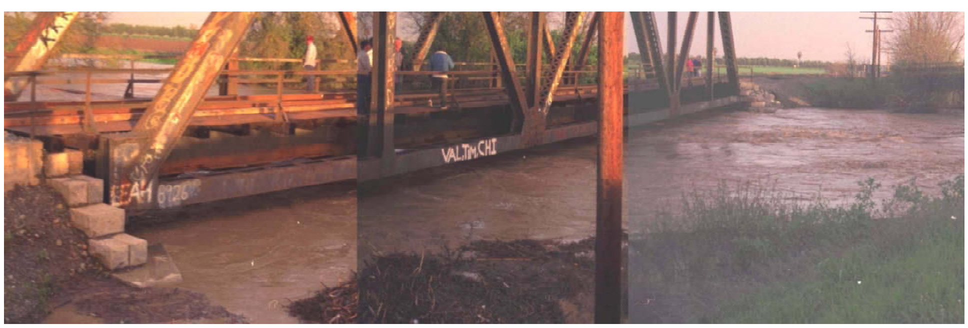
CHAPTER 2
EXISTING AND LIKELY FUTURE WITHOUT-PROJECT CONDITIONS

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



Upstream of railroad bridge near town of Yolo – 1995.

CHAPTER 2

EXISTING AND LIKELY FUTURE WITHOUT-PROJECT CONDITIONS

This chapter describes the existing and likely future without-project conditions in the study area. The project setting includes the physical setting, social and economic conditions, and environmental resources. More-detailed descriptions of these conditions and expected future changes are discussed in the *Lower Cache Creek, Yolo County, CA, City of Woodland Vicinity Draft Environmental Impact Statement/Environmental Impact Report for Potential Flood Damage Reduction Project* (Draft EIS/EIR).

EXISTING CONDITIONS

PHYSICAL SETTING

Cache Creek Basin

Cache Creek originates in the Coast Range Mountains and generally flows southeasterly to the Yolo Bypass. The watershed is approximately 1,139 square miles and includes portions of Colusa, Lake, and Yolo Counties (Figure 1-1). The Cache Creek basin consists of two areas. These areas are known as the Clear Lake area, including the tributaries to Clear Lake, and the Cache Creek area, including Cache Creek and its tributaries.

The Clear Lake area encompasses approximately 528 square miles of the Cache Creek watershed. Water flows from Clear Lake through the Clear Lake Outlet Channel, and then through the Clear Lake Dam into Cache Creek.

Downstream Clear Lake Dam, Cache Creek flows approximately 46 miles to the Capay Diversion Dam. Two major tributaries, the North Fork of Cache Creek and Bear Creek, enter within this reach. Downstream Capay Dam, Cache Creek flows east to its confluence with the Yolo Bypass. The Cache Creek Settling Basin is located at the mouth of the creek.

Existing Water Resources Projects

The Flood Control Act of 1917 authorized the Sacramento River Flood Control Project (SRFCP), and the local sponsor was the California Reclamation Board. Construction began in 1918, and most facilities were completed by 1958. The SRFCP consists of a complete set of levees, leveed bypass floodways, and improved channels. The design flows for the SRFCP were not based on a specific level of protection, so the level of flood damage reduction afforded by the project varies throughout the system.

SRFCP facilities near Woodland include levees along the Willow Slough Bypass, portions of Cache Creek, the Cache Creek Settling Basin, and the Yolo Bypass (Figure 1-2). Under the SRFCP, flows are diverted into the Yolo Bypass from the Sacramento River where levees provide protection against overbank flooding. Levees along the lower reaches of the Willow Slough Bypass and Cache Creek also provide some protection from overbank flooding. The primary function of the settling basin is to remove a significant portion of the sediment load from Cache Creek to avoid its deposition in the Yolo Bypass, thereby preserving the capacity of the bypass for conveying floodflows.

Indian Valley Dam and Reservoir was completed on the North Fork of Cache Creek in 1975. Indian Valley Reservoir has a total storage capacity of 300,000 acre-feet, of which 40,000 acre-feet is for flood damage reduction storage. It has an active reservoir storage capacity of 260,000 acre-feet and is primarily operated for irrigation water supply and energy production.

Clear Lake Dam is operated to control the level of the lake during nonflood periods, regulate summer irrigation releases, and generate hydroelectric power.

Topography

Topographic features of the Cache Creek basin vary from the steep hills of the eastern slopes of the Coast Range Mountains to the nearly flat valley floor. Elevations range from 6,000 feet at the north end of the basin to nearly sea level near the town of Yolo. Stream channel gradients in the upper basin are steep; gradients in the lower basin are very flat. Flood damage reduction and land reclamation levees provide some topographic relief in the relatively flat project area, ranging from 91 feet mean sea level (msl) within the gravel mining reach downstream of CR 94B to 35 feet msl at the settling basin.

Geology and Soils

The study area is in both the Coast Range Mountains and the Great Valley geomorphic areas. The lower basin consists of continental deposits of silt-clay, sand, and gravel. The overlying alluvium deposits are similar and generally not as coarse as the continental deposits. This material forms significant aquifers that underlie the valley portion of the basin downstream from Rumsey. The size and extent of the aquifers are not known.

Lower Cache Creek flows on alluvial fan and flood plain deposits ranging from clay and silt to coarse sand and gravel.[1] Borehole data show clay deposits to be common

[1] Wahler Associates. 1982. Geologic Report, Cache Creek Aggregate Resources, Yolo County, California. For: Aggregate Resources Advisory Committee, County of Yolo, Community Development Agency.

at depths in excess of 20 to 25 feet from the ground surface, whereas more recently deposited silt and sand characterize sediments above the 20- to 25-foot depth.[2]

Several faults are located in the vicinity of the project area. The Dunnigan Hills Fault is less than 5 miles northwest of the project area and is considered active due to recent activity during the Holocene epoch (the last 10,000 years).[3] Other faults in the region include the Zamora and Capay Faults, both of which are considered to be inactive.[4]

Lower Cache Creek has experienced a small amount of land subsidence due to ground-water withdrawal. From 1942 to 1987, the city of Woodland had an estimated maximum cumulative land subsidence of 2.25 feet.

Geomorphology

Lower Cache Creek exhibits several geomorphically distinct reaches along its length (Figure 2-1). The most significant reach change is 1.7 miles upstream from I-5. Upstream from this location, Cache Creek was historically mined for aggregate, whereas areas downstream were not. As a result, channel morphology is vastly different between these two sections of the project area. These and other geomorphic changes can be used to subdivide the creek into the six project-distinct reaches, described below.

Reach 1 is 12,000 feet in length. Cache Creek flows south in an artificially constructed channel that directs Cache Creek flows into the settling basin. The artificial channel exhibits a regular, trapezoidal cross section with little or no change in flow capacity along its length. Dense vegetation cover throughout this reach greatly restricted the observation of in-channel features during the field inspection. As a result, in-channel features were assessed primarily from year 2000 aerial photographs, which showed no apparent bank erosion sites in Reach 1.

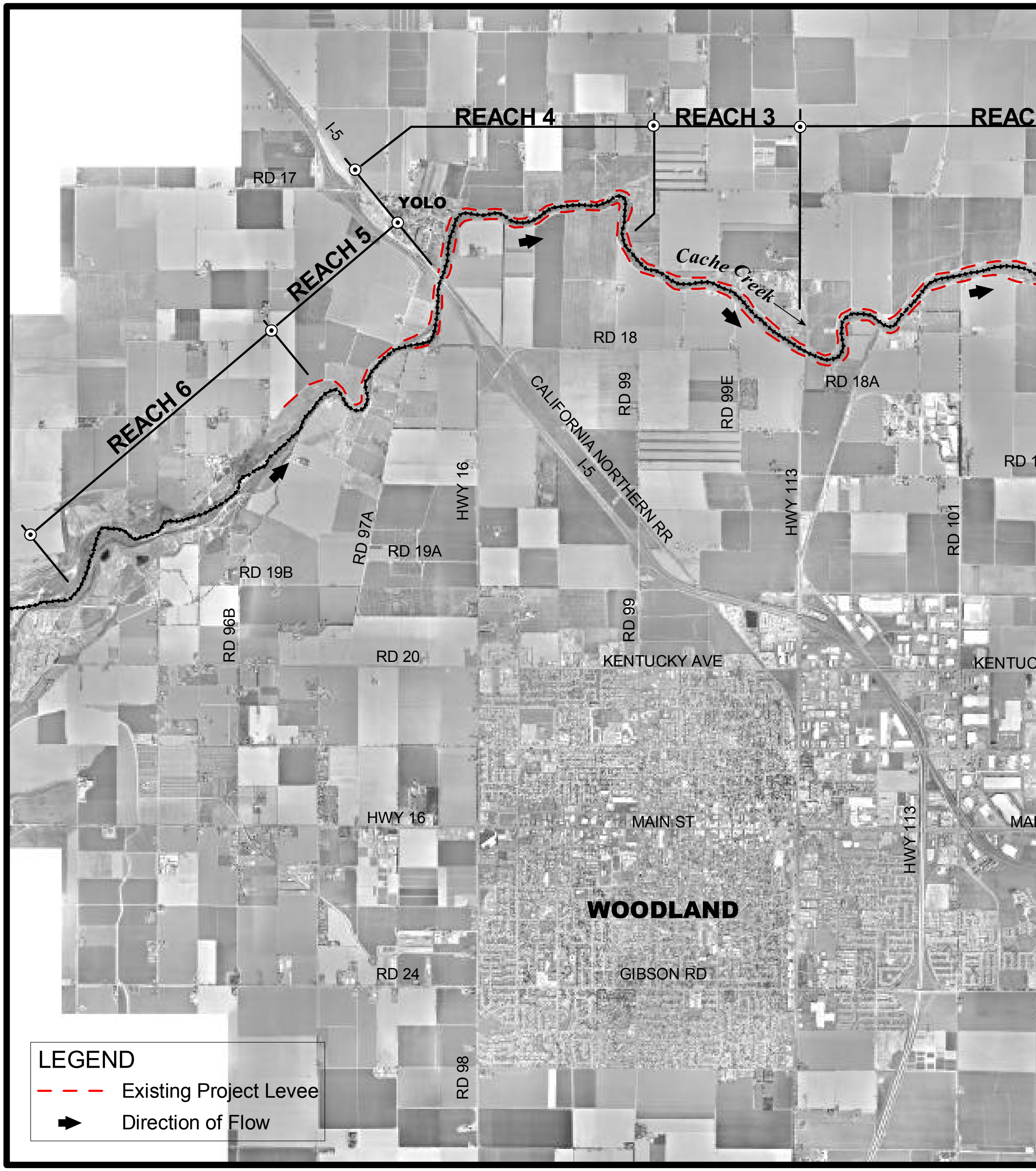
Reach 2 is 15,500 feet in length and located between SH 113 and Reach 1. From aerial photographs, bank vegetation in Reach 2 varied from forest cover with dense understory to open areas of tall grass extending to the water's edge. Channel banks in Reach 2 appeared stable, and no areas of significant bank erosion were observed. However, some small, isolated areas of streambank erosion were identified in the reach. In addition, vertical scarps of exposed bank sediments approximately 3 feet high were also observed near the top of bank in the upstream part of the reach. These breaks in bank

---

[2] U.S. Department of the Army, Corps of Engineers; "Design Memorandum No. 10, Cache Creek, Yolo Bypass to High Ground Levee Construction," November 1, 1958.

[3] Toppozada, T., D. Branum, M. Petersen, C. Hallstrom, C. Cramer, and M. Reichle. 2000. Epicenters of and Areas Damaged by M>5 California Earthquakes, 1800-1999. California Division of Mines and Geology, Map Sheet 49.

[4] Jennings, C.W. 1994. Fault Activity Map of California and Adjacent Areas With Locations and Ages of Recent Volcanic Eruptions. California Division of Mines and Geology, Geologic Data Map No. 6, Scale 1:750,000.



LOWER CACHE CREEK, WOODLAND, CALIFORNIA
AREA FEASIBILITY STUDY

LOWER CACHE CREEK
GEOMORPHIC REACHES

SACRAMENTO DISTRICT, CORPS OF ENGINEERS
OCTOBER 2002

FIGURE 2-1

slope indicate possible slump failures along the bank, although no indications of active or excessive erosion along the toe of these banks were evident at any of these locations.

Three meander bends are located in the upstream part of Reach 2. Rock bank protection was observed at the edge of water in some parts of these meander bends, indicating that these areas had once been eroding and were later stabilized.

Reach 3 is 6,500 feet long and forms a transitional reach between the wider Reach 2 downstream and the narrower Reach 4 upstream. The downstream 1,500 feet of Reach 3 exhibits a fairly consistent line of trees along the south bank, probably planted there several decades ago. These trees occupy the lower part of the streambank near the water's edge, indicating that little or no bank erosion has occurred here over the last several decades. Other areas of Reach 3, particularly along the north bank, are largely devoid of tree cover and instead exhibit grass- and shrub-covered bank slopes.

Reach 3 is significantly narrower and more entrenched than Reach 2, resulting in higher, steeper channel banks that are more prone to bank erosion and instability. In contrast to Reach 2, significant areas of bank erosion and instability are evident in several locations in Reach 3. These areas are typically characterized by eroded, vertical streambanks; slump failures; and single or multiple vertical scarps (2 to 3 feet high) at varying levels on the bank slope, indicating slumping of the downslope segment of bank.

Reach 4 is 10,000 feet long. Trees line much of the south bank of Reach 4, whereas the north bank is virtually devoid of tree cover. Dense shrubs and grasses typically line both banks in this reach.

The frequency of bank erosion and bank instability is greater in Reach 4 than in Reach 3. Reach 4 exhibits the narrowest channel cross section in the project area and is deeper and more entrenched than Reach 3. Both factors contribute to the higher incidence of bank erosion in this reach. Similar to Reach 3, 2- to 3-foot-high vertical scarps occur at varying elevations in several parts of the streambank (both low and high), indicating probable areas of bank slumping. A large bank erosion site on the north bank is very near the levee road and will be repaired by the California Department of Water Resources (DWR) in the near future. A tight meander bend in Reach 4 also exhibits a large bank failure on the inner bank. A grade control structure, constructed of sac-crete, is also located in this reach.

The frequency and magnitude of instream bar features also increase in this reach relative to Reach 3. Well-developed instream gravel bars cause the low-flow channel to migrate from one side of the creekbed to the other.

Reach 5 is 9,000 feet in length and characterized by large meander bends that exhibit severe bank erosion along high (30 feet and greater) vertical banks over hundreds of lineal feet. This morphology results in the most severe and extensive bank erosion in the project area. In general, the low-flow channel in this reach is narrower than in downstream reaches due to lower water depths and confinement of the low-flow channel by large gravel bars that occupy much of the channel bed. A borrow area in Reach 5 is separated from the creek by a high, narrow ridge of material left in place between the creek and borrow area.

A widening trend in channel morphology begins in this reach and continues with distance upstream toward Reach 6 where historical gravel mining has greatly increased channel width and depth from pre-mining levels.

Reach 6 is 11,000 feet long and located in a historically gravel-mined section of the project reach. This reach is very broad in comparison with the rest of the project area and is characterized by large gravel bars, areas with little vegetation that were mined as recently as the mid-1990's, and undisturbed areas of dense vegetation. Vegetation is gradually returning to denuded portions of the creek following the cessation of instream gravel mining operations in 1996.

The following general comments regarding the geomorphic characteristics of the project area can be made from the reach descriptions listed above:

- The frequency and severity of bank erosion and bank instability in the project area increases with distance upstream from Reach 1 to Reach 5.

- Channel width generally decreases with distance upstream from Reach 1 to the I-5 bridge (Reach 5). Conversely, channel depth increases with distance upstream from Reach 1 to the I-5 bridge. In other words, Cache Creek exhibits a narrower, more entrenched channel cross section with distance upstream from the settling basin to the I-5 bridge. This results in channel banks that are generally higher, steeper, and more prone to bank erosion and instability with distance upstream.

- Cache Creek exhibits a widening trend with distance upstream from the I-5 bridge due to active meander bend migration in Reach 5 and channel widening caused by gravel mining in Reach 6.

- Bank instability in the project area is characterized primarily by areas of active bank erosion and by bank slumping. Areas of active bank erosion typically exhibit nearly vertical banks of exposed sediment, indicative of recent erosion. Bank slumping is evidenced by single or multiple vertical scarps (2 to 3 feet high) at varying levels on the bank slope, indicating slumping and subsequent erosion of the downslope segment of the bank.

- Historically, numerous bank protection works have been constructed in the project areas, primarily in river bends. Thus, bank stability in these areas is due to artificial bank protection rather than inherent stream stability. Future maintenance of existing and construction of new bank protection works will be necessary in the project area, even for without-project conditions.

Prior to significant gravel mining, Cache Creek is described as being a wide, relatively steep braided channel upstream from Yolo and a narrow, incised channel flowing in fine-grained overbank deposits and tule marsh downstream from Yolo.[5] In general, average channel width in gravel-mined reaches of Cache Creek has decreased from this historic condition due to bridge and levee construction and aggregate extraction. Conversely, average channel depths have increased as a result of channel degradation and confinement by levees and bridges.

Based on the review of the longitudinal profiles and historical planforms, the following key points are listed below:

- The channel bed has lowered 4 to 26 feet since 1955 along the project reach, resulting in a narrower and entrenched channel cross section as compared to historical channel morphology. Generally, channel bed lowering within the project reach increases with distance upstream from the settling basin.

- The active channel width appears to have decreased since 1937.

- The planform alignment has remained relatively constant since 1937.

- Reaches 4 and 5 exhibit the greatest degree of channel instability manifested primarily as bank erosion and bank sloughing.

- Stream gradient on lower Cache Creek varies from about 0.0015 upstream from I-5 to about 0.00011 near the settling basin. An unusual convex-up "hump" is present in the stream profile between I-5 and SH 113. A sac-crete grade-control structure, 2,300 feet downstream from I-5, is a likely contributor to the unusual profile.

<u>Cache Creek Levee System</u>

In the late 1950's, the Corps enlarged and extended the levees along both banks of Cache Creek. The primary work extended from slightly above I-5 to the settling basin (Figure 1-2). The design flow for the project was 30,000 cfs, which has approximately a 1 in 10 chance of occurring in any given year, although the levee system has passed larger peak flows.

---

[5] EIP Associates, 1995. Technical Studies and Recommendations for the Lower Cache Creek Resource Management Plan for Yolo County Community Development Agency

On April 17, 1958, the Yolo County Board of Supervisors requested that only a minimum amount of work be performed on the Cache Creek levees to preserve the benefits from the potential Wilson Valley Reservoir Project. At that time, the State of California and Yolo County were contemplating constructing the Wilson Valley Reservoir on the main stem of Cache Creek to a capacity of 1 million acre-feet, reserving space for flood damage reduction. The Wilson Valley Reservoir Project was not constructed due to seismic and sedimentation considerations.

Interstate 5

The April 2001 FEMA Flood Insurance Study (FIS) found that I-5, completed through Woodland in 1973, forms a barrier to overland flow resulting from very large floods on Cache Creek and diverts some of the flow toward the city (see Plate 10).

Cache Creek Flooding

Floodflows are most likely between November and April; no known floods have occurred between June and August. Large floods result from rainstorms. Due to the nature of the storms, floods often have multiple peak flows over a 4- to 5-day period. Large peaks result from cloudbursts within a regular storm.

Lower Cache Creek has a history of flooding. Four major flood periods have been documented for the Cache Creek basin during the last half of the 20th century, and 20 severe floods have occurred since 1900. The most severe floods of recent years in the Cache Creek basin downstream from Clear Lake occurred in 1939,1955, 1956, 1958, 1964 and 1965, 1970, 1983, 1995, and 1997.

According to the April 2001 FEMA FIS, the city of Woodland has no recorded history of flooding. However, in 1958, 1983, and 1995, Cache Creek rose to the top of both levees and overflowed its banks toward the cities of Woodland. In 1995, the overland flow came within 1 block of Woodland. In 1983, overland flow flooded areas in the easterly part of what is now in the city limits of Woodland. According to the USGS, the peak flow in January 1983 at the Rumsey gage was estimated to be 53,000 cfs, which is a 1 in 50 chance event at this location. There was a levee break downstream from County Road CR 102 during this flood. Federal, State, and local agencies patched levee boils at that time to prevent additional levee breaks along both sides of the Cache Creek levee system.

The peak flow at CR 94B in January 1995 was approximately 48,000 cfs. An estimated 3,800 cfs overflowed the south bank and almost nothing overflowed the north bank upstream of the levee system. The total flow (approximately 48,000 cfs, peak) represents a 1 in 40 chance event. The volume of the flood hydrograph was approximately a 1 in 20 chance event. The City of Woodland observed and prepared a sketch of high-water marks in the vicinity of the city of Woodland for the March 1995 event. These observations do not define the full extent of the flood boundary.

Cache Creek Settling Basin

The Cache Creek Settling Basin, located adjacent to the Yolo Bypass, was constructed to prevent sediment being carried by Cache Creek from adversely affecting the hydraulic capacity of the Yolo Bypass through excess sediment deposition (Figure 1-2). It is bounded by levees on all sides and covers 3,600 acres. The basin was originally constructed by the Corps in 1937. The levee heights and locations have been modified to control sediment deposition and enhance basin sediment storage.

Sediment data were collected on Cache Creek at a USGS gage near the town of Yolo from 1943 to 1971.[6] Results indicate that 93 percent of the total sediment load at the Yolo gage is suspended sediment, of which approximately 86 percent consists of silts and clays with an average diameter less than 0.064 mm. The annual suspended sediment load into the settling basin area between 1904 and 1963 was approximately 675 acre-feet.[7] The annual deposition rate in the settling basin from 1934-68 was calculated to be 340 acre-feet, yielding a 50 percent trap efficiency. Data concerning sediment loadings for single-flow events are not available.

From 1991 to 1993, modifications to the settling basin included an additional 50-year storage capacity with an average of 340 acre-feet of sediment accumulation per year. This corresponds to an average trapping efficiency of 55 percent, assuming existing levee project conditions. Flows from Cache Creek enter the northwest corner of the basin and exit the basin via two structures in the southeast corner of the basin—the high-flow outlet, a 1,740-foot concrete weir, and the low-flow outlet, a gated, double-box culvert. The crest elevation of the weir is currently set at an approximate elevation of 35 feet (North American Vertical Datum of 1988 [NAVD88]). It is planned that the weir will be raised 6 feet in 2017 or when the basin fills with sediment such that the trap efficiency decreases to less than 30 percent.

A training levee in the settling basin parallel to the west levee ties into the end of the north bank levee of Cache Creek. The training levee is designed to direct flows to the southern portion of the settling basin, maintaining flow velocities and preventing sediment deposition and clogging near the inlet of the basin. At the end of the training levee, the flow expands horizontally, reducing the flow velocity and increasing sedimentation. The training levee is planned to be removed in increments, encouraging an even distribution of sediment deposition across the basin.

[6] U.S. Department of the Army, Corps of Engineers; "Design Memorandum No. 1 – Cache Creek Settling Basin – Final General Design Memorandum," January 1987.
[7] State of California, Department of Water Resources; "Investigation of Alternative Plans for Control of Sediment From Cache Creek," Memorandum Report, December 1968.

The settling basin features, including increases in levee heights, modifications to the training levee, and raising of the outlet weir, were designed to safely contain and pass a design flow of 30,000 cfs. This flow represents the current design capacity of the original settling basin and the upstream channel/levee system. The 30,000-cfs discharge was chosen for design so as not to exceed the capacity of the upstream channel system. The basin's low-flow outlet structure was designed to pass 400 cfs. Review of streamflow gaging data for Cache Creek at Yolo indicates that flows exceed 400 cfs most years for several days at a time.

Existing Storm Drainage System

The City of Woodland has evaluated the existing storm drainage system serving the city and the portions of Yolo County located between Woodland and the Cache Creek levee system. The purpose of the evaluation has been to identify existing storm drainage problems and to develop a plan for storm drainage facilities. These efforts only consider local runoff. The evaluation is presented in the report entitled "City of Woodland Storm Drainage Facilities Master Plan," December 1999, by Borcalli and Associates.

In general, the storm drainage system conveys runoff by gravity flow from west to east. The agricultural lands are served by a minimal drainage system, whereas the city is served by piped trunk systems. The trunk systems discharge into the North or the South Canals. The canals convey the runoff to the city's three pump stations. The pump stations discharge into the Outfall Channel, which conveys runoff to the Yolo Bypass.

The city's existing trunk system is not adequate to convey the runoff from the agricultural areas on the west and south sides of the city, resulting in overflow onto the city streets. Inadequate trunk capacity results in street flooding during the 1 in 2 and 1 in 10 chance storm events. The extent and magnitude of street flooding increases significantly between the 1 in 2 and 1 in 10 chance storm events. The peak flows reaching the North and South Pump Stations exceed pumping capacities, resulting in high stages and ponding in the North Canal and South Canal.

The North Canal flows from north to south parallel to the west levee of the settling basin and conveys runoff that originates from the west to the North Pump Station. When flows in the North Canal exceed the pumping capacity (approximately the 1 in 10 chance storm event) ponding along the west levee of the settling basin occurs.

The South Canal flows from south to north. It conveys runoff that originates to the west and south of I-5 to the South Canal Pump Station. The water-surface elevations in the South Canal exceed its bank elevations for approximately the 1 in 10 chance storm event.

The pump stations are referred to as the North Canal Pump Station, the East Main Pump Station, and the South Canal Pump Station. The pumping capacity of these pump stations is estimated to be 150 cfs, 270 cfs, and 30 cfs, respectively. During storm events, all three pump stations discharge into the Outfall Channel, which is located between the new and the original south levee of the Cache Creek Settling Basin. Provisions exist for gravity discharge from the pump stations to the outfall channel during low-flow conditions.

The Outfall Channel flows from west to east and discharges directly into the Yolo Bypass. The settling basin discharges into the Yolo Bypass immediately north of the city's outfall channel. There is no defined channel to convey flows across the Yolo Bypass to the Tule Canal. The lack of a defined channel has reportedly resulted in scouring near the Yolo Shortline Railroad trestle within the Yolo Bypass. The City, Reclamation District No. 2035, the Shortline Railroad, and DWR are studying the scour problem to identify and implement a solution.

Noise

Major noise sources in the study area are roadway traffic on State and county roadways, particularly I-5; California Northern Railroad and Yolo Shortline Railroad operations, which generally occur between 7 a.m. and 7 p.m.; agricultural activities; and fixed noise sources. Fixed noise sources are a result of many industrial operations, including Adams Grain Dryer, Pacific International Rice Mill, and Woodland Biomass.

Hazardous, Toxic, and Radiological Waste Sites

In March 2000, a Phase I Environmental Site Assessment (ESA) was performed by the Environmental Design Section of the Corps, Sacramento District. In all, approximately 12 miles of Cache Creek and levees on both banks were evaluated; see Appendix E.

No items of environmental concern were observed within the project area during the site visit with the exception of pesticide (chemical) mixing trailers at one location. Although there were no observations of spills at the mixing location, the potential for spills exists. There were no soil, surface-water, or ground-water samples collected as part of the site visit at this location or any other location within the project area.

As part of the records review for hazardous, toxic, and radiological waste (HTRW) sites within the project area, Environmental Data Resources, Inc. (EDR), identified 12 potential HTRW sites. However, they no longer pose environmental hazards, since they had been investigated prior to this inquiry and had been subject to removal actions, as necessary.

Climate

The Cache Creek basin experiences the same Mediterranean climate as the Sacramento Valley, characterized by hot, dry summers and mild, rainy winters. Prevailing winds are moderate in strength and vary from dry, overland wind from the north to moist, clean sea breezes from the south.

Air Quality

The Yolo-Solano Air Quality Management District (YSAQMD) monitors and regulates air quality in the Woodland area and regulates air pollution emissions of commercial and industrial operations. Between 1989 and 1993, exceedences of the State and Federal standards were recorded in Yolo County for the State/Federal ozone standards and State PM_{10} standards. Both pollutants are regional problems affecting the entire Sacramento Valley Air Basin. Under the Federal Clean Air Act (CAA), Yolo County is designated as "severe" nonattainment for the Federal ozone standard, and attainment or unclassified for other pollutants. Under the California CAA, the county is a "serious" nonattainment area for the State ozone standard, and is also considered nonattainment for the State PM_{10} standard.

Woodland contains a multitude of air pollution sources. Motor vehicle exhausts and pesticides are major contributors to the regional ozone problem. Industrial combustion, combustion of natural gas in homes and businesses for space and water heating, and evaporation of paints and solvents are other sources of urban air pollutants. Agricultural lands that surround Woodland generate pollutants through equipment and vehicle exhaust, tilling, burning, unpaved road travel, and evaporation of pesticides.

Water Quality

All the various sources of surface water in the county are of suitable quality for agricultural use and, except for the Colusa Basin Drain, could be treated for municipal use. However, there is a local concern about high levels of boron, salts, and mercury in Cache Creek.

The salts and boron are a result of geothermal releases found in the upper reaches of the basin. Concentrations of boron vary depending on the volume of flow in Cache Creek. However, these concentrations are regularly monitored to ensure suitability of the water for agricultural use.

The Central Valley Regional Water Quality Control Board (RWQCB) currently designates Cache Creek as an Impaired Water Body. RWQCB's toxic monitoring program has demonstrated that mercury is present in sediments throughout the basin as a result of prior mercury mining activities within the upper basin. Studies have demonstrated biomagnification of methyl mercury in the tissues of invertebrates and fishes within the system. RWQCB is concerned about any activity within Cache Creek that could result in disturbance of mercury-contaminated sediments. Disturbance could mobilize the mercury and make it more available for biological intake.

Groundwater quality is generally very good except for localized areas containing high boron levels such as along Cache Creek, where boron concentrations in the groundwater are high, ranging from 2 to 4 ppm, in comparison to background levels of 0.6 to 1.0 ppm in other parts of the county. Other localized areas of groundwater pollution are due to (1) nitrates near Dunnigan, east of Woodland, and west of the University of California at Davis and (2) pesticides near Mace Boulevard north of Putah Creek.

SOCIAL AND ECONOMIC CONDITIONS

Yolo County

Most of the study area is in Yolo County, but it also extends into the southwestern portion of Colusa County and the northeastern portion of Solano County. The area is primarily rural and sparsely populated. The zoning for Yolo County is shown on Plate 1.

Agriculture is an important source of employment and tax revenue for both Yolo and Colusa Counties. Agricultural production in Yolo County is in transition from the production of field crops such as sugar beets and tomatoes to more economically stable production of tree and vine crops. Tree and vine crops such as nuts and fruit provide a more stable income for valley growers and can be harvested yearly.

The population of the counties in the study area is expected to continue to grow at a rate higher than that of the State primarily due to the influx of people who work in Sacramento and the Bay Area. Since the counties are attempting to preserve agricultural land, future development is planned adjacent to existing urban areas.

City of Woodland

The City of Woodland is the largest incorporated community within the study area; the population in 2002 was 50,614. The zoning for the city is shown on Plate 2. Originating as an agriculture support community, Woodland remains surrounded by agricultural lands. Most industrial development occurs in the north and eastern parts of the city, which are within the FEMA flood plain. Residential areas lie primarily to the west of downtown; current developments are to the south. The residential areas in the north and east part of Woodland are in the FEMA flood plain.

The northern residential areas are in the FEMA flood plain (about 3,200 single-family homes and 300 multiple-family homes). An additional 500 structures (industry,

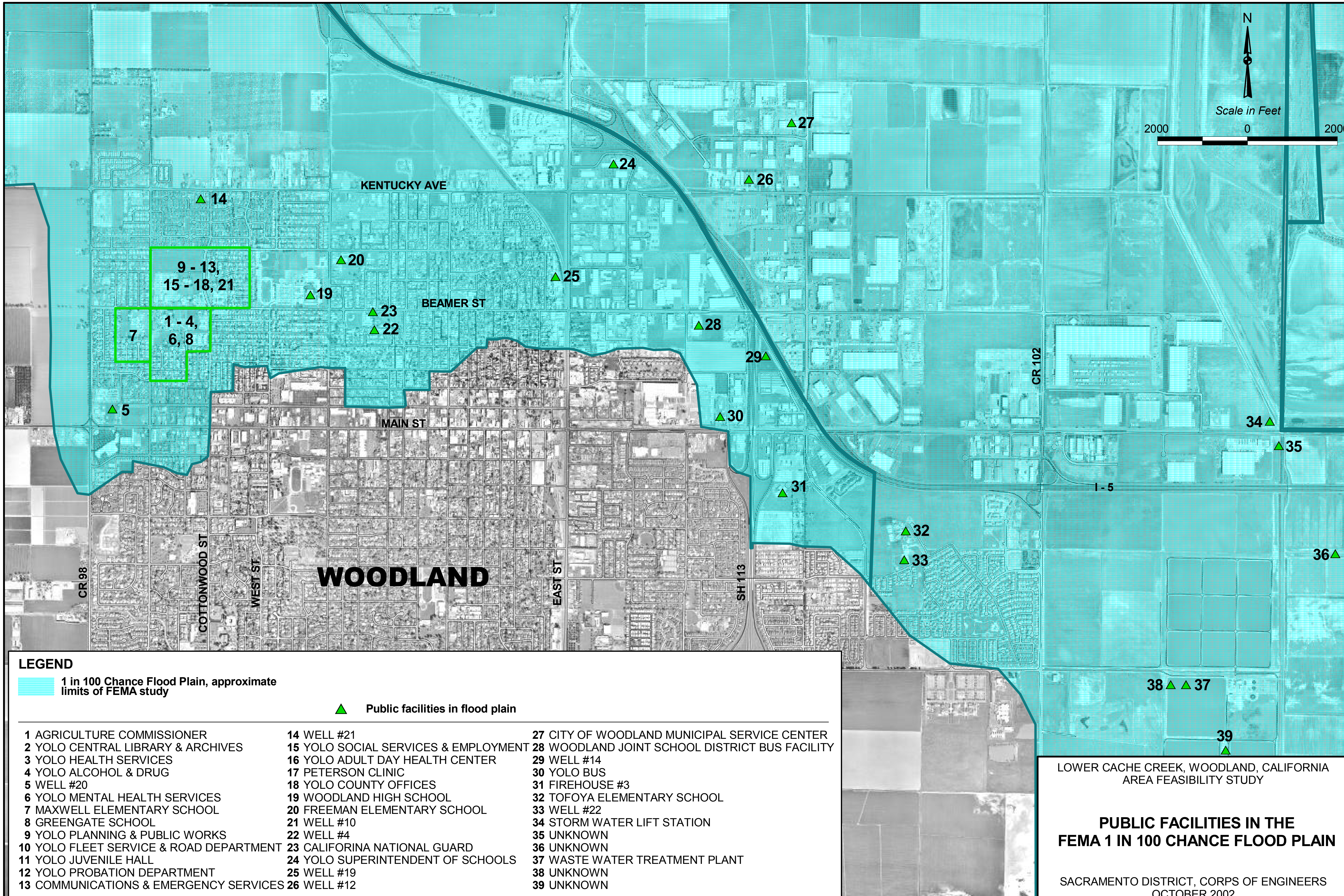

N
Scale in Feet
2000 0 2000
KENTUCKY AVE
BEAMER ST
MAIN ST
I - 5
CR 102
CR 98
COTTONWOOD ST
WEST ST
EAST ST
SH 113
WOODLAND
9 - 13, 15 - 18, 21
1 - 4, 6, 8
7
5
14
19
20
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
LEGEND
1 in 100 Chance Flood Plain, approximate limits of FEMA study
Public facilities in flood plain
1 AGRICULTURE COMMISSIONER
2 YOLO CENTRAL LIBRARY & ARCHIVES
3 YOLO HEALTH SERVICES
4 YOLO ALCOHOL & DRUG
5 WELL #20
6 YOLO MENTAL HEALTH SERVICES
7 MAXWELL ELEMENTARY SCHOOL
8 GREENGATE SCHOOL
9 YOLO PLANNING & PUBLIC WORKS
10 YOLO FLEET SERVICE & ROAD DEPARTMENT
11 YOLO JUVENILE HALL
12 YOLO PROBATION DEPARTMENT
13 COMMUNICATIONS & EMERGENCY SERVICES
14 WELL #21
15 YOLO SOCIAL SERVICES & EMPLOYMENT
16 YOLO ADULT DAY HEALTH CENTER
17 PETERSON CLINIC
18 YOLO COUNTY OFFICES
19 WOODLAND HIGH SCHOOL
20 FREEMAN ELEMENTARY SCHOOL
21 WELL #10
22 WELL #4
23 CALIFORINA NATIONAL GUARD
24 YOLO SUPERINTENDENT OF SCHOOLS
25 WELL #19
26 WELL #12
27 CITY OF WOODLAND MUNICIPAL SERVICE CENTER
28 WOODLAND JOINT SCHOOL DISTRICT BUS FACILITY
29 WELL #14
30 YOLO BUS
31 FIREHOUSE #3
32 TOFOYA ELEMENTARY SCHOOL
33 WELL #22
34 STORM WATER LIFT STATION
35 UNKNOWN
36 UNKNOWN
37 WASTE WATER TREATMENT PLANT
38 UNKNOWN
39 UNKNOWN
LOWER CACHE CREEK, WOODLAND, CALIFORNIA
AREA FEASIBILITY STUDY
PUBLIC FACILITIES IN THE
FEMA 1 IN 100 CHANCE FLOOD PLAIN
SACRAMENTO DISTRICT, CORPS OF ENGINEERS
OCTOBER 2002

FIGURE 2-2

retail, and restaurants), including the city wastewater treatment plant, are within the 1 in 100 annual chance flood plain. Of the 18 schools in Woodland, 6 are in the 1 in 100 annual chance flood plain, as are juvenile detention, social services, elder care, medical treatment, and emergency response facilities and City, county, and State road maintenance yards; see Figure 2-2. Woodland has one hospital, which is not in the FEMA flood plain.

Town of Yolo

The population of the town of Yolo in 1997 was 457. Zoning for Yolo is shown on Plate 1. There were an estimated 161 housing units in the town according to 1997 data. There is one school, and the town does not have a hospital.

Land Use

Land uses in the study area are predominantly agricultural and also include urban and industrial, recreation, and flood damage reduction. Land use in the southern part of the project area includes urban and industrial areas of the city of Woodland. North of the city, agriculture is the predominant land use. North of Cache Creek, land use includes the unincorporated town of Yolo and a mixture of agricultural croplands, orchards, and individual residences (Plate 3).

Gravel Mining Operations

Cache Creek yields high-quality aggregate material between the Capay Bridge and the town of Yolo. This reach has been mined since the late 1800's. Yolo and Solano Counties use the aggregate as construction material for roads, railroad beds, and concrete structures.

Currently, there are five active aggregate mining extraction and processing (gravel mining) operations in the study area. The gravel mining companies are Syar Industries, Inc.; Solano Concrete Company, Inc.; Teichert Aggregates; Schwarzgrubber & Sons, Inc.; and Granite Construction Company.[8] The facilities include sand and gravel processing plants, asphalt-concrete hot-mix plants, concrete batch plants, material stockpiles, settling ponds, water wells, stationary and mobile equipment, and haul roads.

Cultural and Historic Resources

Cultural resources include buildings, structures, objects, sites, districts, and archeological resources associated with historic or prehistoric human activity. The cultural value of these resources may be of national, State, or local significance and may be listed in, or eligible for listing in, the National Register of Historic Places (NRHP) on

[8] Teichert Aggregates, April 3, 2000.

the Federal level or in the California Register of Historic Places as outlined in CEQA. CEQA has similar criteria for the evaluation of the significance of cultural resources to the California Register of Historic Places. If properties are eligible under the NRHP, they are also eligible under the California Register.

Ethnography

The Penutian-speaking Patwin Indians occupied a large area west of the Sacramento River north from the town of Princeton south to the city of Benicia. There is little evidence of occupation away from the streams in the study area, although temporary campsites certainly must have been established. The village of Churup, a Patwin name, was recorded near the town of Yolo. The village of Chila was located near Cache Creek at its lower terminus.

History

Euro-American occupation in the Sacramento Valley is represented first by Spanish interests, then Mexican dominion, and finally by American claim of the region.

William Gordon, the first major settler in the study area, came to Yolo County in 1842 and claimed the Mexican land grant of Rancho Guesesosi along Cache Creek as his own. The rancho boundaries are defined by County Road (CR) 19 on the north, CR 94B on the east, State Highway SH 16 on the south, and CR 89 on the west.

Settlement in Woodland began when John Morris, from Kentucky, moved to the current site of First and Clover Streets in 1849. Although growth in Yolo County, including the communities of Yolo and Woodland, continued steadily in the mid- and late 1800's, the coming of the railroad to Woodland in 1869 accelerated that development. Farmers such as Camillus Nelson, R. H. Beamer, Harvey Gable, W. B. Gibson, and others prospered and built grand homes in Woodland or in the outlying areas. Some of these are still standing and are within the study area.

Cultural Resources Investigations

Only one archeological survey has been completed in the study area. "An Archaeological Reconnaissance of Cache Creek between Capay and Yolo in Yolo County, California," written in 1978 by Archaeological Consulting and Research Services, Inc., indicates that no sites were located in the study area identified on the Woodland topographic map. Two previously recorded prehistoric archeological sites were probably destroyed sometime before 1978.

In 1982, a building inventory was completed of the potentially historic buildings in the city of Woodland.[9] A county-wide survey was completed in 1986. The 1982

[9] Wirth, G.F., A.I.A & Associates/Architects, Inc. 1982. Woodland Historical Resource Inventory Final Report 1981-82: City of Woodland.

inventory identified 32 properties that were recommended for inclusion in the NRHP. Two buildings are State Historical Monuments, and five buildings are listed in the NRHP. One additional house had been nominated for the NRHP. The Camillus Nelson house on CR 18C, north of Woodland, is listed on the NRHP. This two-story brick residence was built in 1872 and has intact outbuildings. It is located within the 1 in 100 chance FEMA flood plain.

The NRHP Internet site listed three individual historic properties in the City of Woodland and one historic district. The three individual properties are the R.H. Beamer house at 19 3rd Street, the William B. Gibson house at 512 Gibson Road, and the Hotel Woodland at 426 Main Street. The historic district is the entire Downtown Woodland Historic District, which is on Main Street between Elm and Third Streets.

The Wells Fargo express stop and bank, Spreckles Sugar processing plant, John E. Taylor residence, Nelson's Grove, and Robinson olive trees are located between Woodland and Cache Creek to the north. None have been evaluated for the NRHP. Because virtually none of the study area has been systematically examined for historic or prehistoric resources due to real estate constraints, and because many of the structures have not been evaluated for the NRHP, a draft Programmatic Agreement is included (Appendix C of the EIS/EIR) that stipulates the steps that would be taken to be in compliance with Section 106 of the National Historic Preservation Act NHPA) and 36 Code of Federal Regulations (CFR) 800. The Area of Potential Effect, while broadly drawn at the present, would be refined depending on the selected plan.

Additional archeological and historic building surveys and NRHP evaluation would be undertaken during later project planning phases to fully assess potential adverse effects.

Transportation

One interstate and two State highways traverse the study area. I-5 provides north-south circulation through the eastern portion of the county and Woodland. SH 16 provides east-west circulation through Woodland. SH 113 provides north-south circulation in the study area.

Esthetics and Visual Resources

The study area is in the Sacramento Valley region, which has its own unique esthetic qualities. This includes the linear and checkerboard pattern of fields, crops, and orchards contrasted by the curvilinear meandering form of the creek and its associated riparian vegetation. The rural/agricultural nature of orchards, croplands, and the occasional farm structure contrasts greatly with the adjacent developed areas of Woodland and Yolo. New warehouses in Woodland are introducing an urbanized scene to the agronomic setting. Orchards, croplands, and the urban areas of Woodland and Yolo characterize the valley portion of the study area. The riparian vegetation adjacent to the levees is visible from the town of Yolo and from I-5. The north Coast Range Mountains and the Sierra Nevada Mountains are visible, but not dominant landscape features, when weather or air quality conditions allow.

Recreation

Yolo County has 11 parks and recreational facilities. Of the 11 parks within Woodland, 7 lie within the floodplain. Within the study area, there is a special-use park (ball field) on county land. Public access to Cache Creek within the study area is limited and restricted as a result of adjacent private lands and locked gates at the entrances to the levees.

ENVIRONMENTAL RESOURCES

Cache Creek flows roughly east-southeast from Clear Lake for approximately 75 miles out of the Coast Range Mountains and into the Sacramento Valley, one of only a few large Coastal Range creeks that follow this path. Unfortunately, 90 percent of California's riparian habitat has been reduced or modified in the past 200 years, and the lower portion of Cache Creek is a prime example of this degradation.

Vegetation and Wildlife

A number of wildlife species are associated with the types of habitat available for food, cover, and nesting along Cache Creek. Typically, riparian forest, valley oak woodland, and freshwater marsh are highly productive wildlife areas. Species found in these habitat types include hawks, quail, deer, raccoon, fox, coyote, and squirrels. The creek itself serves as habitat for a number of reptiles and amphibians, as well as an assortment of fish. Lower Cache Creek is within the Pacific Flyway. The Pacific Flyway is used by 10 to 12 million ducks, of which 300,000 winter in the Yolo Bypass and the Cache Creek Settling Basin.

Lower Cache Creek is dry part of the year as a result of a diversion dam constructed near Capay in 1912 and related irrigation diversions. Some riparian vegetation continues to grow on the banks and terraces of the low-flow channel despite limited water availability. Generally, the vegetation grows in narrow strips between 37 and 75 feet wide along both sides of the low-flow channel. The range of the riparian vegetation is constrained by nearby agricultural activity. Crops cultivated near the creek include rice, wheat, tomatoes, melons, and fruit and nut orchards. The 3,600 acres within the settling basin are also farmed.

Agricultural fields provide foraging and resting areas for Swainson's hawk, red-tailed hawk, Brewer's blackbird, and black-tailed hare. Agricultural fields also provide habitat for western fence lizards, gopher snakes, California ground squirrel, California quail, coyote, skunk, and fox. These species often nest in nearby riparian areas and feed on agricultural field and annual grassland.

Fisheries

The variable streamflow, shallow depths, and agricultural runoff in Cache Creek influence the number and type of fish found in the study area. Historically, fish populations in Cache Creek included anadromous species such as steelhead trout, chinook salmon, and the Pacific lamprey. Due to flood control actions, including the settling basin and agricultural withdrawals, fish migration between the Sacramento River and Cache Creek is limited, but not precluded. Lower Cache Creek has been designated as critical habitat for the Central Valley Steelhead and Essential Fish Habitat for the Central Valley fall-run chinook salmon.

Due to the already degraded nature of Cache Creek, there would be no additional effects to fisheries within the creek. Nevertheless, NMFS has declared Cache Creek to be special-status species' critical habitat and essential fish habitat. (Critical habitat for steelhead included lower Cache Creek; however, an April 30, 2002 court ruling vacated this critical habitat.)

Threatened and Endangered Species

The Federal Endangered Species Act (ESA) provides legal protection and requires definition of critical habitat and development of recovery plans for plant and animal species in danger of extinction. The State provides parallel legal protection in the California Endangered Species Act (CESA). The status of an animal or plant is listed as endangered, threatened, or, in the case of plants, rare by the ESA and CESA.

Species listed by the Federal and California State governments that would potentially be affected by this project include:

Swainson's hawk – There are numerous documented occurrences of Swainson's hawks within the project area from I-5 eastward and throughout the settling basin. These hawks can be habituated to human activity such as crop cultivation if the activity is consistent. Disturbances, particularly during the breeding season, from late March to late August, may include construction actions (a change in current activity routine) and personnel near nesting sites. These disturbances during prenesting, egg-laying, and incubation could result in nest abandonment.

Northwestern pond turtle – There are documented occurrences of the turtle within Cache Creek and various stock ponds of the project area. Loss of upland nesting habitat through human disturbance is a potential source for the turtles' decline.

Bank swallow – There are documented occurrences of bank swallows within the project area, including observations of birds in flight by project biologists during site visits. Breeding bank swallow populations seem to be fairly tolerant of moderate levels of human activity. Bank swallow susceptibility is primarily tied to habitat losses of their nesting banks from flood control measures.

Giant garter snake – During an October 15, 2001, survey, five potential areas of giant garter snake habitat in the project area were logged. These include (1) bed and bank of Cache Creek and the levees adjacent to the creek, (2) agricultural ditch between CR 101 and CR 102, (3) agricultural ditch between CR 102 and the Cache Creek west levee, (4) narrow channel east of CR 102 on the south side of the farm road (levee), and (5) agricultural ditch at the base of the north-south segment of the Cache Creek west levee.

Valley elderberry longhorn beetle – Elderberry shrubs are located on both banks of Cache Creek in the project area.

Palmate-bracted bird's beak – A survey was conducted in September and October of 2001 for this species' habitat. The survey identified potential habitat; however, the areas were outside the project boundary and therefore would not be affected by construction.

Central Valley chinook salmon – Although National Marine Fisheries Service (NMFS) considers Cache Creek to be essential fish habitat for the Central Valley fall-run chinook salmon, currently, Cache Creek no longer flows directly into the Sacramento River, making it highly unlikely that salmon winter and spawn within the creek at present.

Central Valley steelhead trout – Critical habitat has been designated for this species (February 16, 2000) to include all river reaches accessible to listed steelhead in the Sacramento and San Joaquin Rivers and their tributaries (NMFS, 1998). This critical habitat includes lower Cache Creek.

WITHOUT-PROJECT FUTURE CONDITIONS

This section describes the changes expected in the study area over the period of analysis used for this study, assuming a long-term flood damage reduction project is not built. This without-project condition serves as the basis for comparison against which alternative flood damage reduction plans (potential projects) are evaluated to determine their potential effectiveness and effects that could result from them.

Listed below are the categories and related assumptions that may affect without-project future conditions as compared to the existing conditions summarized previously in this chapter. Further analysis can be found in the EIS/EIR.

PHYSICAL SETTING

Flooding

Cache Creek and the Yolo Bypass would continue to be the primary flood hazards to the city of Woodland. The primary flood hazard within the project area would be from Cache Creek. The Corps enlarged and extended the existing constructed levees along both banks of Cache Creek in the 1950's. The design flow for the levees is 30,000 cfs, which has approximately a 1 in 10 chance of occurring in any given year. Historically, the levee system has passed flows up to 34,000 cfs, a 1 in 20 chance flow, without failures. Without a new project, larger flows would continue to flood agricultural lands and would likely flood the city of Woodland.

The only substantial flood threat to Woodland is from Cache Creek. From the west of the city, the runoff area is small and does not pose a flood threat. From the south, Willow Slough floods towards the south; from the east, the Yolo Bypass would flood to a maximum elevation of 32 feet (NAVD88), which affects only a small portion of Woodland. Interior drainage and localized flooding is not expected to generate major flood damages.

Maintenance of the existing Cache Creek levee system is the responsibility of DWR. By State law, operation and maintenance will continue to be the responsibility of DWR. Because the existing system was designed to reliably pass 1 in 10 chance floodflows, flood fighting and repair are expected to be done relatively frequently. Due to existing bank erosion and bank instability problems of the existing levee system, rehabilitation on the existing levee system would be necessary to maintain the current function of the system. Without the rehabilitation, flooding risk to agricultural land and the city of Woodland would likely increase. Rehabilitation work needed to maintain the existing system is described in Chapter 6.

Risk of flooding may affect the City's development plans. The City's General Plan policies outlined in the February 1996 General Plan seek to protect development from flood damage.

The applicable policies include the following:

8.B.1 *"The City shall continue to implement flood plain zoning and undertake other actions required to comply with State flood plain requirements, and to maintain the City's eligibility under the Federal Flood Insurance Program."*

8.B.2 *"The City shall require evaluation of potential flood hazards prior to approval of development projects. The City shall require proponents of new development to submit accurate topographic and flow characteristics information. This will include depiction of the 100-year flood plain boundaries under fully-developed, pre- and post-project runoff conditions."*

8.B.3 *"The City shall not allow development in areas subject to deep flooding (i.e., over four feet deep) unless adequate mitigation is provided, to* *include project levees designed for a standard project flood or a minimum of 400-year protection, whichever is less."*

8.B.4 *"The City shall require flood-proofing of structures and outdoor storage areas for hazardous materials in areas subject to flooding. Hazardous materials and wastes shall be contained within floodproofed structures or storage areas."*

8.B.5 *"The City shall prohibit the construction of facilities essential for emergencies and large public assembly in the 100-year flood plain, unless the structure and road access are free from flood inundation."*

8.B.6. *"The City shall continue to work closely with the U.S. Army Corps of Engineers, the Yolo County Resource Conservation District, the Federal Emergency Management Agency, the State Department of Water Resources, and the Yolo County Flood Control and Water Conservation District in defining existing and potential flood problem areas and solutions."*

8.B.7. *"The City shall recognize flood plains as a potential public resource to be managed and maintained for the public's benefit and, where possible, shall view flood waters as a resource to be used for waterfowl habitat, aquifer recharge, fishery enhancement, agricultural water supply, and other suitable uses."*

The Corps' SRFCP will continue to provide the area with varying levels of flood damage reduction from the Yolo Bypass. In addition to the SRFCP, the Indian Valley Dam and Reservoir, located on the North Fork of Cache Creek, will continue providing some flood damage reduction to lands along Cache Creek using the 40,000 acre-feet allocated for flood damage reduction. The Indian Valley Dam and Reservoir provide a limited amount of flood damage reduction to the lower reaches of Cache Creek and regulates about 20 percent of the Cache Creek watershed area.

The lands to the east of Woodland could potentially be subject to deep flooding from overflows from the Willow Slough Bypass or the Yolo Bypass, depending on the particular flood event or levee failure and the associated volume of overflow. The deep flooding could occur as a result of water ponding against levees of the Yolo Bypass and the Willow Slough Bypass. The proposed document that outlines the method of assessment for operation and maintenance of Reclamation District (RD) 2035 states that lands to the east of Woodland would be subject to 6.5 to 16 feet of inundation should the bypass levee fail.

The possibility for deep flooding can be demonstrated by comparing the ground elevations in the area with the top-of-levee elevations of the Yolo Bypass. The ground elevations range from approximately 32.5 feet mean sea level (msl), North American Vertical Datum 1988 (NAVD88), in the vicinity of the city's sewage treatment plant to approximately 22.5 feet msl (NAVD88) near the Yolo Bypass levee. The top-of-levee elevation of the Yolo Bypass west levee is approximately 39.5 feet msl (NAVD88) between the Cache Creek Settling Basin and the Willow Slough Bypass. The top-of-levee elevation of the Willow Slough Bypass is approximately 35.5 feet msl (NAVD88).

Land Use

The unincorporated agricultural lands comprising the majority of the project area are zoned by Yolo County for agriculture (Plate 1). Unless zoning laws are altered, no significant change is expected for the agricultural lands. The City of Woodland General Plan identifies an Urban Limit Line, shown on Plate 2, that encompasses all land to be considered for urban development within the timeframe of the General Plan (by 2020). The City's General Plan Policy states that these urban limit lines are permanent on the north and east borders; see General Plan policy 1.A.12. This urban development includes much of the eastern and northern portions of the city bordering the settling basin and unincorporated Yolo County. Current urban development trends are expected to continue. New developments would need to be in accordance with the National Flood Insurance Program.

SOCIAL AND ECONOMIC CONDITIONS

On a short-term basis, flooding from a greater storm than one having a 1 in 10 chance could disrupt economic activity in Woodland, Yolo, and the unincorporated areas in the study area, depending on floodflow and duration.

On a more permanent basis, landowners in the FEMA 1 in 100 chance (100-year) flood plain with a federally insured mortgage would be required to purchase flood insurance. New development in the FEMA 1 in 100 chance flood plain would be possible, but only with flood proofing measures and added insurance costs. Woodland's industrial sector could be less competitive due to potential risk and insurance costs. The city may not attract as many new businesses for the same reasons. The loss of businesses within the city would cost Woodland revenue.

Transportation

The potential for flooding during major storms remains without a flood damage reduction project. Transportation would be affected during a severe storm due to the temporary disruption and potential damage to the California Northern Railroad, a north-south freight transportation railway, and I-5. The portion of I-5 east of the city would be particularly subject to disruption and damage because the floodflows would pond against the Yolo Bypass levees. County roads within the study area would also be flooded.

ENVIRONMENTAL RESOURCES

Cache Creek

The environmental resources of Cache Creek has been affected by gravel mining and the construction of bridges and flood control facilities. The outlet of the creek through a wier and box culvert system, and the operations of the settling basin minimize the utility of the creek to anadromous fish. Maintenance of the levee system, which includes vegetation removal and burning by the State and landowner agricultural activities, serves to reduce habitat quality. Because the banks of the leveed channel are failing in some locations, flood fighting (including installation of bank protection) is expected to continue to degrade habitat quality. These factors, coupled with a lack of sponsor support for restoring creek biological functions, indicate the potential for further degradation of the stream over time.