2-8).

In general, the proposed alignment of the Modified Wide Setback Levee Plan is similar to those of the Wide Setback Levee Plan. However, a major difference in levee alignments of this plan occurs on the north and south banks between I-5 and SH 113. The changes in the levee alignments were made in an effort to reduce the environmental mitigation associated with the location of elderberry shrubs and also to reduce effects to homes and farm structures. Modifications to the bridges would consist of rebuilding the bridge approaches and replacing the existing embankment approaches with viaduct approaches. These viaducts would substantially increase bridge openings and flow capacity, reducing the flow velocities, and eliminating the need for bank protection and subsequent environmental mitigation. Concrete linings would still be necessary under bridges and viaducts for erosion and scour protection. CR 97A, CR 18B, CR 17 and CR 18A would need to be realigned.

Although rock slope protection is reduced at the bridges, riprap and a series of gabions would be required on a small portion of the left bank downstream of I-5. Furthermore, hard points (stone fills) would be installed at the outer bend near the vicinity of Yolo. Due to the geomorphology of Cache Creek in these locations, rock slope protection is necessary to ensure lateral channel stability. Toe drains, acting as lateral drainage channels, would also be installed on the waterside of the levees to facilitate adequate drainage. Additionally, approximately 70 percent of the existing levee system would be removed for hydraulic and interior drainage purposes. The other 30 percent is expected to naturally degrade over time, minimizing disturbance to the nearby elderberry shrubs, substantially reducing environmental effects.

Real estate requirements for the Modified Wide Setback Levee Plan would be based upon the "footprint" of the levee and toe drain, in addition to 20 feet for maintenance access. A flowage easement would be required between the footprints of the

levees. In addition, a temporary 40-foot-wide construction easement and a 40-foot-wide drainage easement would be necessary on the waterside of the levee. The temporary construction easement would be acquired for the duration of the construction contracts. Thirty-two homes would need to be relocated based on the alignment of the Modified Wide Setback Levee Plan.

Accomplishments

The main benefit of the Modified Wide Setback Levee Plan is the reduced frequency of flooding from Cache Creek to lands north and south of the levee system. Flooding of major interstate and State transportation routes would also be reduced.

The Modified Wide Setback Levee Plan would allow for future restoration of Cache Creek.

Operation and Maintenance

Ownership of the Modified Wide Setback Levee Project, once completed, would be transferred to the non-Federal sponsor. Operation, maintenance, and rehabilitation of the Modified Wide Setback Levee Project would be in accordance with the operation and maintenance manual to be provided by the Corps. The Corps would have the responsibility to make certain that the non-Federal sponsor inspects, maintains, and rehabilitates the project according to this manual to provide an operational and a safe project. Maintenance of the existing levees now includes grading and maintenance of patrol roads, weed control, rodent control, and drainage inspection, and would be similar under project conditions.

Construction Details

The Modified Wide Setback Levee Plan would be constructed during the dry season over the course of 2 to 3 years. The levees would be constructed using standard earth moving equipment and would begin east of CR 102 and continue westward. Staging areas would be used to stage equipment and materials along the project site. Staging areas of approximately one acre would likely occur in between the levees and near the bridges. At peak construction periods, 100 additional roundtrip truck trips per day and 70 worker vehicle roundtrips would be required. Haul routes would be on construction easements on the waterside of the proposed setback levee alignment. Access to these easements would be along CR 102, CR 101, SH 113 and SH 16, and CR 99. Borrow material would come from land confined between the levees, the removal of the training levee in the settling basin, the removal of portions of the existing Cache Creek levee system, and an area in the northwest corner of the settling basin. Any materials that would need to be disposed, such as removed vegetation, would be hauled to the Yolo County dump site.

2.5 Comparative Effects of the Alternative Plans

Based on the least adverse effects to social, economic, and environmental resources as discussed above, the Modified Wide Setback Levee Plan was selected from among the other Setback Levee Plans. For the remainder of this Draft EIS/EIR, the three

N

1 0 1 Miles

YOLO

I-5

RD 17

Cache Creek

RD 18

RD 18A

RD 18B

RD 18C

RD 99

RD 99E

CALIFORNIA NORTHERN RR

HWY 16

HWY 113

RD 101

RD 102

RD 97A

RD 19A

RD 19B

RD 96B

RD 94B

RD 20

KENTUCKY AVE

CHURCHILL DOWNS

CACHE CREEK SETTLING BASIN

HWY 16

MAIN ST

WOODLAND

RD 24

GIBSON RD

RD 98

LEGEND

- Cache Creek
- Existing Project Levee
- Raise Existing Project Levee
- Construct New Levee
- Slope Protection

LOWER CACHE CREEK
FLOOD DAMAGE REDUCTION STUDY EIS/EIR

MODIFIED WIDE SETBACK LEVEE PLAN

SACRAMENTO DISTRICT, CORPS OF ENGINEERS
AUGUST 2002

Figure 2-8

plans carried forward for further analysis are the No-Action, LCCFB, and the Modified Wide Setback Levee Plans.

For analytical purposes, the environmental effects of the various plans have been classified as direct and indirect effects. Direct effects would result immediately from constructing the project. Indirect effects would result from the effects of the project, but occur later in time. These effects were evaluated by comparing environmental conditions with the project to the likely conditions without the project. A flood that has a 1 in 100 chance of occurring in any given year was used in this comparison. Table 2-2 summarizes the direct environmental effects of the No-Action, LCCFB, and the Modified Wide Setback Levee Plans. Chapter 4 describes these effects in detail.

Mitigation for all direct effects of the second and third alternative plans would be a joint responsibility of the Corps and the non-Federal sponsor on a cost-shared basis. The mitigation measures to avoid, minimize, or compensate for these effects are summarized in Table 2-3 and are discussed in detail in Chapters 4 and 5. If any future maintenance work requires mitigation under the No-Action Plan, the specifics would be decided at that time by DWR. Therefore, the No-Action Plan is not included in Table 2-3.

The environmental analysis was prepared for a range of levee crown widths between 12 and 20 feet for the Modified Wide Setback Levee and the LCCFB. This allows flexibility to increase the width as appropriate for ease and safety of maintenance operations. Crown widths between 12 and 20 feet have the same level of significance in environmental impacts. The increases in width can be accommodated by reductions in the size of the temporary construction easement that parallels the base of the levee, and therefore the only changes would be associated with the increase in levee fill material. Crown widths will be refined for the selected plan.

2.6 Environmental Commitments

Environmental commitments are defined as the required measures, particularly mitigation measures, incorporated into projects as recommended by the Corps. These commitments are related to the mitigation measures and environmental monitoring described in this Draft EIS/EIR.

Commitments related to direct environmental effects would be implemented during (1) preconstruction engineering and design, (2) project construction, or (3) O&M. The Preconstruction, Engineering, and Design Phase begins prior to project authorization and extends until all project-related plans and specifications are completed. This process includes preparation of detailed mitigation plans and ongoing coordination with other agencies.

The acquisition of all lands, easements, rights-of-way, and relocations included in any project mitigation measure it the responsibility of the non-Federal sponsor. During construction, the Corps is responsible for administering project construction contracts and for ensuring that the mitigation measures included in these contracts are carried out. After completion of the project, the non-Federal sponsor is required to maintain the

improvements. The Corps prepares the O&M manual, which the Sacramento District and the non-Federal sponsor are responsible for implementing. The O&M manual includes requirements for annual inspections by qualified specialists to review and evaluate all mitigation features and ensure compliance.

State law requires that the Board pass on O&M responsibilities and their costs to the local beneficiaries of the project. As a result, an as yet undetermined local entity would be responsible for maintaining the completed project. The environmental commitments to mitigate the direct effects of the project alternative plans are listed below.

Table 2-2. Summary of Environmental Effects

Affected Resource	No-Action Plan	Lower Cache Creek Flood Barrier Plan	Modified Wide Setback Levee Plan
Social and Economic Resources	Landowners with Federally insured mortgages and some businesses/facilities within the FEMA 1 in 100 chance flood plain would be required to pay flood insurance.	The potential for growing tree crops in the ponded area would be reduced. One home would need to be relocated. The city of Woodland would be able to continue with planned growth patterns.	The city of Woodland, town of Yolo, and most of the unincorporated community within the County would no longer be required to pay flood insurance. The potential for growing tree crops in the land confined by the levees would be reduced. A total of 32 homes and 182 structures would need to be relocated.
Land Use	Future growth and land use changes would occur as described in City and County General Plans where not limited by the FEMA 1 in 100 chance flood plain. The unincorporated communities north and south of Cache Creek, and the city of Woodland would be subject to flooding during major storm events.	The city of Woodland and county land south of the flood barrier would be removed from the FEMA 1 in 100 chance flood plain. A total of 104 acres would be converted for flood damage reduction purposes.	The city of Woodland, town of Yolo, and unincorporated communities north and south of the levees would be removed from the FEMA 1in 100 chance flood plain. A total of 216 acres would be converted for flood control purposes; potential conversion of 2,135 acres confined by the levees.
Agriculture, Prime and Unique Farmlands	The status of important farmlands would not be expected to change without a flood damage reduction project.	The flood barrier would result in the conversion of 100 acres of prime farmlands and 2 acres of locally important farmland to flood damage reduction uses.	The Modified Wide Setback Levee Plan would result in the conversion of 158 acres of prime farmlands to flood control uses. Potential conversion of an additional 1,254 acres of prime farmland confined by levees.

Table 2-2. Summary of Environmental Effects

Affected Resource	No-Action Plan	Lower Cache Creek Flood Barrier Plan	Modified Wide Setback Levee Plan
Transportation	Potential for flooding of roadways during major storm events remains.	Temporary increases in trips, volumes, roadway safety hazards, and traffic disruption during construction. Flooding of roadways during major storm events. Lengthened response times for emergency vehicles due to flooding.	Temporary increases in trips, volumes, roadway safety hazards, and traffic disruption during construction. Significantly reduces roadway flooding potential.
Noise	Noise levels would be the same as existing conditions.	Temporary increase in noise levels during construction.	Temporary increase in noise levels during construction.
Air Quality	Local emission rates would likely change with projected traffic volume increases.	Temporary increase in combustion, dust, and asphalt paving emissions during construction.	Temporary increase in combustion, dust, and asphalt paving emissions during construction.
Sedimentation and the Settling Basin	No change to sedimentation pattern in settling basin.	The removal of the training levee could alter the distribution of sedimentation in the settling basin. It is expected that this would not be significant.	The removal of the training levee could alter the distribution of sedimentation in the settling basin. It is expected that this would not be significant.
Water Quality	Water quality would remain generally the same as under current conditions.	Pollutants from construction equipment and erosion at the construction site could temporarily degrade the water quality of local runoff during construction.	Pollutants from construction equipment and erosion at the construction site could temporarily degrade the water quality of local runoff during construction.
Vegetation and Wildlife	Vegetation and wildlife resources are likely to be affected by O&M of existing levee system. Future flood fighting and repair activities are also likely to affect vegetation and wildlife resources.	Temporary and permanent loss of row cropped agricultural land and orchards during construction. Vegetation and wildlife resources are likely to be affected by O&M of existing levee system. Potential for continued degradation of Cache Creek system.	Temporary and permanent loss of row cropped agricultural land and orchards during construction. Mitigation provides opportunity for habitat improvements. Vegetation and wildlife resources are likely to be affected by O&M of existing levee system.

Table 2-2. Summary of Environmental Effects

Affected Resource	No-Action Plan	Lower Cache Creek Flood Barrier Plan	Modified Wide Setback Levee Plan
Special-Status Species	Habitat for special-status species is likely to be affected by O&M of existing levee system. Future flood fighting and repair activities are also likely to affect special-status species.	Potential loss or disturbance of Swainson's hawk, giant garter snake, northwestern pond turtle, chinook salmon, and steelhead habitat.	Potential loss or disturbance of the following species or their habitat: giant garter snake, northwestern pond turtle, Swainson's hawk, valley elderberry longhorn beetle, chinook salmon, and steelhead.
Cultural Resources	Archeological sites would continue to be degraded due to various activities such as flooding, farming, and construction.	Cultural resources south of the flood barrier would be protected from flood damage. Increased flooding would occur at sites between CR 101 and the settling basin.	Archeological and historic sites could be affected by levee construction, degradation of the present levee, and accelerated erosion.
Esthetic and Visual Resources	Continued need for flood fighting and repair would degrade visual nature of lower Cache Creek by removing or altering its remaining riparian forest and changing the nature of the creek bank.	The flood barrier would create a linear visual wall within a rural landscape and also a view block to future users. Levee walls are a prominent visual feature of unincorporated Yolo County. Primary view block would be from the industrialized area of Woodland.	Levee would form a view block to local rural residences. Levee walls are a prominent visual feature of unincorporated Yolo County.

Table 2-3. Summary of Mitigation

Affected Resources	Lower Cache Creek Flood Barrier Plan	Level of Significance With Mitigation	Modified Wide Setback Levee Plan	Level of Significance With Mitigation
Social and Economic Resources	Landowners would be compensated for land value effects/takings (flowage easements, raising and/or flood proofing structures, fair market value given for homes/land).	LTS[1]	Landowners would be compensated for land value effects/takings (flowage easements, raising and/or flood proofing structures, fair market value given for homes/land).	LTS
Land Use	Loss of farmland is an effect that cannot be mitigated.	SU[2]	Loss of farmland is an effect that cannot be mitigated.	SU
Agriculture, Prime and Unique Farmlands	The conversion of prime farmlands represents an effect that cannot be mitigated.	SU	The conversion of prime farmlands represents an effect that cannot be mitigated.	SU
Transportation (temporary)	Temporary construction effects would be offset by use of best management practices.	LTS	Temporary construction effects would be offset by use of best management practices.	LTS
Transportation (indirect effect)	Detours would be available to circumvent flooded roadways. However, emergency vehicles would still have lengthened response times.	SU	There are no long-term transportation effects due to the Modified Wide Setback Levee Plan. Therefore, no mitigation required.	No Effect
Noise	Temporary effects of construction noise would be reduced by use of best management practices.	SU	Temporary effects of construction noise would be reduced by use of best management practices.	SU
Air Quality	Air quality effects would be reduced by use of best management practices.	SU	Air quality effects would be reduced by use of best management practices.	SU
Sedimentation and the Settling Basin	Design of LCCFB Plan would incorporate function of the settling basin.	LTS	Design of Modified Wide Setback Levee Plan would incorporate function of the settling basin.	LTS
Water Quality	The proper permitting procedures would be adhered to. In addition, best management practices and monitoring would be implemented to preserve the quality of surface runoff.	LTS	The proper permitting procedures would be adhered to. In addition, best management practices and monitoring would be implemented to preserve the quality of surface runoff.	LTS

[1] LTS = Less than significant
[2] SU = Significant unavoidable

Table 2-3. Summary of Mitigation

Affected Resources	Lower Cache Creek Flood Barrier Plan	Level of Significance With Mitigation	Modified Wide Setback Levee Plan	Level of Significance With Mitigation
Vegetation and Wildlife	Mitigation would occur onsite within the project area where possible and at a mitigation bank if necessary.	LTS	Mitigation would occur onsite within the project area where possible and at a mitigation bank if necessary.	LTS
Special-Status Species	Specific mitigation/avoidance measures are proposed for the giant garter snake, chinook salmon, and steelhead. Mitigation would be finalized during consultation with the USFWS.	LTS	Specific mitigation/avoidance measures are proposed for the giant garter snake, northwestern pond turtle, Swainson's hawk, valley elderberry longhorn beetle, chinook salmon, and steelhead. Mitigation would be finalized during consultation with the USFWS.	LTS
Cultural Resources	Mitigation measures would be developed in consultation with the SHPO and could include flood proofing some structures.	LTS	Mitigation measures could consist of avoidance, data recovery, and for structures, recordation under the Historic American Buildings Survey/Historic American Engineering Recordation criteria.	LTS
Esthetic and Visual Resources	Mitigation measures would include reseeding the new levees.	SU	Mitigation measures would include reseeding the new levees.	SU

Transportation

- The lead agency would develop a traffic management plan and implement precautions such as posted construction zones, reduced speed limits, flagmen, off-street parking, and construction quality control monitors to ensure public safety on the roadways. Traffic would be rerouted when necessary to avoid construction zones.

- Contractors would avoid public roads as much as feasible when hauling materials to the construction site. Any damage to roadway surfaces from the operation of heavy equipment would be repaired.

Noise

- During project construction, noise-generating equipment would be limited to work during daytime hours only.

- Additionally, all mobile equipment would be fitted with mufflers consistent with the best noise reduction technology.

Air Quality

- The lead agency would provide a dust suppression plan that would likely include the following measures:

    - All construction areas, unpaved access roads, and staging areas would be watered as needed when soil is dry.

    - All trucks hauling soil or other loose material would be covered or have at least 2 feet of freeboard. Construction vehicles would use paved roads to access the construction site wherever possible.

    - Vehicle speeds would be limited to 15 mph on unpaved roads and construction areas, or as required to control dust.

    - Streets would be cleaned daily if visible soil material is carried onto adjacent public streets.

    - Exposed stockpiles of soil and other excavated materials would be enclosed, covered, and watered twice daily as needed.

    - Vegetation would be replanted in disturbed areas as quickly as possible following the completion of construction.

- All standard practices and procedures set by the Yolo-Solano Air Quality Management District, the Air Resources Board, and the guidelines provided by the U.S. EPA to minimize emissions would be used during construction.

- According to the results of the conformity review process, a conformity determination is not needed.

Water Quality

- The lead agency would prepare a stormwater pollution prevention plan. A portion of this plan would specifically address erosion and sediment control, including the following measures:

    - Regular watering of construction surfaces with water trucks to prevent wind erosion of dust into water resources.

- Construction crews would install erosion controls such as hay bales, water bars, covers, sediment fences, and sensitive-area access restrictions where necessary and appropriate before initiating extensive clearing and grading to prevent materials from eroding in or near water resources.

- The refueling of equipment is designated staging areas.

- The regular monitoring and maintenance of equipment for fuel leaks.

- Reseeding soil areas with native grass to prevent soil erosion from surface water runoff.

- The lead agency would prepare a Hazardous Substance Control and Emergency Response Plan.

- The lead agency would comply with all Section 404 requirements.

Vegetation and Wildlife

- Limiting construction crews to the right-of-way and confinement of disturbance to as small an area as possible;

- Requiring construction crews to maintain a 15-m.p.h. speed limit on all unpaved roads to reduce the chance of wildlife being mortally wounded if struck by construction equipment;

- Avoidance of effects to Cache Creek's water quality by taking appropriate measures to prevent construction materials (fuels, oils, and lubricants) from spilling or otherwise entering the creek;

- Avoidance of effects to woody vegetation at all construction sites, staging areas, borrow sites, and haul routes by fencing them with orange construction fencing;

- Minimization of effects to trees along the construction area by having all trimming performed by a qualified arborist to ensure tree survival after the project;

- Conducting of nest surveys prior to the removal of any trees or scrub shrub to ensure migratory birds would not be lost during construction, pursuant to the Migratory Bird Treaty Act; and

- Revegetation of borrow, staging, turn-arounds, and any other disturbed areas with native grasses and forbs.

- Development of a mitigation and remediation plan for the project by the lead agency.

Special-Status Species

The conservation measures for the giant garter snake include those taken from the "Programmatic Formal Consultation for U.S. Army Corps of Engineers 404 Permitted Projects with Relatively Small Effects on the Giant Garter Snake within Butte, Colusa, Glenn, Fresno, Merced, Sacramento, San Joaquin, Solano, Stanislaus, and Yolo Counties, California," (November 13, 1997). Measures include:

- Seasonal restrictions (construction from May 1 to October 1 only) to avoid overwintering giant garter snakes;
- Ensuring that dewatered habitat remains dry for at least 15 consecutive days after April 15 and prior to excavation or filling;
- An environmental awareness program for construction workers;
- Avoidance of giant garter snake identified during completion of pre-construction surveys 24 hours prior to commencement of construction by a qualified biologist, who would remain available thereafter to provide additional services should a snake be encountered during construction;
- Halting of all construction activities within the area should a giant garter snake be encountered during construction until the snake has had time to move away from the area;
- Confinement of construction activities to the minimal area necessary to facilitate construction;
- Flagging and avoidance of areas that would not be affected by construction and are designated Environmentally Sensitive to the giant garter snake;
- Restoration of all riprap areas to upland habitat by placing at least an 18- to 24-inch layer of soil over the rock and reseeding the area with native grasses and forbs; and
- Compensation of lost habitat according to ratios agreed upon by the Corps and the USFWS.

Conservation measures for chinook salmon and steelhead are based on the recommendations outlined in the "Guidelines for Salmonid Passage at Stream Crossings," (September, 2001). In addition to guidance specific to culverts, the following general conservation measures would be observed (the final determination of specific conservation measures would be determined during consultation with NMFS):

- Minimization of erosion and sediment delivery through the use of erosion control devices such as hay bales, water bars, covers, and sediment fences where necessary and appropriate;

- Restriction of access to sensitive-areas to minimize streamside habitat effects;
- Installation of culverts in a de-watered site with a sediment control and flow routing plan;
- Use of pumps with fish screens to dewater the site; and
- Restoration of the affected area to pre-project conditions including reseeding using locally native riparian and other vegetation.

Conservation measures for Swainson's hawks would include:

- Replacement of non-native trees at a 1:1 ratio and native trees at a 5:1 ratio.
- Avoidance of hawks identified during pre-construction surveys conducted according to Swainson's Hawk Technical Advisory Committee guidelines (2000); and
- Prohibition of construction activities within one-half mile of a nesting hawk until young fledge.

The following conservation measures for the valley elderberry longhorn beetle include those taken from the "Conservation Guidelines for the Valley Elderberry Longhorn Beetle," (July 9, 1999). Measures include:

- All areas to be avoided during construction activities would be fenced at 100-feet from the dripline of each elderberry plant;
- Signs would be erected along the edge of the avoidance area designating the area as environmentally sensitive for the valley elderberry longhorn beetle;
- An environmental awareness program for construction workers; and
- Compensation of lost habitat according to ratios agreed upon by the Corps and the USFWS.

These conservation measures for the giant garter snake would provide sufficient avoidance, minimization, and mitigation measures for the northwestern pond turtle.

Cultural Resources

- If previously unidentified cultural materials and/or features are discovered during construction, all work in the immediate area would cease and a cultural resources specialist would be immediately contacted for identification and evaluation.

- If materials and/or features are determined to be significant and cannot be avoided, a site-specific mitigation plan would be prepared in consultation with interested parties and the SHPO.

- If human remains are encountered, a cultural resources specialist and county coroner would be contacted in compliance with State law.