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K. HYDROLOGY AND WATER QUALITY

This section provides a discussion of the existing water resources and hydrology conditions in the County, including the extent and quality of surface water and groundwater, runoff and drainage patterns, and flood conditions. Analysis of storm water management and storm drainage is provided in Section IV.H, Utilities and Energy. This description is largely based on information contained in the Yolo County General Plan Update Background Report.[1] The discussion is supplemented with available information and maps from the Yolo County Planning and Public Works Department; California Regional Water Quality Control Board, Central Valley Region (Water Board); Federal Emergency Management Agency (FEMA); Water Resources Association of Yolo County;[2] and the Yolo County Flood Control and Water Conservation District (YCFCWCD).[3,4] Following the existing conditions discussion is a summary of the regulatory framework related to water resources. The significance criteria, which are used to determine whether build-out of the Draft General Plan would result in significant impacts to water resources, are listed. Finally, potential impacts to the water resources and hydrology of the County that could result from implementation of the policies and actions of the Draft General Plan are described.

1. Setting

The County's existing conditions related to water resources, hydrology, and water quality are described below.

a. Climate. Yolo County is in the Sacramento Valley Air Basin (SVAB), which includes Sacramento, Shasta, Tehama, Butte, Glenn, Colusa, Sutter, Yuba, Yolo, and parts of Solano and Placer Counties. The SVAB is bounded on the west by the Coast Ranges and on the north and east by the Cascade Range and Sierra Nevada. To the south is the San Joaquin Valley Air Basin. The SVAB, and Yolo County, has a Mediterranean climate characterized by hot, dry summers and temperate, rainy winters. Yolo County is comprised of two distinct climate zones. The northern and central areas of Yolo County experience hot summers and moderately cold winters, while the southeastern County receives marine air influence from the San Joaquin-Sacramento Delta regions that reduce the temperature extremes. During winter, the North Pacific storm track intermittently dominates area weather, and fair weather alternates with periods of extensive clouds and precipitation. During the summer, temperatures generally average a high of 95º F and a low in the mid-50s. Winter temperatures average a high in the 50s, and low of 38 to 40º F. Much of the precipitation received in Yolo County falls on the Vaca Mountains (part of the Coast Range geomorphic province) to the west of the County, annually averaging 34 inches along the western edge of the County. Rainfall in the eastern County averages approximately 20 inches.

[1] Jones and Stokes, 2005. Background Report for the Yolo County General Plan Update, prepared for Yolo County, January.

[2] Water Resources Association of Yolo County (WRA), 2007. Integrated Regional Water Management Plan, April.

[3] Yolo County Food Control and Water Conservation District (YCFCWCD), 2008. Floodsafe Yolo Pilot Program Work Plan Tasks: Cache Creek and Westside Watersheds, 26 February.

[4] YCFCWCD, 2004. Groundwater Monitoring Program, Data Management System, and Update of Groundwater Conditions in the Yolo County Area. July.

b. Topography. The highest elevation in the County is Berryessa Peak at 3,046 feet above sea level, decreasing to 5 feet above sea level near the Sacramento River on the eastern edge of the County. The County is located such that approximately the western 30 percent is located in California's Coast Ranges with the eastern remainder in the Great Valley. The Great Valley portion of the County consists of gently sloping to level alluvial areas, while the Coast Ranges part of the County consists of moderately sloping to very steep uplands and terraces and is characterized by northwest-southeast trending ridges and valleys.[5]

c. Subsidence. Subsidence is the lowering of the land-surface elevation. In Yolo County as much as 4 feet of land subsidence due to groundwater withdrawal has occurred since the 1950s, particularly in the area between the towns of Zamora, Knights Landing, and Woodland. The land subsidence has damaged or reduced the integrity of highways, levees, irrigation canals, and wells.[6] The mechanism for subsidence in Yolo County is generally related to groundwater pumping and subsequent consolidation of loose aquifer sediments. The primary hazards associated with subsidence are increased pressure on levees, increases in relative flood water depths and area, and damage to underground utilities. Other effects of subsidence include changes in the gradients of stormwater and sanitary sewer drainage systems, particularly a concern when the flow is gravity-driven. Precise monitoring of subsidence in the part of the County east of the Coast Range area began in 1999. Between 1999 and 2002, the greatest amount of subsidence in the County was detected near Davis (2 inches) and Zamora (3 inches). No data from 1999 were available for the southeastern "panhandle" part of the County, so no precise measurement of subsidence is available for that area. Previous investigations have reported subsidence in the Clarksburg area, the southern tip of the County, and a small area in the northeastern part of the County, all as a result of excessive groundwater removal.

d. Ground Water Resources. The Yolo subbasin of the Sacramento Valley groundwater basin underlies the majority of Yolo County. Yolo County is underlain by a substantial amount of groundwater. It is estimated that groundwater storage for all of Yolo County, between 20 and 420 feet below the surface, is 14,038,000 acre-feet.[7] During the period of 1950 to 1976 the basin experienced a large decline in storage due to aquifer overdraft. The construction of the Indian Valley Dam and Reservoir in 1976 alleviated the overdraft by supplying surface water for irrigation and potable uses.[8] The groundwater basin in Yolo County is divided into six subbasins: Capay Valley, Buckeye Creek, Dunnigan Hills, West Yolo, East Yolo, and Sacramento River, as shown in Figure IV.K-1.[9]

[5] Jones and Stokes, 2005. op. cit.

[6] Ibid.

[7] Department of Water Resources, 2004. California's Groundwater Bulletin 118. Sacramento River Hydrologic Region, Sacramento Valley Groundwater Basin, Yolo Subbasin. Last update February 27, 2004. Accessed 30 November 2008 at: www.groundwater.water.ca.gov/bulletin118/basin_desc/basins_t-y.cfm.

[8] Ibid.

[9] Jones and Stokes, 2005. op. cit.

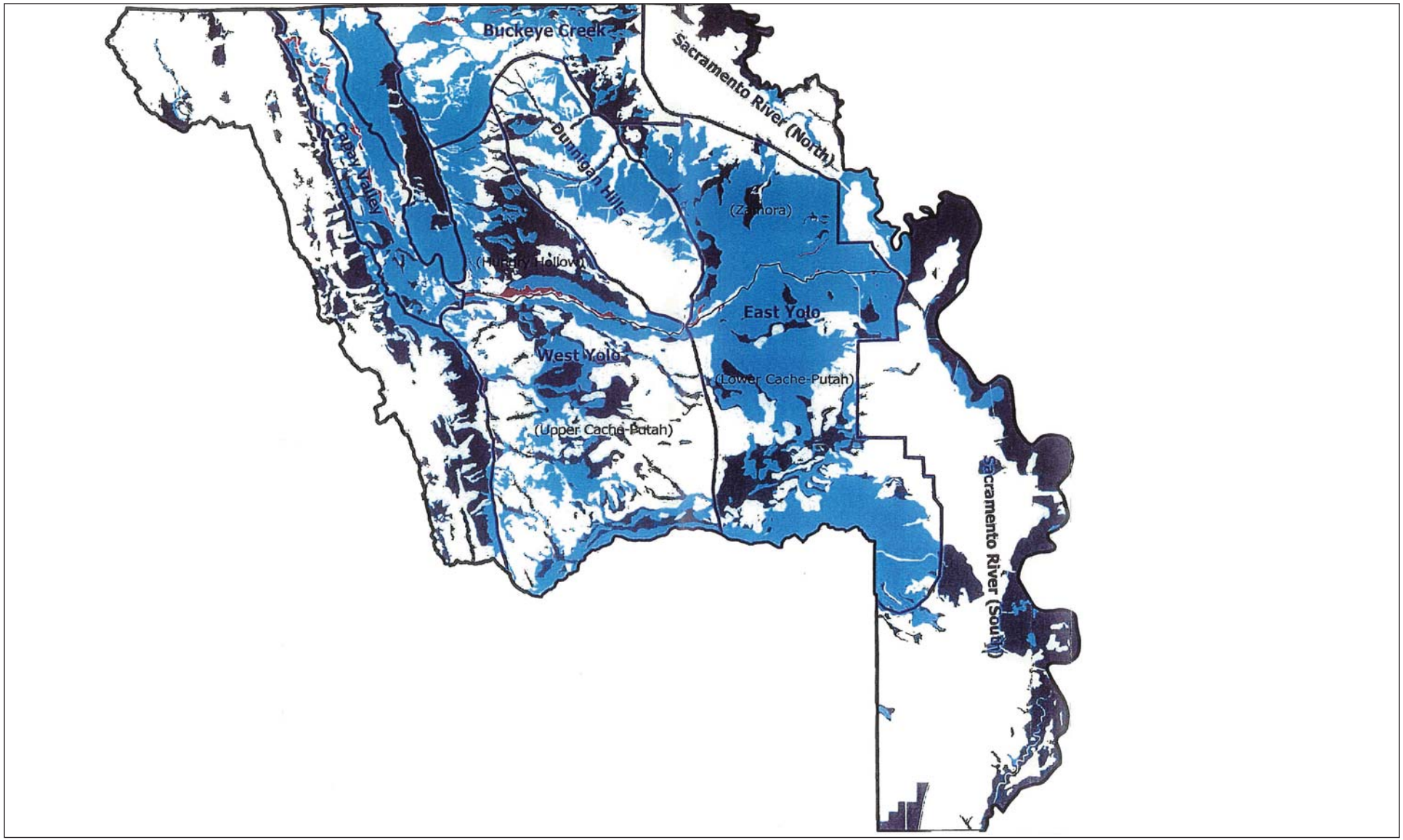

FIGURE IV.K-1

Yolo County 2030 Countywide General Plan EIR

Relative Soil Infiltration Properties and Delineation of Groundwater Subbasins, Yolo County

SOURCE: JONES & STOKES, 2005

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e. Hydrology and Surface Water Resources. Within the unincorporated County, there is approximately 7,300 acres covered in surface water.[10] The surface water in Yolo County generally drains from the west to east, eventually being received by the Yolo Bypass. Four major watersheds and associated drainages are located in Yolo County: the Sacramento River, Cache Creek, Putah Creek, and Willow Slough watersheds. Surface water supplies primarily originate from the Cache Creek and Putah Creek watersheds, and the Sacramento River (Figure IV.K-2). In addition, many sloughs and drainage ditches cross the eastern half of the County. These sloughs and ditches convey water to irrigate agricultural fields, manage floods, or transport water supplies to users within the County and downstream. [11] Figure IV.K-3 shows the major waterways in the County, and the major surface water features are described below.

(1) Sacramento River. The Sacramento River forms the County's eastern border and is California's largest river. Unlike the watersheds that drain from the west to the east through Yolo County, much of the water in the Sacramento River watershed comes from the melting snowpack in the Sierra Nevada to the east, which supports flow throughout the spring and early summer. The Sacramento watershed contains Lake Shasta and Lake Oroville, the two largest reservoirs in California, which are major features of the Federal Central Valley Project and State Water Project, respectively. The Sacramento River conveys two thirds of California's water via the Central Valley and State Water Projects.[12]

(2) Cache Creek. Cache Creek is a large stream that traverses Lake, Colusa, and Yolo counties. The Cache Creek Dam (also listed as Clear Lake Impound)[13] on the South Fork of Cache Creek, five miles downstream from Clear Lake and approximately 50 miles upstream of the Capay Diversion Dam, was built to increase Clear Lake's capacity and to regulate outflow for downstream users of Cache Creek water. In 1975, the YCFCWCD completed construction of the Indian Valley Dam and Reservoir Project on North Fork Cache Creek to provide additional water supply for Yolo County. The dam and reservoir are located on the North Fork Cache Creek approximately 54 miles upstream of the Capay Diversion Dam.[14] The Capay Diversion Dam diverts water for distribution throughout Yolo County using a 175 mile network of canals. Cache Creek is a tributary of the Yolo Bypass, however flow in the creek now only reaches the Bypass during extremely wet years due to damming and diversion of the stream's water.

(3) Putah Creek. Putah Creek is a large stream with its headwaters in the Mayacamas Mountains, a part of the Coast Range in Lake and Napa counties. The creek originates from springs on the east side of Cobb Mountain south of the town of Cobb in southwestern Lake County. It descends eastward, eventually flowing into Lake Berryessa. Downstream of Monticello Dam (the hydroelectric dam and power plant at Lake Berryessa) on the southeastern corner of the lake, Putah Creek leaves Napa County and becomes the boundary between Yolo County and Solano County. The creek continues to flow toward the east and eventually flows into the Yolo Bypass.

[10] Ibid.

[11] ibid

[12] Ibid.

[13] DWR, 1988. Dams within Jurisdiction of the State of California, Bulletin 17-88, October.

[14] Jones and Stokes, 2005. op. cit.

(4) Willow Slough. The Willow Slough watershed contains 131,000 acres running from the Blue Ridge in the coast range eastward then northeast toward the Sacramento River and Yolo Bypass. The majority of the Willow Slough watershed lies on the valley floor, and is characterized by the flat areas of the slough's natural broad floodplain. The Willow Slough Bypass was constructed to divert up to 6,000 cubic feet per second (cfs) of floodwaters through a shorter path to the Yolo Bypass. [15]

(5) Water Distribution Channels. The Yolo County Flood Control and Water Conservation District (District), a state-designated special district that is not affiliated with the County, maintains over 175 miles of irrigation and drainage facilities, the majority of the canals in the County. The District's network of canals transport water from the Capay Diversion on Cache Creek to irrigated lands in their service area. In addition, private landowners construct and maintain ditches for conveying irrigation water on their lands. These conveyances range from major engineered canals to relatively small ditches. Many of the channels used to convey irrigation water in the summer also convey rainfall runoff in the winter, including the lower end of Putah Creek and several sloughs in the west central part of the County. In most cases, flow control structures are removed after the irrigation season and before the onset of winter rains to maximize channel capacity for high flows. This includes, for example, removing the flashboards at check dams, deflating the inflatable Capay Dam, and removing earth impoundments. Even with implementation of these measures to increase winter flow capacity, flooding along some of these canals and channels is fairly common.[16]

(6) Yolo Bypass. The Yolo Bypass is a 59,000-acre leveed floodplain constructed during 1917-1924 as part of the Sacramento River Flood Control Project. The Bypass can convey a maximum of 377,000 cfs at the Fremont Weir and 490,000 cfs south of Putah Creek.[17] The Yolo Bypass carries flood flows generated by runoff from the entire Sacramento River watershed, including the Sacramento, Feather, and American Rivers and their associated tributary watersheds. Tributaries specific to the Bypass include Cache and Putah Creeks, Willow Slough, and the Knights Landing Ridge Cut from the Colusa Basin. The Bypass consists of farmed land and lands dedicated to publicly and privately managed wetlands.[18]

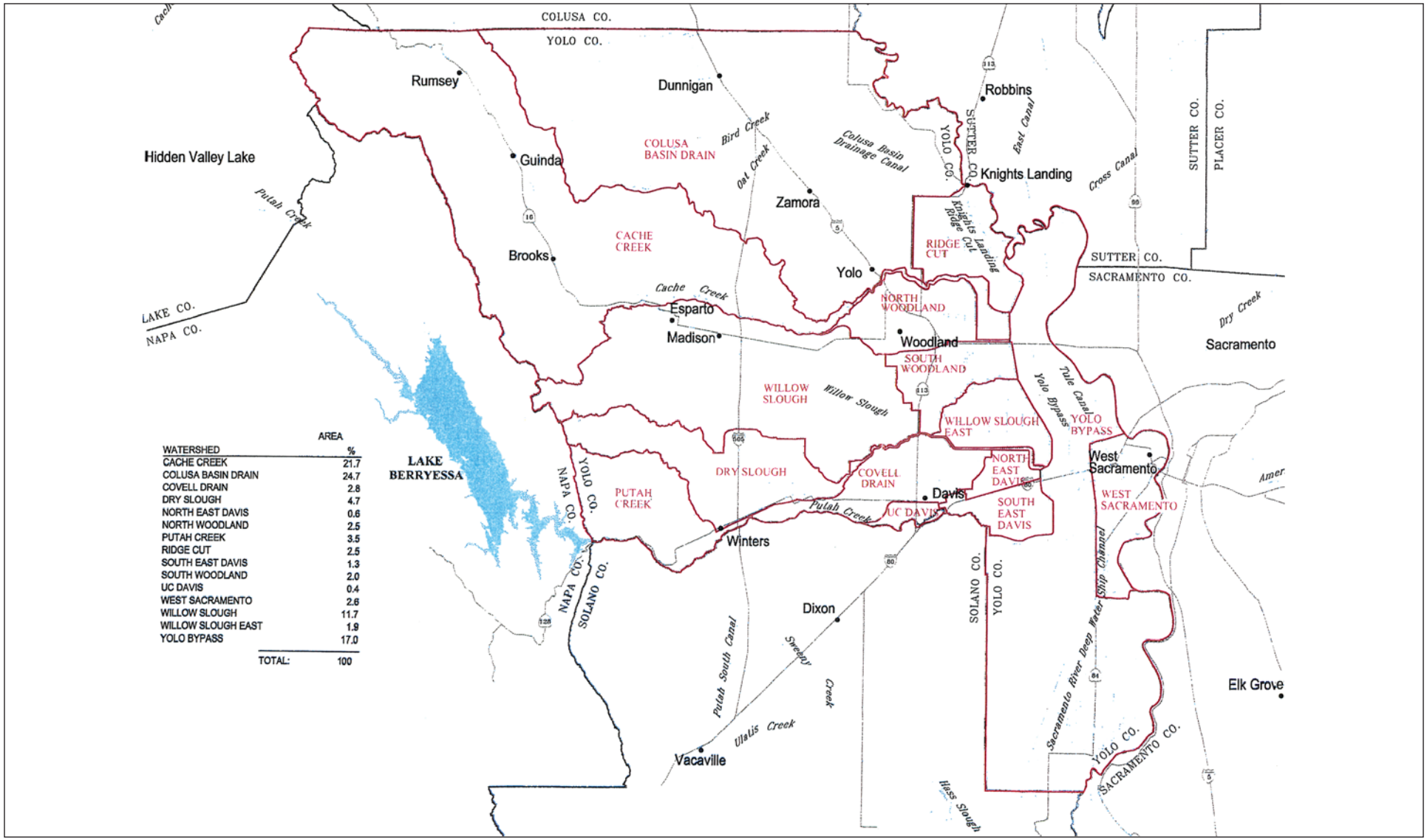
e. Flooding. Much of Yolo County is a natural floodplain, and there are five primary watersheds with the potential for flooding: Cache Creek Basin/Woodland; the Sacramento River corridor (including the Yolo Bypass, Clarksburg, and Knights Landing); Willow Slough, (including Madison and Esparto), Colusa Basin Drain (including Knights Landing) and Dry Slough (including Winters, Yolo County Airport, D-Q University, and Davis). Areas within a designated 100-year floodplain in the County are residential and agricultural areas along Cache Creek, the Colusa Basin Drainage Canal, the Sacramento River, and the majority of the lower eastern portion of the County (see Figure IV.K-3). The 500-year floodplain is most extensive north of the City of Woodland, the region west of the City of Davis and east of the Yolo Bypass, and through the City of West Sacramento south to Clarksburg.

[15] ibid.

[16] Ibid.

[17] WRA, 2007. op. cit.

[18] Jones & Stokes, 2005. op. cit.



WATERSHED	AREA %
CACHE CREEK	21.7
COLUSA BASIN DRAIN	24.7
COVELL DRAIN	2.8
DRY SLOUGH	4.7
NORTH EAST DAVIS	0.6
NORTH WOODLAND	2.5
PUTAH CREEK	3.5
RIDGE CUT	2.5
SOUTH EAST DAVIS	1.3
SOUTH WOODLAND	2.0
UC DAVIS	0.4
WEST SACRAMENTO	2.6
WILLOW SLOUGH	11.7
WILLOW SLOUGH EAST	1.9
YOLO BYPASS	17.0
TOTAL:	100

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Yolo County Principal Watersheds

Watershed or Subwatershed Boundary

Major Roads

N

0 2.5 5

MILES

FIGURE IV.K-2

Yolo County 2030 Countywide General Plan EIR

Watersheds

SOURCE: JONES & STOKES, 2005

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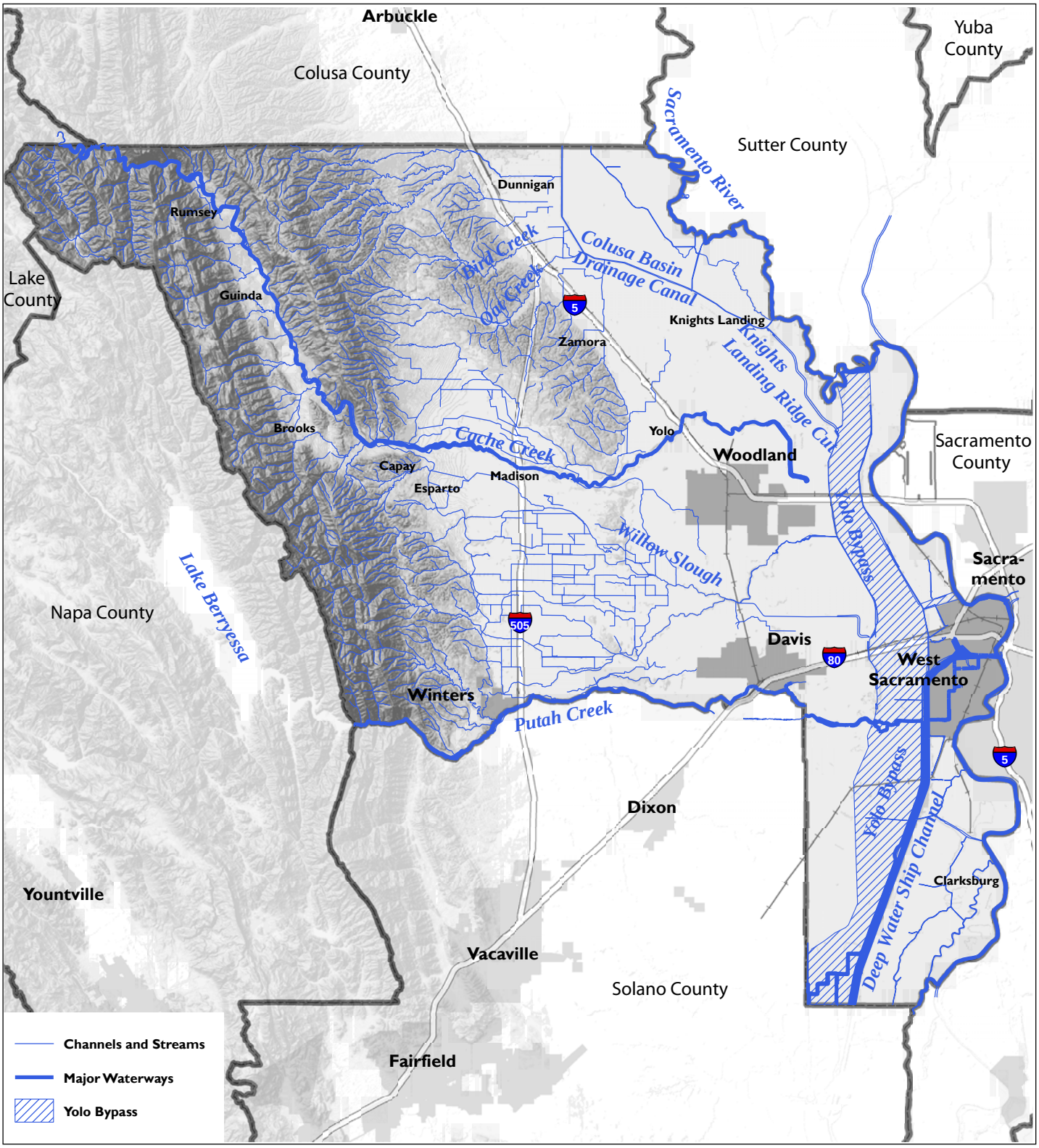

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FIGURE IV.K-3

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Yolo County 2030 Countywide General Plan EIR
Major Water Ways

SOURCE: COUNTY OF YOLO, 2009.

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On December 19, 2008, the Federal Emergency Management Agency (FEMA) released preliminary drafts of revised Flood Insurance Rate Maps (FIRM) for Yolo County. The revised maps incorporate new standards which assume that any levee where there is not evidence to support federal certification (indicating structural integrity) will fail (i.e., the non-certified levees are considered to provide no flood protection). As a result, large areas of Yolo County, primarily located along the Sacramento River and lower Willow Slough, are proposed to be re-designated as part of the 100-year floodplain. This includes the towns of Clarksburg, Knights Landing, and Yolo, as well as the eastern portion of El Macero.

In December, 2008, the Department of Water Resources released their preliminary Best Available Maps (BAM) for the Sacramento-San Joaquin Valley Floodplain. The maps show the extent of 100-year and 200-year floodplains, in accordance with the requirements of Senate Bill 5 (California Senate Bill No. 5 (2007), Section 9 which adds Part 6 to Division 5 of the California Water Code Section 9610-9616). The maps are similar in their analysis regarding the boundaries of the 100-year floodplain to the draft revised FIRMs, although there are some differences between the two in specific areas. In addition, FIRMs do not provide any description of the 200-year floodplain.

(1) Sacramento River Flood Management. The California Flood Control Act of 1917, authorized construction of the Sacramento River Flood Control Project. The U.S. Army Corps of Engineers, the State Board of Reclamation, and local reclamation districts constructed a series of weirs, bypasses, levees, and reservoirs by 1958. Figure IV.K-5 presents a schematic of the Sacramento Valley Flood Control System. Federal flood control levees border the Sacramento River along the entire length of the Yolo County reach. Although none of these levees have failed in recent floods, the river channel conveys only 18 percent of the flow generated by a 100-year flood event in the Sacramento Valley. The remaining 82 percent of the flow spills into the Yolo Bypass, located west of the Sacramento River, which conveys the water to the Delta at Rio Vista.[19]

In response to repeated catastrophic flooding of the Sacramento River, the Sacramento Area Flood Control Agency (SAFCA) was formed in 1989. The City of Sacramento, the County of Sacramento, the County of Sutter, the American River Flood Control District and Reclamation District 1000 created SAFCA through a Joint Exercise of Powers Agreement. The California Legislature has given SAFCA broad authority to finance flood control projects via development fees and annual assessments imposed on benefiting properties in three separate districts in Sacramento and Sutter Counties east of the Sacramento River. Currently planned activities in Yolo County by SAFCA consist of acquiring agricultural conservation easements in the northern portion of the Elkhorn area.[20]

[19] WRA 2007, op. cit.

[20] Economics and Planning Systems, 2008. *Final Report, Sacramento Area Flood Control Agency Development Fee Program,* prepared for the Sacramento Area Flood Control Agency, 5 May.

(2) Cache Creek. The lower portion of the Cache Creek system is an integral component of the Sacramento River Flood Control System. The flow capacity in the lower reach of Cache Creek is approximately 36,000 cfs. The Cache Creek Settling Basin, located east of the City of Woodland, is essential to preserving the integrity of the flood control function of the Yolo Bypass (a flood bypass system that protects Sacramento and other California Central Valley communities from flooding). The Settling Basin traps a large portion of the sediment load from Cache Creek that otherwise would be deposited in the Yolo Bypass, and reduce its flood carrying capacity. A levee system extends upstream from the Settling Basin to the communities of Yolo and Woodland. The current design capacity of the levee is 30,000 cfs, while modeled 100-year flows at Capay are estimated to be 61,000 cfs.[21]

(3) Putah Creek. Historically, Putah Creek was a flood-prone system. The construction of the Monticello Dam at Lake Berryessa began in 1953 and was followed by construction of nine miles of levees along the lower Putah Creek channel. These improvements substantially reduced the likelihood of overbank flooding. Under current conditions, analysis and modeling of flood flows indicates that the 100-year discharge from Lake Berryessa (when full) into Putah Creek would flow at 32,200 cfs in the vicinity of the community of Winters. By contrast, there were three floods recorded before construction of the dam that peaked from 67,200 to 81,000 cfs in that same area.[22]

(4) Willow Slough. The Willow Slough floodplain area encompasses the central region of the County, including parts of the towns of Esparto and Madison. Repetitive flood events have generated damage, most of which has occurred in Madison and to the south along Chickahominy Slough in West Plainfield area, mostly to areas developed more than 30 years ago. As a consequence, flood management has been the focus of many studies. Rural roads and housing have been constructed in the flat areas of the Willow Slough watershed that include the slough's natural floodplain. County roads often flood during large storms. As roads are repaired and the land is reworked for row crops and grazing, the drainage patterns are altered and the extent of flooding changes. In some cases, irrigation ditches in the area are poorly maintained, and can contribute to flood water finding new drainage paths during large storms. These altered drainage patterns can cause increased damage to structures and agricultural fields.[23]

(5) Levees. Yolo County has approximately 215 miles of levees managed by various agencies including the County, 13 reclamation districts, one levee district, one drainage district, and the California Department of Water Resources. These levees provide flood protection to West Sacramento, Woodland, Knights Landing, Clarksburg, Davis and important agricultural lands. In addition, the Yolo Bypass, the Sacramento Weir, and the Fremont Weir help protect Sacramento and other urban communities in the region from flooding by the Sacramento River.[24]

(6) Dams. To the west of Yolo County are the Indian Valley Dam and Reservoir, the Cache Creek Dam at Clear Lake, and the Monticello Dam on Putah Creek at Lake Berryessa (see IV.K-6). If any of these dams were to fail, or dams to north or east of Yolo County along the Sacramento,

[21] Jones and Stokes, 2005. op. cit.

[22] Ibid.

[23] Ibid.

[24] County of Yolo, 2008. Draft 2030 Countywide General Plan.

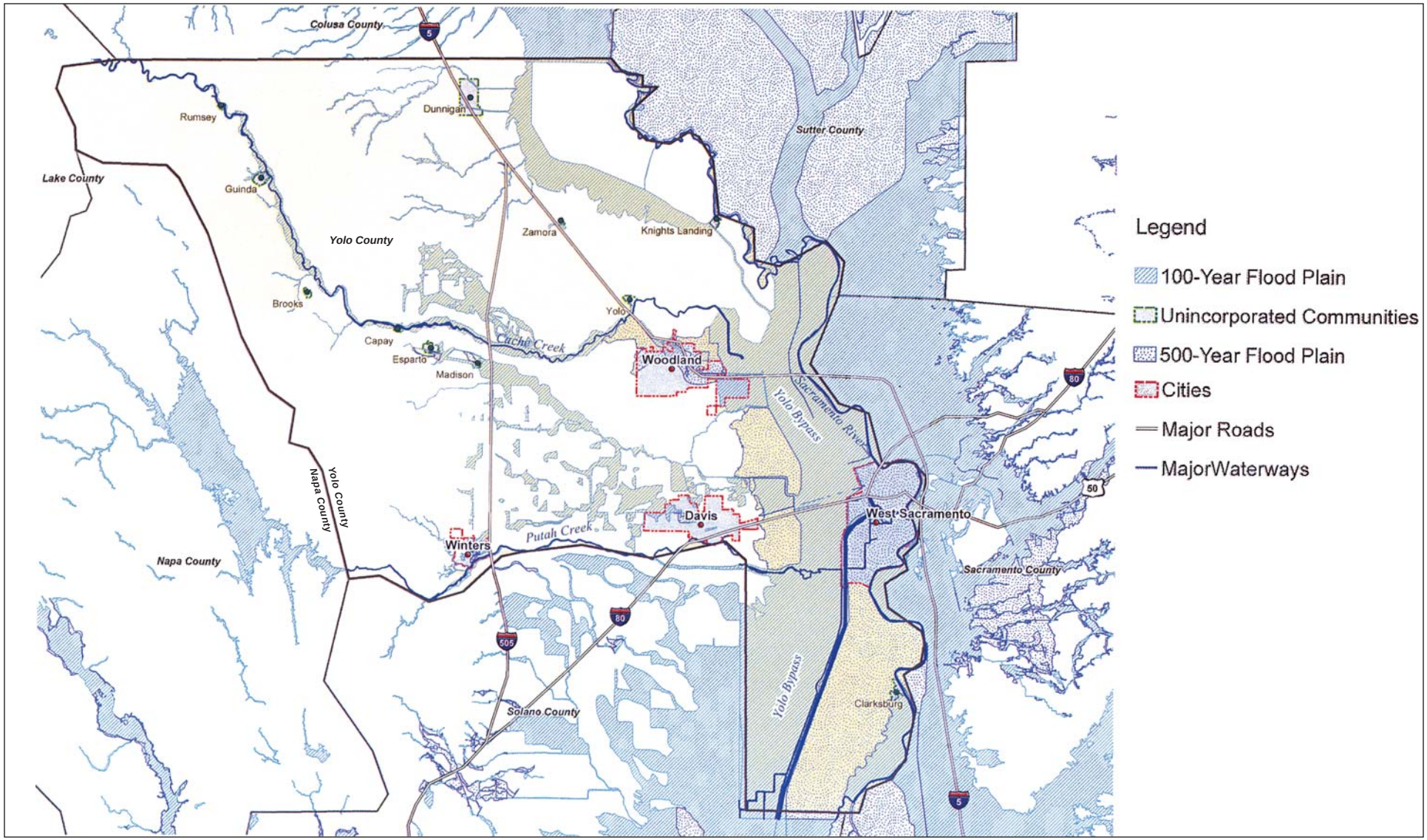

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FIGURE IV.K-4

Yolo County 2030 Countywide General Plan EIR

100- and 200-Year Flood Zones

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SOURCE: JONES & STOKES, 2005

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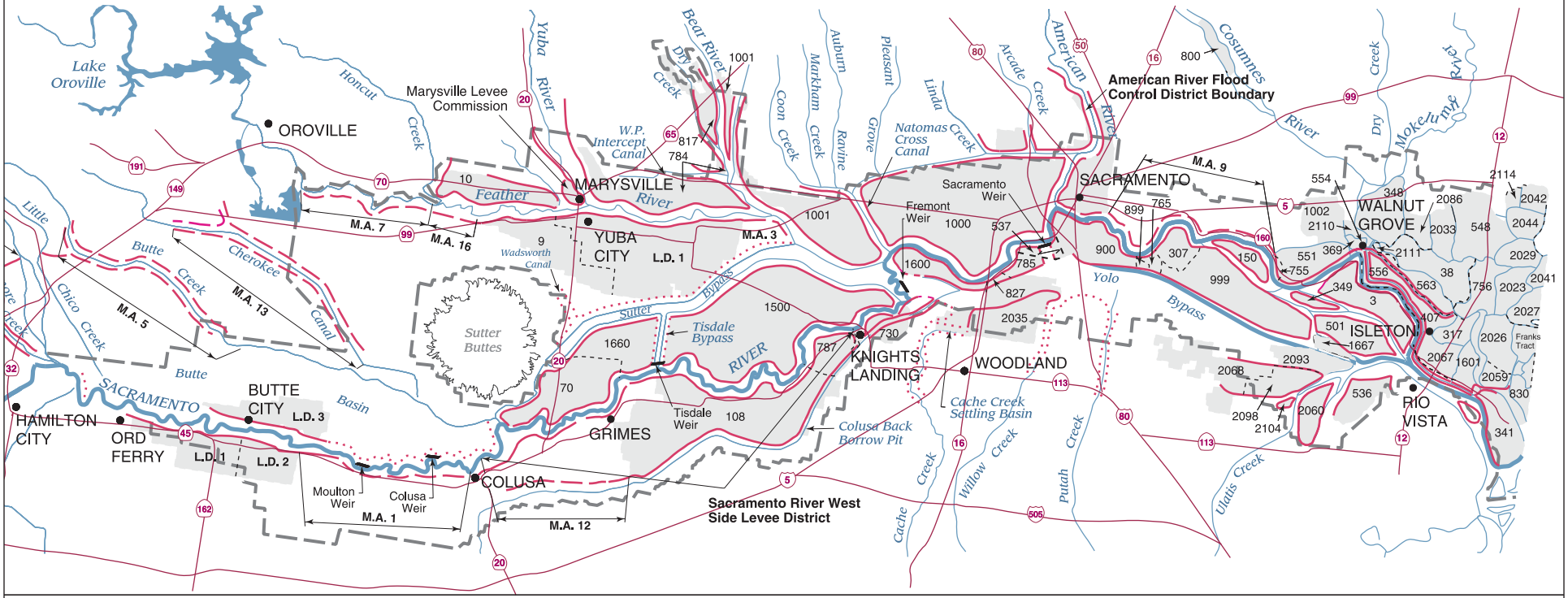
Flood Control Projects and Agencies



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N

NOT TO SCALE

R.D. 20 — Reclamation and Levee Districts

Project Levees Maintained by Department of Water Resources, Sec. 12878 to Sec. 1278.45 of the Water Code

Project Levees Maintained by Department of Water Resources, Sec. 8361 of the Water Code

Project Levees Maintained by Reclamation, Levee, and Drainage Districts and Municipalities

Boundary of Sacramento-San Joaquin Drainage District

FIGURE IV.K-5

Yolo County 2030 Countywide General Plan EIR

Flood Control System

SOURCE: CALIFORNIA DEPARTMENT OF WATER RESOURCES, 2008.

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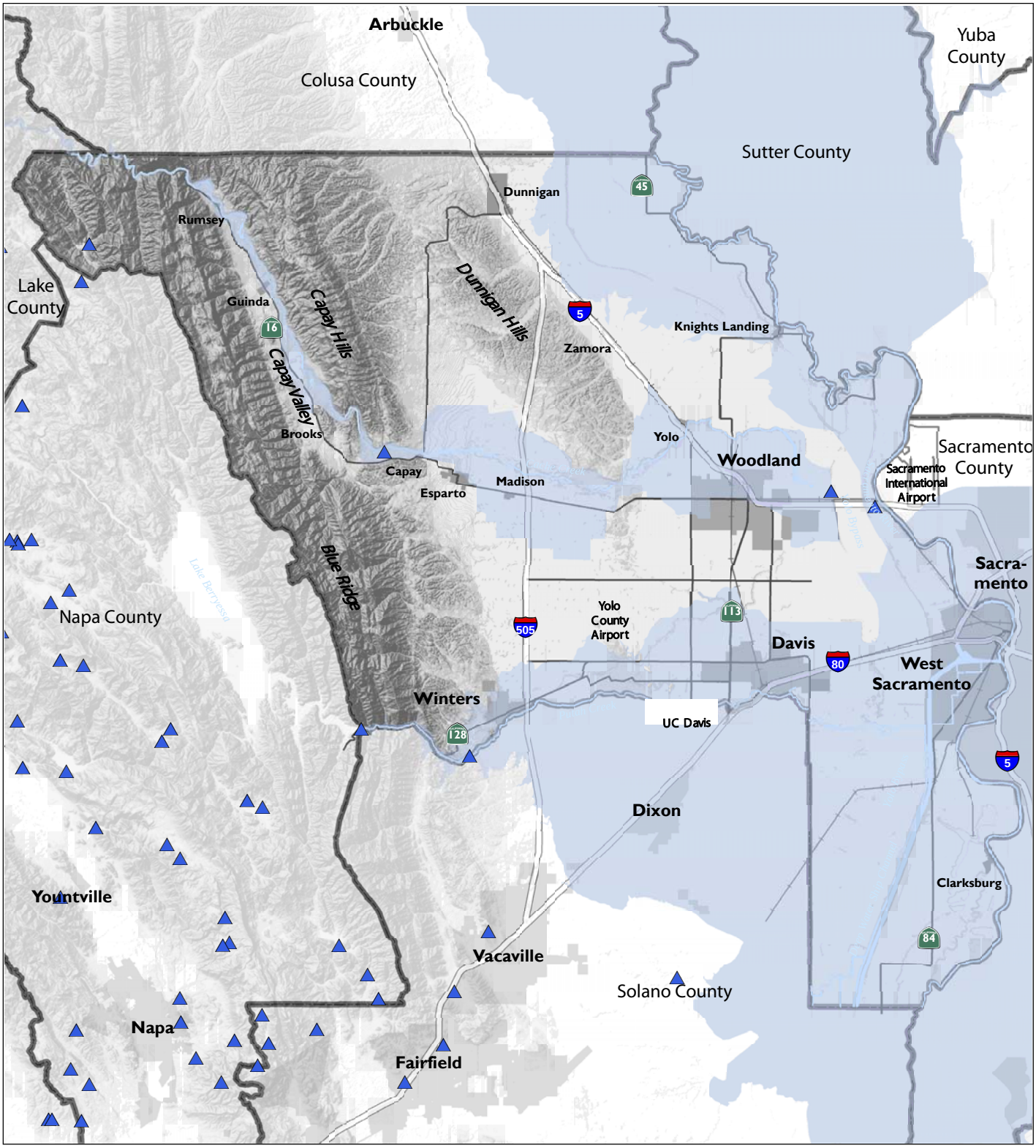

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FIGURE IV.K-6

Yolo County 2030 Countywide General Plan EIR

Dam Inundation Zones

SOURCE: CALIFORNIA OFFICE OF EMERGENCY SERVICES, 2000; COUNTY OF YOLO, 2008.

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Feather, or American rivers failed, flooding would occur in Yolo County. If the dam at the Indian Valley Reservoir were to fail, floodwaters would flow south and east through the Cache Creek watershed to the Yolo Bypass and Sacramento River. In the event of a failure of the Cache Creek Dam, the Cache Creek Settling Basin would slow the floodwaters, however, flooding in developed areas of Woodland would likely occur near Cache Creek. Failure of the Monticello Dam on Putah Creek would potentially cause more property damage than a dam failure on Cache Creek because the cities of Winters and Davis could be inundated. Failure of dams in the Sacramento River watershed (Sacramento, Feather and American rivers) would not directly inundate the densely populated communities within the County, but would potentially damage farmland in eastern Yolo County.[25]

g. Water Quality. The quality of surface water and groundwater is affected by past and current land uses within the watersheds as well as by the composition of geologic materials in the vicinity. The water quality of the major hydrologic features in the County, including groundwater, are described below.

(1) Groundwater Quality. Groundwater in the Yolo subbasin of the Sacramento Valley basin is characterized by presence of sodium magnesium, calcium magnesium, or magnesium bicarbonate. The groundwater quality is generally good for agricultural and municipal uses, though it is "hard" to "very hard" overall.[26] Elevated concentrations of selenium, nitrate, and boron have been detected in groundwater along Cache Creek and the Cache Creek Settling Basin area, while in the East Yolo subbasin beneath the City of Davis and University of California, average concentrations of arsenic in the Tehama formation below 600 feet bgs are 0.04 mg/l. This value exceeds the U.S. EPA maximum contaminant level (MCL) of 0.01 mg/l. The intrusion of saline or brackish water into fresh water aquifer systems is generally associated with coastal areas. However, the intrusion of saline or brackish water from the Delta area may occur in the Sacramento Valley, including eastern Yolo County if overdrafting of deep wells lowers the water levels in the groundwater basin. If salt water intrusion were to occur on a widespread basis in this area, the local water supply would be adversely affected.

(2) Sacramento River–Yolo Bypass and Associated Canals. The Sacramento River is listed by the U.S. EPA under Section 303(d) of the Clean Water Act as being impaired by unknown toxicity starting from Red Bluff, by mercury starting at Hamilton City, and by diazinon starting at Knights Landing, all extending to the Sacramento River–San Joaquin River Delta.[27] In 2003, the Water Board adopted a TMDL for discharges of diazinon to the Sacramento and Feather Rivers.[28] TMDLs for mercury and toxicity are under development. Pesticides from agricultural use are also contaminants of concern to water quality of the Sacramento River. The concentration of chemical contaminants within the Yolo Bypass is influenced directly by discharges from Cache Creek and the Knights Landing Ridge Cut. High concentrations of nutrients and contaminants, perhaps from agricultural fields and abandoned mines, were detected at creek discharge points where spring rains

[25] Jones and Stokes, 2005. op. cit.

[26] Hard water is the type of water that has a high mineral content (in contrast with soft water) which consist primarily of calcium, magnesium, metal cation, and other dissolved compounds.

[27] USEPA and SWRCB, 2006. op. cit.

[28] USEPA and SWRCB, 2006b. Proposed 2006 CWA Section 303(d) List of Water Quality Limited Segments Being Addressed by USEPA Approved TMDLs, 25 October 25.

flush accumulated nutrients to the tidal area of the Sacramento River. In addition, the City of Woodland discharges its wastewater effluent to the Tule Canal, which flows to the Yolo Bypass.

(3) Clear Lake and Cache Creek. Erosion and groundwater discharge from marine sediments and marine sedimentary rocks have resulted in release of high boron and mercury concentrations to the Cache Creek watershed. The Yolo County Flood Control and Water Conservation District monitors boron and mercury at seven locations throughout the watershed. Boron concentrations typically range from 0.7 mg/l in the spring to 2.2 mg/l in the winter, and the average concentration during the irrigation season is less than 1.0 mg/l. Many fruit and nut tree crops are sensitive to boron concentrations as low as 0.5-1.0 mg/l, although some of these crops are successfully grown in the Capay Valley.

Clear Lake and Cache Creek are both listed as impaired for mercury on the 303(d) list. These drainage basins are an identified source of mercury and contribute a substantial portion of total mercury load delivered to the Sacramento-San Joaquin Delta. Mercury contamination originates from past mining activities, geothermal springs, erosion of naturally occurring mercury-containing soils, and atmospheric deposition near Clear Lake and at tributaries to Cache Creek. Consequently, high concentrations of mercury have been detected during high flows in the Cache Creek channel and the Yolo Bypass. Numeric targets for methylmercury, a particularly toxic form of mercury that can bioaccumulate in fish and other organisms, have been established in an effort to protect the health of humans and wildlife from eating fish from Clear Lake and its drainage basin. A mercury Total Maximum Daily Loads (TMDL) plan was approved for Clear Lake in 2003 and for Cache Creek in 2005. The mercury TMDLs for Clear Lake and its drainage basin include an implementation plan that presents a strategy and proposes actions to reach established numeric targets to reduce the mercury load. In addition, Clear Lake is listed as impaired for nutrients and a TMDL for nutrients was approved in September of 2007. Cache Creek is also impaired for unknown toxicity, however, no TMDL is pending.

(4) Lake Berryessa and Lower Putah Creek. The soils and surface waters of the Putah Creek watershed contain elevated concentrations of mercury and boron. Lake Berryessa and Lower Putah Creek, downstream of Lake Solano, are listed as impaired by mercury on the U.S. EPA 303(d) list. During low flows in summer months, Putah Creek flow is dominated by effluent downstream of UCD wastewater treatment plant outfall. Lake Berryessa and Lower Putah Creek downstream of Lake Solano are also listed for mercury impairment. TMDLs for mercury in Lake Berryessa and Lower Putah Creek have not yet been established.

(5) Willow Slough. Willow Slough is not included in the CWA 303(d) list of impaired water bodies. Monitoring studies conducted by the County Department of Health Services and UCD noted invertebrate and algae impairment from unknown causes and sources. The City of Davis discharges its wastewater effluent to Willow Slough.

h. Coastal Hazards. This section describes the potential for coastal hazards in the County.

(1) Sea Level Rise. The earth has gone through several cycles of cooling and warming over recent geologic time, resulting in periods of glaciation with an associated sea level lowering, and climate warming with sea level rise. The most recent cycle of global climate change is a warming trend of the earth's atmosphere (an increase of approximately 1.8°F in the last 100 years) which has

resulted in sea level rise. Based on long-term monitoring of stationary tidal gauges around the world, it is estimated that the current background rate of sea level rise is 0.07 to 0.08 inches per year.[29] Rates of sea level rise may vary at specific locations, as local subsidence or uplift affects the relative change in sea level between land masses and the ocean. For example, in the San Francisco Bay area, the background rate of sea level rise has been estimated to be approximately 0.085 inches per year over the past 100 years.[30]

(2) Seiche. A seiche is the oscillation of a body of water at its natural period. Seiches occur most frequently in enclosed or semi-enclosed basins such as lakes, bays or harbors. They can be triggered in an otherwise still body of water by strong winds, changes in atmospheric pressure, earthquakes, tsunami or tides. Triggering forces that set off a seiche are most effective if they operate at specific frequencies relative to the size of an enclosed basin. Coastal measurements of sea level often show seiches with amplitudes of a few centimeters and periods of a few minutes due to oscillations of the local harbor, estuary, or bay, superimposed on the normal tidal changes. Because the County is generally subject to only to low to moderate levels of earthquake-induced ground-shaking, the hazard of a seiche is not considered high. However, in the event that significant groundshaking does occur, the County of Yolo Emergency Plan has identified the following primary areas in the County in which a seiche could occur: Lake Berryessa in Napa County, where the seiche could occur along Putah Creek; the Sacramento River, which could affect bordering communities including Knights Landing and Clarksburg, the Yolo Bypass when water is present in the bypass; and Lake Washington Harbor, the Port of West Sacramento (both located in the City of West Sacramento) and the Deep Water Ship Channel from which Clarksburg could be affected. Because Lake Berryessa is closest of the four areas to active faults, it is perhaps the most likely of the four to experience a seiche. Based on a review of the available literature for this DEIR, no identified or measurable seiches have been documented in Yolo County surface water bodies.

(3) Tsunami. Tsunamis are long period water waves caused by underwater seismic events, volcanic eruptions, or undersea landslides. Areas that are highly susceptible to tsunami inundation tend to be low-lying coastal areas, such as tidal flats, marshlands, and former bay margins that have been artificially filled. Inundation or damage caused by a tsunami may disrupt highway traffic in those low-lying areas. Tsunami entering San Francisco Bay through the relatively narrow Golden Gate would tend to dissipate as the energy of the wave spreads out as the Bay becomes wider and shallower.[31] Predicted wave run-up at Carquinez Straits from the 100-year tsunami event is estimated to be 3.3 feet.[32] Tsunami wave run-up elevations for the Sacramento River in the Yolo County area have not been quantified, but would be substantially lower that those identified for the Carquinez Strait and would not be expected to represent a hazard for Yolo County.

[29] Titus, James G. and Narayanan, Vijay, 1995. *The Probability of Sea Level Rise,* U.S. Environmental Protection Agency, Washington, D.C., 186 pp. EPA 230-R95-008. October.

[30] National Oceanic & Atmospheric Administration (NOAA), 2007. Mean Sea Level Trend (station) 9414290 San Francisco, California, accessed 6/12/07 at: tidesandcurrents.noaa.gov/sltrends/sltrends_station.shtml?stnid=9414290

[31] Houston, J. R., Garcia, A.W., 1975. Type 16 Flood Insurance Study: *Tsunami Predictions for Monterey and San Francisco Bays and Puget Sound*, Technical Report H-75-17. November.

[32] Ritter, J., Dupre, W., 1972. *Maps Showing Areas of Potential Inundation of Tsunamis in the San Francisco Bay Region, California*, Department of the Interior, U.S. Geological Survey, Misc. Field Studies, MF480.

(4) Extreme High Tide. Extreme high tides in San Francisco Bay result from the combined effects of astronomical high tides (related to the lunar cycle) and other factors, including winds, barometric pressure, ocean temperatures, and freshwater runoff. In California, the highest astronomical tides occur in the summer and winter, and therefore extreme high tides are most likely to occur during these times. Based on the 129-year record of daily high tide, the U.S. Army Corps of Engineers has developed an estimated 100-year high tide elevation for various locations in the San Francisco Bay (an extreme high tide with a probability of occurrence every 100 years). The elevation of the estimated 100-year tide at Port Chicago (approximately 25 miles southwest of the 'panhandle' of Yolo County) is approximately 6.5 feet.[33] It is unlikely that, with the attenuating effects of the intervening river and delta system, the 1-percent (100-year) tide would have a significant environmental impact on tidally influenced areas of Yolo County.

i. Regulatory Framework. Responsibility for water resource and flood protection in Yolo County is distributed among many agencies at various levels of government. At the federal level the primary agencies are the U.S. Environmental Protection Agency (EPA), FEMA, Army Corps of Engineers (USACE), and the Bureau of Reclamation. At the state level the primary agencies are Department of Water Resources (DWR), the State Water Resources Control Board (State Water Board), the Water Board, and the Central Valley Flood Protection Board (CVFPB). At the local level agencies include: the County of Yolo and each of its four cities, the YCFCWCD, 15 local reclamation districts, the Knights Landing Ridge Drainage District, the Madison Storm Drainage Maintenance District, various County Service Areas, and the Sacramento River West Side Levee District.

(1) Federal. Federal regulations are described below.

Federal Clean Water Act of 1972. The Clean Water Act (CWA) is the primary federal law that protects the quality of the nation's surface waters, including lakes, rivers, and coastal wetlands and is administered by the U.S. EPA. It operates on the principle that all discharges into the nation's waters are unlawful unless specifically authorized by a permit; permit review is the primary regulatory tool of the CWA.[34] The following sections of the CWA are particularly relevant to the build-out of the Draft General Plan.

- Section 303 — Water Quality Standards and Implementation Plans
- Section 401 — Wetlands Certification
- Section 402 — National Pollutant Discharge Elimination System
- Section 404 — U.S. Army Corps of Engineers fill or dredge discharge Permits

With the exception of the 404 permits, The EPA has delegated its authority to implement and enforce the provisions of these sections to the individual states. In California, the provisions are enforced by nine Regional Water Quality Control Boards under the auspices of the State Water Board. Additional information on the requirements imposed by CWA Sections 303, 401, and 402 is provided in "Porter-Cologne Act and State Implementation of Clean Water Act Requirements" below.

[33] United States Army Corps of Engineers (COE), 1984. *San Francisco Bay Tidal Stage vs. Frequency Study*.

[34] Copeland, Claudia, 2008. *Clean Water Act: A Summary of the Law*, Congressional Research Service.

CWA Section 402—The National Pollutant Discharge Elimination System (NPDES) Program. The CWA Section 402, enacted as an amendment to the original act in 1972, regulates construction-, industrial-, and municipal-related stormwater discharges to surface waters through the NPDES program. The NPDES program provides for general permits (those that cover a number of similar or related activities) and individual permits (those issued on a project-by-project basis). In California, the State Water Board is authorized by EPA to oversee the NPDES program through the Regional Water Boards via the Porter-Cologne Act, as described above.

Stormwater runoff can entrain pollutants from a variety of sources. Many types of human activity can result in discharge of pollutants to the surface, including new construction projects, industrial activity, agriculture and urbanization. Within the NPDES program, there are several sub-programs that could apply to projects and activities in Yolo County: the Construction Program, the Industrial Program, and the Municipal Program. NPDES regulations generally exclude agricultural programs as described below.

Construction General Permit Program. Projects disturbing more than 1.0 acre of land during construction are required to file a Notice of Intent (NOI) with the Water Board to be covered under the state NPDES Construction General Permit for Discharges of Storm Water associated with Construction Activity (NPDES General Permit No. CAS000002). The project proponent must propose control measures that are consistent with the Construction General Permit. A Storm Water Pollution Prevention Plan (SWPPP) must be developed and implemented for each site covered by the Construction General Permit. A SWPPP must include Best Management Practices (BMPs) designed to reduce potential impacts to surface water quality through the construction period. The Construction Program is largely "self-implemented" (i.e., typically no direct oversight is provided by the Water Board).

Industrial General Permit Program. The control of runoff from industrial sources and associated pollutants is regulated in California by the State Board under the statewide General Permit for Stormwater Discharges associated with Industrial Activities. The Industrial General Permit provides the requirements for compliance of certain industries with the NPDES program. A wide range of industries are covered under the Industrial General Permit, including mining operations, lumber and wood products facilities, petroleum refining, metal industries, and some agricultural product facilities, such as dairies. If new industrial activities were to be developed under the proposed project, these industries would be required to comply with the requirements of the Industrial General Permit, which include preparation and implementation of a SWPPP, monitoring, and annual reporting.

Municipal Program. The State Board regulates stormwater discharges from municipal storm sewer systems (MS4s discharges) by the General Permit for Discharges of Storm Water From Small Municipal Separate Storm Sewer Systems program. This permit was issued in two phases. Under Phase I, which started in 1990, the Water Boards issued NPDES stormwater permits for medium (serving between 100,000 and 250,000 people) and large (serving 250,000 people) municipalities. There are no medium or large MS4s in Yolo County. Phase II covered small municipalities, including non-traditional MS4s, which are governmental facilities such as military bases, public campuses, and prison and hospital complexes. Woodland, Davis, Yolo, UC Davis, and West Sacramento are each covered under a Phase II MS4 General Permit. Yolo County was required under the NPDES MS4 program to implement a Water Board approved Storm Water Management Plan.

A requirement of the Phase II General Permit is that small MS4s develop measures to limit peak stormwater runoff discharge rates from new development. Specifically, post-development peak storm water runoff discharge rates shall not exceed the estimated pre-development rate for developments where the increased peak stormwater discharge rate will result in increased potential for downstream erosion, also referred to as hydromodification.

Agricultural Programs. The NPDES regulations exclude agricultural irrigation and agricultural stormwater runoff from the required permit coverage under the *Conditional Waivers of Waste Discharge Requirements for Discharges from Irrigated Lands* program. The Water Board has adopted the Irrigated Lands Conditional Waivers program to provide a way for agricultural dischargers to comply with the California Water Code. The Conditional Waivers apply to discharges from irrigated lands, including "tailwater," to surface waters of the State as a result of irrigation activities and stormwater runoff, and certain water district operations. A discharge to surface water subject to the Conditional Waiver is one that could directly or indirectly reach surface waters of the State, which include natural streams, constructed agricultural drains, agriculturally dominated waterways, and other non-stream tributaries, or to other waters which may be hydrologically connected to such waters of the State. To qualify for the conditional waiver, the discharger is required to meet certain conditions, including, but not limited to: 1) implement management practices to protect water quality; 2) comply with water quality standards; 3) conduct water quality monitoring, or join a Coalition Group that conducts monitoring; 4) prevent pollution of surface water; 5) avoid nuisance conditions, such as odors; and 6) pay applicable fees.

The NPDES Conditional Waiver program is not available to certain classes of agricultural producers; for instance, discharges from concentrated animal feeding operations, concentrated aquatic animal production facilities, dairies, and silviculture (forestry), as well as discharges from aquaculture projects do not qualify for the waiver. These uses are covered under the Industrial Permits program.

CWA Section 303—Total Maximum Daily Load Program. CWA Section 303(d) of the 1972 federal Clean Water Act requires that states develop a list of water bodies that do not meet water quality standards, establish priority rankings for waters on the list, and develop action plans, called Total Maximum Daily Loads (TMDL), to improve water quality. The list of impaired water bodies is revised periodically (typically every two years). Section 303(d) of the CWA established the TMDL process to guide and ensure the application of state water quality standards. A TMDL represents the maximum amount or concentration of a given pollutant allowable in a given water body, based on the nature of the water body and its designated beneficial uses. The State Water Board maintains a Section 303(d) list of water bodies in which water quality is impaired.[35] A water body can be impaired by more than one pollutant. Consequently, multiple TMDLs can be established for a single water body. The most urgent impairments are then prioritized for development of TMDL programs and establishment of a means to limit pollutant input.

CWA Section 401—Certification and Wetlands. Section 401(a)(1) of the CWA specifies that any applicant for a Federal license or permit (e.g., NPDES) to conduct any activity, including but not limited to the construction or operation of facilities that may result in any discharge into navigable

[35] USEPA and California State Water Resources Control Board (SWRCB), 2006a. Proposed 2006 CWA Section 303(d) List of Water Quality Limited Segments: Central Valley Regional Board, 25 October.

waters, shall provide the federal licensing or permitting agency a certification from the state in which the discharge originates or will originate, or, if appropriate, from the interstate water pollution control agency having jurisdiction over the navigable water at the point where the discharge originates or will originate, that any such discharge will comply with the applicable provisions of Sections 301, 302, 303, 306, and 307 of the CWA. Most Certifications are issued in connection with U.S. Army Corps of Engineers CWA section 404 permits for dredge and fill discharges. In California, the Water Board must certify that the project will comply with water quality standards. It is important to note that even if section 401/404 requirements do not apply, Water Board requirements under state law for waste discharges to waters of the State must be satisfied.

Safe Drinking Water Act. The Safe Drinking Water Act of 1974 is the principal federal law that protects the quality of the nation's drinking water. It empowers EPA to set drinking water standards and to oversee water providers—cities, water districts, and other agencies—that actually implement those standards. It also includes provisions for the protection of surface waters and wetlands, in support of drinking water quality. In California, EPA delegates some of its implementation authority to the California Department of Health Services (DHS) Division of Drinking Water and Environmental Management. DHS administers a wide range of regulatory programs that include components aimed at drinking water quality and safety, including permits for water well installation; potable water supply monitoring requirements for public drinking water systems and new domestic wells; regulations for septic and sewer systems; regulations governing generation, handling, and discharge/disposal of hazardous materials and wastes; and regulations for underground storage tanks (USTs) and solid waste disposal facilities. Yolo County is required to comply with all federal regulations as administered by State agencies. The supply of drinking water in the County is discussed further in Section IV.H, Utilities and Energy. Hazardous materials management is discussed in Section IV.L, Hazards and Hazardous Materials section of this EIR.

Federal Flood Insurance Program. In 1968, Congress created the National Flood Insurance Program (NFIP) in response to the rising cost of taxpayer funded disaster relief for flood victims and the increasing amount of damage caused by floods. The NFIP makes federally-backed flood insurance available for communities that agree to adopt and enforce floodplain management ordinances to reduce future flood damage. FEMA manages the NFIP. FEMA creates Flood Insurance Rate Maps (FIRMs) that designate 100-year floodplain zones and delineate flood hazard areas. A 100-year floodplain zone is the area that has a one in one hundred (1 percent) chance of being flooded in any one year based on historical data.

(2) State. Applicable hydrology and water quality State programs are described below.

Delta Protection Commission (DPC). The mission of the Delta Protection Commission is to adaptively protect, maintain, and where possible, enhance and restore the overall quality of the Delta environment consistent with the Delta Protection Act, and the Land Use and Resources Management Plan (LURMP) for the Primary Zone. The Primary Zone of the Sacramento-San Joaquin Delta includes approximately 500,000 acres of waterways, levees and farmed lands extending over portions of five counties: Solano, Yolo, Sacramento, San Joaquin and Contra Costa. The goal of the Commission is to ensure improved flood protection, and orderly, balanced conservation and development of Delta land resources including, but not limited to, agriculture, wildlife habitat, and recreational activities. The LURMP was developed in response to the Delta Protection Act of 1992 by the State Delta Protection Commission. The LURMP was adopted by the State in 1995 for the

purpose of providing direction to local jurisdictions in the Delta region on land use decisions. General Plan polices that pertain to the portion of the County located within the Delta primary zone, designated within the General Plan as Delta Protection Overlay, must be consistent with the LURMP. The LURMP was adopted by the County as a General Plan amendment on March 18, 1997 by Resolution No. 97-34.

As of December 2008, the DPC is in the process of updating the LURMD, to address a wide range of issues, including recent court decisions related to water export, studies that indicate serious problems with the health of the Delta ecosystem, concerns about the ability of levees to withstand significant flood and/or seismic events, and the effects of future global climate change. This review may include areas outside of the Delta as currently defined. The updated Draft LURMD is expected to be released in 2009..

Delta Vision Blue Ribbon Task Force. California Executive Order S-17-06, created the Delta Vision Blue Ribbon Task Force (DVBRTF) and directed that it develop a vision statement for sustainable management of the Delta and a LURMD for the long term restoration and maintenance of identified functions and values that are determined to be important to the environmental quality of the Delta and the economic and social well being of the people of California. The DVBRTF consist of public officials, experts, and stakeholders, charged with developing recommendations on the overall management and governance of the Delta, including goals related to improving safety, ensuring water supply and water quality, expanding recreation, coordinating emergency response, and protecting infrastructure and public safety. The visioning statement was completed in 2007.[36] The DVBRTF is currently conducting their strategic planning process, which is expected to be completed by early 2009.

Bay Delta Conservation Plan. The Bay Delta Conservation Plan (BDCP) is a collaborative effort between Federal and State agencies, water districts, environmental organizations, and the California Farm Bureau to help recover endangered/sensitive species and their habitats in the Delta, while ensuring sufficient and reliable water supplies for Central and Southern California. Primary among their recommendations is the construction of a new facility to convey water from the North Delta to the South Delta. There are two potential alignments for an alternative conveyance: one going through Sacramento County and one through Yolo and Solano counties. Extensive habitat restoration to mitigate for the plan is also under consideration, including the lower Yolo Bypass and the Clarksburg region. The BDCP is expected to be completed by 2010. California Department of Water Resources is the CEQA/NEPA Lead Agency for the Plan.

Central Valley Flood Protection Program. In 2007 California Senate Bill 5 (SB5-2007) and California Assembly Bill 5 (AB5-2007), both dealing with Flood Management in the central valley were adopted. Between them, they renamed the Department of Water Resources Reclamation Board as the Central Valley Flood Protection Board (CVFPB), and expanded its size, duties, and powers, including a requirement that the CVFPB prepare and adopt a Central Valley Flood Protection Plan by 2012. In addition, the program required that cities and counties in the Sacramento–San Joaquin Valley, including Yolo County, amend their General Plan and Zoning Ordinances to be consistent with a newly adopted Flood LURMD within 36 months of flood plan adoption, and established other

[36] The Resources Agency, 2007. *Blue Ribbon Task Force: Delta Vision, Our Vision for the California Delta.* November. Accessed 12/2/08 at: deltavision.ca.gov/DeltaVision-DraftTaskForceVision.shtml

flood protection requirements for local land-use decisions consistent with the Central Valley Flood Protection Plan. Further, SB5-2007 established higher standards of flood protection (generally 200-year protection) for urban and urbanizing areas (defined as areas of at least 10,000 residents, or which will grow to 10,000 or more within the next 10 years). Other areas remain subject to the pre-existing 100-year standard for protection.[37]

Porter-Cologne Act and State Implementation of Clean Water Act Requirements. The Porter-Cologne Water Quality Control Act, passed in 1969, implements the federal CWA (see "Clean Water Act and Associated Environmental Compliance" above). It established the State Water Board and divided the State into nine regions, each overseen by a regional Water Board. The State Water Board is the primary State agency responsible for protecting the quality of the State's surface and groundwater supplies, but much of its daily implementation authority is delegated to the nine Water Boards. The Porter-Cologne Act also provides for the development and tri-annual review of Water Quality Control Plans (Basin Plans) that designate beneficial uses of California's major rivers and groundwater basins and establish narrative and numerical water quality objectives for those waters.

Basin Plans are primarily implemented by using the NPDES permitting system to regulate waste discharges so that water quality objectives are met. Basin Plans provide the technical basis for determining waste discharge requirements, taking enforcement actions, and evaluating clean water grant proposals. The Porter-Cologne Act assigns responsibility for implementing the NPDES and Total Maximum Daily Load programs to the State Water Board and regional Water Boards. Yolo County lies within the jurisdiction of the Central Valley Water Board which enforces compliance with water quality objectives for beneficial uses of surface waters.

State Implementation Policy (SIP). The *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* of 2005 addresses a gap in water quality standards covering priority toxic pollutants. The SIP established the policy for development of new standards for a variety of toxic pollutants, as required by the CWA. It applies to discharges of toxic pollutants into California's inland surface waters, enclosed bays, and estuaries subject to regulation under the Porter-Cologne Water Quality Control Act and the CWA. Such regulation may occur through the issuance of NPDES permits, the issuance or waiver of waste discharge requirements (WDRs), or other regulatory approaches.

Dam Inundation Mapping Requirement. The California Code of Regulations, Section 8589.5, requires that dam owners submit flood routing information, land surveys to delineate the floodplain, and a technical report to support a dam failure inundation map to the Office of Emergency Services. The purpose of the program is to provide decision support for emergency preparedness planning, mitigation, response to, and recovery from potential damage to life and property from dam inundation flood waves. Based upon approved inundation maps, or the delineated areas, cities and counties with territory in the mapped areas are required to adopt emergency procedures for the evacuation and control of populated areas below the dams.[38] The technical study must contain information about dam specifications, physical conditions affected by the dam, including downstream

[37] DWR, 2008. Urban Floodplain Evaluation. Accessed 12/02/08 at: www.water.ca.gov/floodmgmt/lrafmo/fmb/fes/urban_floodplain.cfm

[38] California Office of Emergency Services, 2008. Natural Hazards Disclosure Statement, CERES. Accessed 30 November 2008 at: ceres.ca.gov/planning/nhd/dam_inundation.html

areas and floodwater routing, and the cities, towns, and County areas which could be affected by a dam failure. The requirements of the technical study can also include modeling of worst case breaching parameters and identification of the downstream hazard potential from partial or complete failure of the dam. The technical study and dam inundation map must be updated when a dam is enlarged.[39]

Levee Flood Protection Zones. As of October of 2007, AB 156-2007 requires the DWR to prepare Levee Flood Protection Zones (LFPZ) maps by December 31, 2008 using the best available information. The LFPZ maps will be developed for areas protected by the 1,600 miles of State-Federal project levees in the Central Valley. In addition to the total inundation areas, those regions that would have depths greater than 3 feet also will be identified. The Department will use information from several sources currently available, including FEMA floodplain maps and digital databases, the USACE 2002 Sacramento and San Joaquin River Basins Comprehensive Study, and local project-levee studies. AB 156-2007 also requires that the LFPZ maps be updated by September 1, 2010 and September 1 of each year thereafter with new floodplain data. DWR is in the process of launching an aggressive multi-year program to evaluate and delineate detailed floodplains for many of the areas protected by State-Federal project levees. This effort includes new topography, hydrology, hydraulic models, and floodplain maps. This information will be used to update the LFPZ maps prepared during the initial stage of the project.

Groundwater Management Act. California's Groundwater Management Act (Water Code Sections 10750–10756) provides guidelines by which local agencies not having authority for groundwater management can acquire that authority over the management of groundwater resources in basins recognized by the DWR. Its intent is to promote the voluntary development of groundwater management plans and provide criteria for the plans in order to ensure sustainable groundwater supplies for the future. The Act stipulates the technical components of a groundwater management plan as well as procedures for such a plan's adoption, including passage of a formal resolution of intent to adopt a groundwater management plan, and holding a public hearing on the proposed plan. The Act also allows agencies to adopt rules and regulations to implement an adopted plan, and empowers agencies to raise funds to pay for the facilities needed to manage the basin, such as extraction wells, conveyance infrastructure, recharge facilities, and testing and treatment facilities. SB 1938 also requires basin management objectives and other additions to be included in local groundwater management plans to comply with California Water Code.[40]

(3) Local Regulations. County regulations associated with hydrology and water quality are described below.

Yolo County Emergency Planning. The Yolo County Office of Emergency Services (OES) is responsible for coordinating the County government's role in preparation and response to a disaster or large scale emergency within the County. Countywide emergency preparedness plans outline procedures for coordination and response. The County's federally approved Yolo Operational Area Multi-Hazard Mitigation Plan (MHMP) provides the framework for this disaster response.

[39] Jones and Stokes, 2005. op. cit.

[40] Ibid.

Yolo County Improvement Standards. The Yolo County Department of Planning and Public Works provides guidance and sets minimum standards for improvements to be built within the County on County easement or right-of-way, or any private development under entitlement per *Title 8, Land Development and Planning* of the County Code.[41] These Improvement Standards serve as the "County Standards," or "Design Standards" per County Code Title 8, Chapter 1, Article 7, and are sometimes referred to as Standards of Design or Development Standards. These Improvement Standards guide the development of public improvements such as streets, storm drainage, sewerage, water supply, and site access, and set guidelines for similar private works. These Improvement Standards provide guidance as to the minimum acceptable standards; however project-specific conditions of approval and/or mitigation requirements, as approved by the Board of Supervisors, may result in more stringent project requirements than those included in the standards.

Chapters of the Improvements Standards related to Hydrology and Water Quality include; *Section 9: Storm Drainage, Section 10: Grading, and Section 11: Stormwater Quality, Erosion and Sediment Control.* Section 11 specifically requires that all construction sites, regardless of size, identify all storm drains, swales, and creeks in the vicinity of the site. Further it requires that all workers and subcontractors are aware of the location of these features, and act to prevent pollutants from entering these features, and that all spills, leaks, or drips be immediately cleaned up and properly disposed of by workers. Additional 'Good Housekeeping Practices' and BMPs are detailed in the section and implementation instructions provided. The requirements as detailed by the Yolo County Improvements Standards manual are not in lieu of, but are in addition to, other regulatory requirements imposed by County, State, and Federal agencies.

Stormwater Management Program. The U.S. EPA regulates urban stormwater discharges as point sources and requires municipalities to obtain NPDES permits for these discharges, as described above. The County developed a Storm Water Management Program (SWMP) Planning Document in March of 2003 (revised in October 2004) to address stormwater quality within the County's jurisdiction. The SWMP addresses a wide variety of activities conducted in urbanized areas of the County that are sources of pollutants in stormwater. The SWMP was submitted with the Notice of Intent to comply with the permit to the Water Board, indicating the County's commitment to managing properties, facilities and operations within its jurisdiction to protect stormwater resources and the quality of receiving waters.

Cache Creek Area Plan. The Off-Channel Mining Plan for Lower Cache Creek (OCMP) together with the Cache Creek Resources Management Plan for Lower Cache Creek (CCRMP) comprise the Cache Creek Area Plan (CCAP). The CCAP describes approaches for managing riparian habitats along Cache Creek from the Capay Dam to I-5, in particular, for restoring habitats, reducing erosion, maintaining flood capacity, and improving water quality. Among the goals of the plan is to promote coordination of local, State, and federal regulation of activities within Cache Creek. The OCMP was established as a comprehensive and integrated planning framework for regulating and protecting the Cache Creek area. The OCMP accommodates gravel mining on the creek terraces (but not in-channel) while emphasizing habitat restoration, open space, and reclamation of mined lands to agricultural use. The OCMP describes a future groundwater recharge and storage program and allows for future recreation opportunities along the creek. The CCRMP is a comprehensive creek management plan that eliminated commercial in-channel aggregate mining, established an

[41] Yolo County Department of Planning and Public Works, 2008. County of Yolo Improvement Standards, 5 August.

improvement program from implementing on-going projects to improve channel stability, and ensured restoration of riparian habitat along creek banks in the future.

FloodSafe Yolo County Pilot Program. The Yolo County Flood Control and Water Conservation District, City of Woodland, and Yolo County have created a two-year pilot program (2008 to 2010), floodSAFE Yolo. This joint venture seeks effective solutions to the seasonal flooding of Cache Creek and the localized floodplain that impacts all three jurisdictions in different ways.

Yolo County Code. The following chapters of Title 10 of the Yolo County Code address hydrology and water resource issues within Yolo County.

Chapter 3. The Cache Creek Area Plan In-Channel Maintenance Mining Ordinance was enacted to implement the provisions of the CCAP as related to allowance of in-channel activities. Pursuant to the CCAP, commercial in-channel mining is precluded within Cache Creek. Limited excavation activities related to stream stabilization, flood protection, and riparian restoration (referred to as "maintenance mining") may be performed pursuant to the CCRMP and the Cache Creek Improvement Program (CCIP). This maintenance mining is necessary and required in order to protect structures, infrastructure, and land uses along the creek and downstream, from damage from natural creek forces (e.g., flooding, erosion, deposition, washout). Stabilizing the channel banks and profiles pursuant to the CCRMP/CCIP results in reduced erosion, increased in-channel recharge, and additional riparian habitat opportunities. Approved projects requiring excavation of channel banks and removal of riparian vegetation are required to be revegetated consistent with the performance standards set out in the CCRMP and the CCAP upon the completion of excavation activities.

Chapter 4. The Off-Channel Surface Mining code pertains to both in-channel and off-channel mining for Lower Cache Creek (commercial in-channel mining is no longer permitted in the County). This chapter sets forth monitoring requirements such that mining activities protect public health and safety and requires that mining operations are adapted to site-specific conditions. The Final Off-Channel Mining Plan for Lower Cache Creek (see above) was established as a comprehensive and integrated planning framework for regulating and protecting the Cache Creek area. The OCMP accommodates gravel mining on the creek terraces (not in-channel) while emphasizing habitat restoration. The OCMP describes a future groundwater recharge and storage program and allows for future recreation opportunities along the creek.

Chapter 5. The Surface Mining Reclamation code (known as the Surface Mining Reclamation Ordinance of Yolo County) ensures reclamation of mined lands to minimize the adverse effects of mining on the environment and to protect public health and safety. It requires that reclamation plans be adapted to site-specific conditions and be directed to reclaiming of mined areas to a beneficial use, particularly for groundwater storage and recharge; fish, wildlife, and plant habitat; watercourses and flood control basins; and recreational or open space lands.

Chapter 7. The Groundwater Export code (known as the Groundwater Export Ordinance) requires a permit to extract groundwater for the purposes of export outside the County. The permit ensures groundwater usage will not affect basin elevation or adversely affect long-term storage or transmission of groundwater within the aquifer.

Chapter 9. The Stormwater Management and Discharge Control code (known as The Stormwater Ordinance) implements the required stormwater management regulations per the CWA, 33 U.S.C. § 1251 et seq., and provides for the regulation and reduction of pollutants discharged into the waters of the United States by extending NPDES requirements to stormwater and urban runoff discharge into the County storm drain system. The County's stormwater Management Program, adopted by the County on December 7, 2004, requires the County to effectively prohibit non-stormwater discharges from the unincorporated area of the County into the County storm drain system except as otherwise permitted by law.

2. Draft 2030 Countywide General Plan for Yolo County

The following is a list of relevant Draft General Plan policies that relate to water resources, hydrology and water quality:

Land Use and Community Character Element

- Policy LU-3.8: Prohibit the designation of new urban development in places with one or more of the following characteristics:
  - Areas without adequate emergency services and utility capacity and where there are no capital improvement plans to pay for and construct new facilities that can accommodate the proposed development.
  - Areas where there are significant hazards and where there are no plans to adequately mitigate the risk (e.g. floodplains, high fire hazard areas, unstable soils, known seismic faults, etc.).
  - Areas where there are significant natural resources (e.g. groundwater recharge, wildlife habitat, mineral or timber resources, scenic areas, etc.).
  - Areas not contiguous to existing urban development.
- Policy CC-4.3: Reduce activities that encroach upon nature, through:
  - Reuse of existing buildings and sites for development.
  - Compact and clustered residential development, including reduced minimum lot sizes.
  - Reduction or elimination of impervious paving materials.
  - Development patterns that respect natural systems such as watersheds and wildlife corridors.
- Policy CC-4.11: Require site specific information appropriate to each application to enable informed decision-making, including but not limited to the following: biological resources assessment, noise analysis, traffic and circulation assessment, air quality calculations (including greenhouse gases), cultural resources assessment, geotechnical study, Phase One environmental site assessment, title report, storm drainage analysis, flood risk analysis, water supply assessment, sewer/septic capacity and service analysis, and fiscal impact analysis.
- Policy CC-4.12: Require “green” design, construction and operation including:
  - Site planning sensitive to the natural environment.
  - Efficiency in resource use (including energy, water, raw materials and land).
  - Recycling of construction and demolition waste.
  - Reduction in the use of toxic and harmful substances in the manufacturing of materials and during construction.

- Reduction in water use for buildings and landscaping.
- Facility maintenance and operational practices that reduce or eliminate harmful effects on people and the natural environment during occupancy.
- Water reuse systems
- Other systems to capture energy sources that would otherwise be wasted.

- Policy CC-4.13: Strongly encourage LEED certification[42] for all public, private and existing buildings and LEED-Neighborhood Design (ND) for other applicable projects, particularly within the Specific Plan areas.
- Policy CC-4.31: Encourage clustering of allowed residential units to protect resources and/or improve efficiency of services.
- Policy CC-4.32: Emphasize the use of regionally native drought-tolerant plants for landscaping where appropriate.

Conservation and Open Space Element

- Policy CO-2.22: Prohibit development within a minimum of 100 feet from the top of banks for all lakes, perennial ponds, rivers, creeks, sloughs, and perennial streams. The setback will allow for fire and flood protection, a natural riparian corridor (or wetland vegetation), a planned recreational trail where applicable, and vegetated landscape for stormwater to pass through before it enters the water body. Exceptions to this action include irrigation pumps, roads and bridges, levees, docks, boat ramps, and similar uses.
- Policy CO-5.1: Coordinate with water purveyors and water users to manage supplies to avoid long-term overdraft, water quality degradation, land subsidence and other potential problems.
- Policy CO-5.3: Strive to manage the County's groundwater resources on a sustainable yield basis that can provide water purveyors and individual users with reliable, high quality groundwater to serve existing and planned land uses during prolonged drought periods.
- Policy CO-5.4: Support educational programs to educate the public about practices and programs to minimize water pollution and reduce water usage.
- Policy CO-5.5: Integrate balanced water management programs that emphasize multiple benefits and balance competing needs into all aspects of the planning and development process.
- Policy CO-5.6: Improve and protect water quality for municipal, agricultural, and environmental uses.
- Policy CO-5.7: Support mercury regulations that are based on good science and reflect an appropriate balancing of sometimes competing public values including health, food chain, reclamation and restoration of Cache Creek, sustainable and economically viable Delta agriculture, necessary mineral extraction, flood control, erosion control, water quality, and habitat restoration.
- Policy CO-5.8: Support efforts to reduce the accumulation of methyl mercury in fish tissue in Cache Creek and the Delta, as well as the consumption of fish with high levels of methyl mercury.
- Policy CO-5.9: Within the Delta Primary Zone, ensure compatibility of permitted land use activities with applicable, water policies of the Land Use and Resource Management Plan of the Delta Protection Commission.
- Policy CO-5.12: Support the integrated management of surface and groundwater, stormwater treatment and use, the development of highly treated wastewater, and desalinization where feasible.
- Policy CO-5.14: Require that proposals to convert land to uses other than agriculture, open space, or habitat demonstrate that groundwater recharge will not be significantly diminished.

[42] The LEED certification program awards points for water conservation amongst other things.

- Policy CO-5.15: Encourage new development and redevelopment to use reclaimed wastewater, where feasible, to augment water supplies and to conserve potable water for domestic purposes.
- Policy CO-5.17: Require new development to be designed such that nitrates, lawn chemicals, oil, and other pollutants of concern do not impair groundwater quality.
- Policy CO-5.18: Encourage developers to build new homes to higher water-efficiency standards than already required.
- Policy CO-5.19: Strive for "water-neutral" development with new water demand offset by efficiency improvements elsewhere in the system. Require all new developments to offset new water demands to the greatest extent feasible.
- Policy CO-5.21: Encourage the use of water management strategies, biological remediation, and technology to address naturally occurring water quality problems such as boron, mercury, and arsenic.
- Policy CO-5.22: Work with other agencies and non-profit organizations to provide educational and technical assistance programs to encourage farmers to adopt agricultural methods that improve water quality.
- Policy CO-5.23: Support efforts to meet applicable water quality standards for all surface and groundwater resources.
- Policy CO-5.24: Pursue funding to remediate historic mines and other sources of mercury contamination on the Cache Creek watershed.
- Policy CO-5.25: Support the efforts of Davis, Woodland and UC Davis to acquire surface suppliers from the Sacramento River for domestic water uses.
- Policy CO-5.26: Provide financial and regulatory incentives for the installation of water conservation measures for agriculture.
- Policy CO-5.27: Encourage the development of groundwater management plans pursuant to the State Groundwater Management Act (Sections 10750-10756 of the California Water Code) for all regions of the County.
- Policy CO-5.28: Encourage the Water Resources Agency to implement and regularly update the Integrated Regional Water Management Plan.
- Policy CO-5.29: Vigorously protect all water rights related to lands within Yolo County, including areas of origin, riparian water rights, and other existing water rights.
- Policy CO-5.30: Anticipate and adapt to changes in the amount and timing of water availability due to predicted effects of global warming
- Action CO-A69: Collaborate with the Water Resources Agency to collect data from public water suppliers and other water users which use groundwater sources to monitor and report groundwater levels and yields, where appropriate, to manage long term aquifer conditions. (Policy CO-5.1, Policy CO-5.3)
- Action CO-A70: Work cooperatively with water purveyors and with other land use planning agencies to share data on water supply availability, anticipated demand, land use, and population projections. (Policy CO-5.1, Policy CO-5.2, Policy CO-5.3)
- Action CO-A73: Participate in regional planning efforts regarding surface water resources, including the Sacramento River, Cache Creek, Putah Creek, Tehama-Colusa Canal, Yolo Bypass, and Sacramento-San Joaquin Delta. (Policy CO-5.1, Policy CO-5.2, Policy CO-5.3)
- Action CO-A75: Coordinate with local water purveyors to develop a conjunctive use program, consistent with the Integrated Regional Water Management Plan, to make the most efficient use of surface and groundwaters. (Policy CO-5.1, Policy CO-5.3)

- Action CO-A76: Ensure the collection and maintenance of data on water use, water supplies, and water quality to avoid long-term overdraft, water quality degradation, land subsidence and other potential groundwater problems. (Policy CO-5.5, Policy CO-5.6)
- Action CO-A77: Map operational and non-operational wells into the County's Geographic Information System. (Policy CO-5.3, Policy CO-5.5, Policy CO-5.6, Policy CO-5.7, Policy CO-5.8)
- Action CO-A78: Work with local water purveyors to develop and implement urban and agricultural water management plans to provide a 20 percent improvement in water use efficiency throughout the County by 2030. (Policy CO-5.1, Policy CO-5.5)
- Action CO-A79: Develop and implement an integrated wellhead protection program. (Policy CO-5.6)
- Action CO-A80: Develop a County grading ordinance that maintains existing terrain, channels, and vegetation to the extent possible, in order to minimize the disruption of natural systems. (Policy CO-5.5, Policy CO-5.6)
- Action CO-A81: Adopt a Water Efficient Landscape Ordinance to require greater use of regionally native drought-tolerant vegetation, limitations on the amount of turf in residential development, computer controlled irrigation systems, and other measures as appropriate. (Policy CO-5.2, Policy CO-5.3, Policy CO-5.4)
- Action CO-A82: Consider development and adoption of a groundwater management ordinance to address the cumulative impacts of incremental groundwater extraction. (Policy CO-5.3)
- Action CO-A83: Work with local agencies and non-profit organizations to provide educational and technical assistance to farmers to reduce sedimentation, provide on-site retention of irrigation water and flow attenuation, on-site detention of stormwater flows, and incorporate native vegetation. (Policy CO-5.4)
- Action CO-A84: Coordinate with water purveyors in the unincorporated areas to inform the public about practices and programs to minimize water pollution. (Policy CO-5.4)
- Action CO-A85: Coordinate with Yolo Resources Conservation District to create educational programs to inform agencies, stakeholders, and the public about groundwater Best Management Practices for efficient water use, water conservation, and recharge. (Policy CO-5.4)
- Action CO-A87: Adopt an ordinance to allow for shared water systems to facilitate the clustering of homes and preservation of agricultural land, where an entity is established to provide maintenance or financing for maintenance of the water system. (Policy CO-5.1, Policy CO-5.2, Policy CO-5.3)
- Action CO-A88: Encourage roof catchment and the use of rainwater for non-potable uses to reduce the need for groundwater. (Policy CO-5.1, Policy CO-5.2, Policy CO-5.3, Policy CO-5.4)
- Action CO-A86: Adopt development design standards to reduce or eliminate impervious surfaces where possible. (Policy CO-5.6)
- Action CO-A91: Implement and regularly update the County Stormwater Management Plan and associated programs. (Policy CO-5.5, Policy CO-5.6)
- Action CO-A92: Require the implementation of Best Management Practices (BMPs) to minimize erosion, sedimentation, and water quality degradation resulting from new development and increases in impervious surfaces. (Policy CO-5.5, Policy CO-5.6)
- Action CO-A93: Adopt development design standards that use low-impact development techniques that emulate the natural hydrologic regime and reduce the amount of runoff and associated pollutants. Examples include vegetated swales, landscaped detention basins, permeable paving, and green roofs. (Policy CO-5.5, Policy CO-5.6)
- Action CO-A94: Work with the Central Valley Regional Water Quality Control Board and other State and federal agencies to implement mercury total maximum daily loads (TMDLs) for Cache Creek and to

develop mercury TMDLs for the Delta and other Yolo County waterways where appropriate. (Policy CO-5.6, Policy CO-5.7)

Health and Safety Element

- Policy HS-2.1: Manage the development review process to protect people, structures, and personal property from unreasonable risk from flooding and flood hazards.
- Policy HS-2.2: Ensure and enhance the maintenance and integrity of flood control levees.
- Policy HS-2.3: Actively update and maintain policies and programs to ensure consistency with State and federal requirements.
- Policy HS-2.4: Clearly communicate the risks, requirements, and options available to those who own land and live within the floodplain.
- Policy HS-2.5: Within the Delta Primary Zone, ensure compatibility of permitted land use activities with applicable flood control and protection policies of the Land Use and Resource Management Plan of the Delta Protection Commission.
- Policy HS-2.6: Maintain the structural and operational integrity of essential public facilities during flooding.
- Policy HS-2.7: Manage the floodplain to improve the reliability and quality of water supplies.
- Policy HS-2.8: Consider and allow for the ecological benefits of flooding while balancing public safety and the protection of property.
- Policy HS-6.1: Respond to catastrophic emergencies by:
    - Continuing and restoring critical services.
    - Maintaining order.
    - Supporting evacuations.
    - Distributing emergency supplies. Ensuring search/rescue operations and medical care.
    - Saving lives and protecting property.
    - Repairing and restoring essential public infrastructure.
    - Mobilize the necessary resources to carry out emergency response efforts.
    - Coordinating operations with other jurisdictions.
    - Disseminating emergency public information.
    - Establishing emergency operation centers and maintaining communications.
    - Notifying vulnerable populations (e.g., seniors, school children, disabled, non-English speaking households, etc.)
- Policy HS-6.2: Provide continuous advance planning to anticipate potential threats and improve emergency response effectiveness.
- Policy HS-6.5: Work with Yolo Emergency Communications Agency to seek funding for emergency communications, evacuation planning and recovery planning.
- Action HS-A5: Require a minimum of 100-year flood protection for new construction, and strive to achieve 200-year flood protection for unincorporated communities. Where such levels of protection are not provided, require new development to adhere to the requirements of State law and the County Flood Damage Prevention Ordinance. (Policy HS-2.1)

- Action HS-A6: Continue to require habitable structures in the 100-year floodplain to be designed and constructed so that they do not significantly contribute to cumulative flooding that could pose a hazard to surrounding landowners and/or the public. (Policy HS-2.1)
- Action HS-A7: Yolo County shall not approve any discretionary permit, or ministerial permit, that would result in the construction of a new residence, for a project located within a flood hazard zone, unless the County can make the findings identified in Section 65962a of the Government Code. (Policy HS-2.1)
- Action HS-A8: Locate new essential public facilities outside of flood hazard zones, including hospitals and health care facilities, emergency shelters, fire stations, emergency command centers, and emergency communications facilities. Where such location is not feasible, incorporate methods to minimize potential flood damage to the facility. (Policy HS-2.6)
- Action HS-A9: Require new developments to detain the stormwater runoff created on-site by a 100-year storm event. (Policy HS-2.1)
- Action HS-A10: Limit the construction of extensive impermeable surfaces and promote the use of permeable materials for surfaces such as driveways, and parking lots. (Policy HS-2.1)
- Action HS-A11: Locate new structures outside of the floodplain, where feasible, and implement appropriate methods to minimize potential damage where new construction occurs within flood hazard zones.(Policy HS-2.1)
- Action HS-A12: Evaluate the feasibility of designating land as open space for future bypass systems to prevent flooding hazards. Work with State and Federal agencies to include such bypasses in the Central Valley Flood Protection Plan, where appropriate. Ensure that responsible agencies fund the purchase of flood easements where bypass systems are designated. (Policy HS-2.1)
- Action HS-A13: Review development proposals to ensure that the need to maintain flood control capacity is balanced with consideration of the environmental health of watercourses that convey floodwaters so as not to cause significant erosion, sedimentation, water quality problems, or loss of habitat. (Policy HS-2.1)
- Action HS-A14: Require a minimum 50-foot setback for all permanent improvements from the toe of any flood control levee. (Policy HS-2.2)
- Action HS-A15: Restrict proposed land uses within 500 feet of the toe of any flood control levee, including but not limited to:
    - Prohibit permanent unlined excavations;
    - Large underground spaces (such as basements, cellars, swimming pools, etc) must be engineered to withstand the uplift forces of shallow groundwater;
    - Prohibit below-grade septic leach systems;
    - Engineered specifications for buried utility conduits and wiring;
    - Prohibit new water wells;
    - Prohibit new gas or oil wells;
    - Engineered specifications for levee penetrations; and
    - Require landscape root barriers within 50 feet of the toe. (Policy HS-2.2)
- Action HS-A16: Support the efforts of levee maintenance districts with efforts to secure State and Federal funding for geotechnical studies of levees and implementation of associated improvements, as well as their ongoing maintenance. (Policy HS-2.2)
- Action HS-A17: Encourage flood hazard reduction projects along the Sacramento River to be consistent with the guidelines of the Sacramento River Corridor Floodway Management Plan. (Policy HS-2.2)

- Action HS-A18: Coordinate with local, State and Federal agencies to define existing and potential flood problem areas, including the possible impacts associated with global climate change, and to maintain and improve levees and other flood control features. (Policy HS-2.2)
- Action HS-A19: Develop a detailed maintenance and funding plan for levees under County control, to ensure that levee safety is maintained. (Policy HS-2.2)
- Action HS-A20: Support and encourage responsible agencies to site new levees or major rehabilitation of levees at a distance from the river and from existing levees, where feasible. These setback levees would provide a degree of redundancy in the system, increase the land available for habitat and flood storage, reduce operation and maintenance costs, and help to ensure the integrity of the structures. (Policy HS-2.2)
- Action HS-A21: Private development of levees should be limited to those cases where the construction meets national levee standards, the project is in conformance with the State's comprehensive plan for flood damage reduction, and a public agency agrees to provide long-term maintenance of the levee. (Policy HS-2.2)
- Action HS-A22: Ensure that the upgrade, expansion, or construction of any flood control levee demonstrates that it will not adversely divert flood water or increase flooding. (Policy HS-2.2)
- Action HS-A23: Work cooperatively with other local agencies and interested parties to develop funding mechanisms to finance the local share of design, construction, and capital costs for repairs and improvements to flood control levees. (Policy HS-2.2)
- Action HS-A24: Improve the County's classification within the Federal Emergency Management Agency Community Rating System. (Policy HS-2.3)
- Action HS-A25: Pursuant to Sections 65302.9 and 65860.1 of the Government Code, amend the Zoning Ordinance and General Plan, as appropriate, to be consistent with the adopted Central Valley Flood Protection Plan.(Policy HS-2.3)
- Action HS-A26: Review on an annual basis those portions of the unincorporated area that are subject to flooding, based on mapping prepared by the Federal Emergency Management Agency and/or the Department of Water Resources, and amend the General Plan as appropriate to reflect any changes. (Policy HS-2.3)
- Action HS-A27: Revise the Health and Safety Element, concurrently with the regular update to the Housing Element, to include new information regarding floodplain mapping and/or regulation. (Policy HS-2.1, Policy HS-2.3)
- Action HS-A28: Take all reasonable and feasible actions to mitigate potential flood damage for new construction on agriculturally designated land in areas protected by the Sacramento River Flood Control Project and related flood protection efforts. (Policy HS-2.1)
- Action HS-A29: Pursuant to Section 8201 of the State Water Code, develop local plans for flood protection, including analysis of financing options to construct and maintain any needed improvements, to address how 100-year floodplain protection for each community may be provided. Those communities that are economically disadvantaged and at greatest risk shall have priority in developing flood protection plans. The cities shall be consulted in development of the plans, which shall be consistent with the Central Valley Flood Protection Plan. (Policy HS-2.1, Policy HS-2.2)
- Action HS-A30: Maintain and update on a regular basis the County Flood Damage Prevention Ordinance, to ensure its conformity with the State Model Flood Ordinance and all Federal Emergency Management Agency requirements. (Policy HS-2.1, Policy HS-2.3)
- Action HS-A31: Inform the public about the specific risks of living in areas at risk of flooding, and provide steps property owners can take to reduce their exposure to flood damages. Encourage all landowners within

the 100- or 200-year floodplain, and/or within areas protected by levees, to purchase and maintain flood insurance. (Policy HS-2.4)

- Action HS-A32: Require that all residential development projects located within floodplains include a signed waiver regarding the potential flood risk to future buyers. (Policy HS-2.4)
- Action HS-A33: Develop and implement a public outreach campaign to notify landowners and tenants of their flood status, options for flood insurance, evacuation plans, flood protection programs, locally responsible flood agencies, and other related topics. (Policy HS-2.4)
- Action HS-A34: Amend the County's Development Agreement enabling ordinance to include the applicable restrictions from Section 65865.5 of the Government Code. (Policy HS-2.3)
- Action HS-A35: Develop emergency response plans and systems for floodplain evacuation and flood emergency management. Educate the public regarding these plans. (Policy HS-2.4)
- Action HS-A36: Evaluate the creation of a Countywide agency to provide flood control and protection. (Policy HS-2.2, Policy HS-2.4, Policy HS-2.6)
- Action HS-A37: Continue to work with the Flood Control District, the City of Woodland, other appropriate agencies and private landowners to develop strategies and pursue funding for the implementation of projects to improve flood protection for urban and rural residents along lower Cache Creek. (Policy HS-2.2)

3. Impacts and Mitigation Measures

This section provides an assessment of the potential adverse impacts related to hydrology and water quality for the proposed project. It establishes the thresholds of significance for impacts and then evaluates the Draft General Plan. Where potentially significant impacts of the proposed project are identified, mitigation measures are recommended.

a. Significance Criteria. The Draft General Plan would have a significant effect on hydrology or water resources if it would:

Water Quality:

- Violate any water quality standards;
- Substantially increase stormwater runoff volumes such that it would result in significant degradation of receiving streams related to higher erosive flows;
- Create or contribute runoff that would be an additional source of water quality degradation during construction and operation;
- Result in substantial erosion or sedimentation on- or off-site that would affect the quality of receiving water;
- Degrade groundwater quality, adversely affect aquifer characteristics or interfere substantially with groundwater recharge such that there would be a significant net deficit in aquifer volume, a lowering of the local groundwater table level, or result in surface subsidence;

Flooding and Hydrology:

- Expose people or structures to increased risk of loss injury or death involving flooding by placing people or structures within a 100-year flood hazard area as mapped on a federal Flood Hazard

Boundary or Flood Insurance Rate Map, the 200-year flood hazard boundary as defined by the Central Valley Flood Protection Plan in urban areas, or other flood hazard delineation map;

- Expose people or structures to unreasonable risk of flooding by siting structures where they could impede or redirect flood flows;
- Expose people or property to flood hazards from dam failure inundation;
- Expose people or structures to a substantial risk of inundation by seiche, extreme high tides, and/or sea level rise;

General

- Substantially conflict with applicable plans, policies and regulations of other agencies adopted for the purpose of avoiding or mitigating an environmental effect and where such conflict would actually result in a physical adverse change in the environment; or
- Result in new policies that would result in significant adverse physical impacts as compared to the 1983 General Plan policies.

b. Impacts Analysis. The following section provides an evaluation and analysis of the potential impacts of the Draft General Plan related to growth and changes to land use (commercial, industrial and residential) in the unincorporated County for each of the criteria of significance listed above.

(1) Violate Water Quality Standards or Degrade Water Quality during Construction and Operation. Growth and new development allowed under the Draft General Plan would be subject to existing water quality and waste discharge regulations and programs, as described in the regulatory framework section above. These existing programs establish water quality standards and provide enforcement, and all new development projects would be required to comply with these programs. Countywide development policies also have a substantial effect on successful implementation and enforcement of the existing water quality regulatory programs and can provide programmatic guidance so that sensitive water quality environments are protected. Draft General Plan Policy CO-5.23 specifies that the County would "support efforts to meet applicable water quality standards for all surface and groundwater resources." In addition, build-out based on the following policies and actions also addresses potential impacts on water resources by requiring consistency and maintenance of water quality standards: HS-2.3, CO-2.29, CO-5.4 through CO-5.8, CO 5.17, CO-5.22, CO-5.23, CO-A74, CO-A92, and CO-A92.

Specific Plans are required to be prepared for growth identified in Dunnigan, Knights Landing, Madison, and Elkhorn. The preparation of these Specific Plans within the County as well as the community plans and specific plans for other areas where growth is targeted (e.g., Capay Valley, Clarksburg, Esparto and Monument Hills per Mitigation Measure LU-2a and revised Policy CC-3.1) will require environmental review and CEQA compliance as part of the entitlement process. Other planned development (described in Chapter III, Project Description and including: growth in other community areas, farm dwellings, agricultural commercial/industrial uses, open space improvements, roadway widenings/improvements, and trails) that may occur 'by right' and requiring only ministerial approvals would still be subject to, at a minimum, the County of Yolo Improvement Standards, and based on project site size and the area of soil disturbance, may also be subject to NPDES Construction General Permit requirements. The Improvement Standards specifically include projects with small areas of disturbance and require that projects adopt 'Good Housekeeping' practices,

minimize impacts related spills, fuels and construction debris, practice erosion control, and implement BMPs to protect water quality. The three alternative sites in Clarksburg identified for agricultural commercial/industrial use and the two alternative I-505 commercial/industrial sites would all require an NPDES Construction General Permit, in addition to the Yolo County Improvement Standards, as development on these sites would be greater than one acre in size.

Implementation of these Draft General Plan policies and actions in conjunction with compliance with existing regulatory programs would ensure that water quality impacts related to potential violation of water quality standards associated with growth under the Draft General Plan would be less than significant.

(2) Increase Stormwater Runoff Resulting in Degradation of Water Quality. The impervious surfaces associated with new development tend to increase stormwater runoff volumes, potentially resulting in degradation of water quality in creeks related to higher erosive flows (or hydromodification impacts). However, development projects of more than one acre would be subject to compliance with NPDES regulations that address hydromodification. Projects of less than one acre would be regulated under the County Development Standards applicable to all building and grading permits. Action CO-A90 specifies that the County "adopt design standards that use low-impact development techniques that emulate the natural hydrologic regime and reduce the amount of runoff and associated pollutants. Examples include vegetated swales, landscaped detention basins, permeable paving, and green roofs." In addition, implementation of the following policies and actions would address potential impacts related to new development and increased stormwater flows by reducing flows, maintaining buffers around water bodies and protecting riparian corridors: CC-4.3, CC-4.13, CO-2.22, HS-A.9, CO-A86, CO-A87, CO-A88, and CO-A90.

Implementation of these Draft General Plan policies and actions, in conjunction with compliance with existing regulatory programs would ensure that impacts related to growth and increased stormwater flows and effects on receiving water bodies under the Draft General Plan would be less than significant. Please refer to the analysis in Section IV.H, Utilities and Energy regarding storm drainage management.

(3) Result in Erosion or Sedimentation Affecting Water Quality. This analysis addresses the third and fourth significance criteria. Growth and new development allowed under the Draft General Plan could result in grading and excavation projects that could expose soils to erosion and sedimentation which could degrade the quality of receiving waters. Development projects completed under the Draft General Plan would be subject to compliance with NPDES regulations that address erosion and sedimentation related to construction projects per the Construction General Permit. Action CO-A76 also specifies that the County "develop a County grading ordinance." A grading ordinance would assist the County in regulating certain types of grading activities that are most likely to cause water quality impacts (e.g., development sites on slopes or near receiving waters). In addition, implementation of the following policies and actions also would address potential impacts related to erosion and sedimentation: CC-4.3, CO-2.3, CO-5.23, HS-A.12, and CO-A89.

Implementation of these Draft General Plan policies and actions, in conjunction with compliance with existing regulatory programs would ensure that impacts related to increased erosion or sedimentation related to growth allowed under the Draft General Plan would be less than significant.

(4) Affect Groundwater Quality or Recharge. Build-out under the Draft General Plan would result in additional demands on available groundwater resources. Aquifer overdraft (or overpumping) can cause permanent damage to an aquifer if the aquifer materials settle, reducing its future storage capacity. In addition, overdraft can, and has in the past in Yolo County, cause land subsidence at the ground surface. Subsidence can significantly impact flood hazard areas by effectively increasing flooding depths. The Draft General Plan includes a policy (Policy CO-5.3) that addresses groundwater resources, under which the County would "strive to manage the County's groundwater resources on a sustainable yield basis that can provide water purveyors and individual users with reliable, high quality groundwater to serve existing and planned land uses during prolonged drought periods." This policy would require strengthening the County's current water management programs to preclude overpumping. The potential for overdraft of aquifers and subsidence is a significant impact.

New development will also result in increases in impervious surfaces which could reduce aquifer recharge. Development, and associated impervious cover, in areas of moderate and high potential for recharge would cause the greatest impact. Areas mantled with clayey soils or near-surface bedrock tend to have a low potential for aquifer recharge and creation of new impervious cover in these areas would have little effect on aquifer recharge. High aquifer recharge areas tend to be located along alluvial channels. Moderate aquifer recharge areas are located through the county. Figure CO-7 of the Draft General Plan identifies areas of high, moderate, and low recharge potential within the County. A comparison of the new development that could occur under the Draft General Plan (as depicted in Figure IV.J.6) to the important recharge areas as shown on Figure CO-7 of the Draft General Plan (also Figure IV.K.1 of this EIR) demonstrate that most of the proposed development will occur in areas of very slow and slow infiltration, with some development potentially occurring in areas of moderate infiltration. Areas of high infiltration are protected as open space in the Draft General Plan. Notwithstanding the potential for increases in impermeable surfaces in some areas of moderate infiltration, these areas (of moderate infiltration) are extensive in Yolo County and general occur in Agriculture and Open Space designated areas where urban growth is prohibited. As demonstrated by comparing these two figures the overall potential for impact is minimal and is not considered significant.

Policy CO-5.14 would "require proposals to convert land within or near areas identified as having a moderate to very high recharge capability to uses other than agriculture, open space, or habitat to demonstrate that groundwater recharge will not be significantly diminished." In addition, implementation of the following policies and actions would address potential impacts related to groundwater resources: CO-5.4, CO-5.5, CO-5.12, CO-5.18, CO-5.19, CO-5.21, CO-5.28, HS-A.9, CO-A69 through CO-A79, CO-A80, and CO-A87. Implementation of the following mitigation measures will reduce the potential impacts related to an increased overdraft of County aquifers and a reduction of aquifer recharge resulting in a net reduction aquifer capacity, availability of groundwater resources, and ground surface subsidence to a less-than-significant level.

Impact HYD-1: Build-out of the Draft General Plan could result in increased overdraft of County aquifers and a reduction of aquifer recharge resulting in a net reduction aquifer capacity, availability of groundwater resources, and ground surface subsidence. (S)

Implementation of the following mitigation measures would ensure that Draft General Plan impacts related to aquifer overdraft and recharge reduce the severity of this impact.

Mitigation Measure HYD-1a: Amend Policy CO-5.3 of the Draft General Plan as follows:

Policy CO-5.3: ~~Strive to m~~Manage the County's groundwater resources on a sustainable yield basis that can provide water purveyors and individual users with reliable, high quality groundwater to serve existing and planned land uses during prolonged drought periods.

Mitigation Measure HYD-1b: The Draft General Plan shall be amended to include the following new policy in the Conservation and Open Space Element.

Policy CO-#: Strive to increase artificial recharge of important aquifers with surplus surface water supplies. (LTS)

(5) Placement of People or Structures within a Mapped Flood Hazard Area. Growth and new development under the Draft General Plan would allow new construction in flood zones, including within the100-year flood hazard boundary, and would increase the number of people and structures subject to flood risks. Placement of structures may impede or redirect flood flows, resulting in additional flood related risks and impacts. Most of Yolo County's unincorporated communities are well under the 10,000 residents threshold at this time and therefore are generally not affected by the new 200-year floodplain standard. However, the County has assumed that future planned growth in Dunnigan (with a projected build-out of approximately 24,139 people) will be required to meet the higher 200-year flood hazard protection standard.

FEMA's evaluation of flood risks rely on certification of levee integrity, and FEMA FIRMs will map an area as subject to flood hazards if levee integrity is not verified. Some levees, particularly those that protect parts of the City of Woodland and unincorporated Yolo County, the vicinity of Cache Creek and the town of Yolo, currently provide a 10-year level of flood protection rather than the 100-year federal standard or the 200-year Central Valley Flood Protection Program standard. Without work to improve these levees, additional development in Yolo County's floodplain could put more residents at risk of flooding hazards. The local levees have been assumed to provide adequate protection since their acceptance into the Sacramento River Flood Control Project in 1918. However, recently, where insufficient geotechnical information exists to evaluate the integrity of the levees, the State Department of Water Resources (DWR) has taken the position, in conjunction with FEMA, that levees may not be recertified. The DWR has completed geotechnical evaluations of the urban Sacramento River Flood Control Project levees within the County, and proposed to do additional (as yet unknown) evaluations of non-urban levees in the next two years. As such, the local levees face potential reclassification on future federal flood protection maps; On December 19, 2008, FEMA released preliminary drafts of revised FIRMs for Yolo County. The revised maps incorporate new standards which assume that any levee where there is not evidence to support federal certification (indicating structural integrity) will fail. As a result, large areas of Yolo County, primarily located along the Sacramento River and lower Willow Slough, are proposed to be re-designated as part of the 100-year floodplain. This includes the towns of Clarksburg, Knights Landing, and Yolo, as well as the eastern portion of El Macero. For example, the entire community of Knights Landing would be located within the 100-year flood hazard zone.

Siting structures in flood zones can result in direct impacts to new development related to flooding. In addition, structures that impede flood flows can cause a backwater effect, potentially raising flood

levels, causing more severe flooding impacts to existing vulnerable areas or by exposing new areas that would not have previously flooded to new flooding impacts.

Several policies and actions of the Draft General Plan, including LU-3.8, HS-2.5, CO-2.22, HS-A7, HS-A13 would restrict development within flood-prone areas and/or specify specific levels of protection for the new development. Implementation of these policies would reduce direct flood-related impacts associated with new development. In addition, the following policies would address the requirement to evaluate and development adjacent to inadequate levees; HS-2.2, HS-2.6, HS-A15, HS-A18, and HS-A19 through HS-A22. Issues related to notification of people that could be exposed to flooding and evacuation planning are addressed in Draft General Plan policies and actions HS-2.4, HS-A26, HS-A30, HS-A31, HS-A32, HS-A34. Implementation of the following policies and actions would address potential impacts related to new development and an increase stormwater flows that could exacerbate flooding conditions: CC-4.3, CC-4.14, CO-2.29, CO-2.37, HS-A.9, CO-A86, CO-A87, CO-A88, and CO-A90. Notwithstanding these policies, the Draft General Plan would allow for development in community areas such as Knights Landing, Elkhorn, Madison, Esparto, and Clarksburg, all of which are considered floodplains. This new development could be vulnerable to flooding and cause floodplain encroachment, resulting in increased flood levels by the redirection of flood flows, resulting in additional flood-related risks and impacts. This is a significant impact.

Impact HYD-2: Build-out of the Draft General Plan would expose more people and structures flood hazards and may impede or redirect flood flows, resulting in increased flood hazards. (S)

Mitigation Measure HYD-2: None available.

While implementation of the policies and actions included in the Draft General Plan would reduce the severity of this impact, under build-out of the Draft General Plan new growth would occur within flood zones. Other than avoiding all development within floodplain areas, which the County does not consider to be practical or feasible, there are no additional mitigation measures available to reduce this impact. Therefore, this impact would remain significant and unavoidable. (SU).

(6) Inundation from Dam Failure. Much of the County is mapped as being susceptible to inundation hazards from one or more of the various dams within or upstream of the County. Inundation characteristics from a dam failure and the related hazards are a function of the distance from the dam and the region's topography. Development located just downstream of a dam and within a narrow valley or canyon would be at the highest risk. Whereas, development located at a great distance and in a broad valley would be at the lowest risk.

For example, a catastrophic failure of the Oroville Dam (the largest dam to the north) would result in main channel flood arrival at the northern Yolo County border in approximately 11 hours.[43] The only community area within the County located within this inundation zone is Knights Landing. Flood waters are predicted to reach Knights Landing in 36 hours and inundation depths or 2 to 3 feet would be expected.

[43] California Department of Water Resources, 2004. Report SP-E4, Appendix B, Figure B-4, Oroville Dam Failure Inundation Map (Oct. 2000).

In the event of failure of the Indian Valley Dam, water would follow the North Fork Cache Creek Canyon to the confluence with the Cache Creek main channel, and then downstream to cross the northern border of Yolo County near Cache Creek Canyon State Park. Floodwaters in the Capay Valley would reach up to 90 feet in depth, and would arrive at the lower end of the Capay Valley at approximately three hours after the dam failure and spread out across the valley floor from Hungry Hollow to Willow Slough. The communities in the Capay Valley could be adversely impacted in the event of dam failure. The community area of Madison is located within the mapped inundation area. Although the mapping does not indicate a depth of inundation in the Madison area, the depths and flow velocities would be largely reduced as the flood moves out into the broad open valley. Arrival at Woodland occurs roughly six hours post event with unspecified depth before following the Cache Creek settling basin to the Yolo Bypass channel.[44]

A catastrophic failure of Monticello Dam on Lake Berryessa would result in approximately 15 foot inundation depth in the vicinity of Winters within 20 minutes after the event. At approximately 1.5 hours after the event water would arrive in the vicinity of Davis with a surface elevation of approximately 75 NGVD, or approximately ten feet over stream bed. Other dams in the vicinity have similar timelines and depths of floodwaters, typically running relatively deep and fast until reaching the open valley floor where the waters spread out, slow down, and result in flooding of several feet above the related stream bed until intercepting the Yolo Bypass channel.

There are 1,483 dams under the supervision of the California Department of Water Resources Division of Safety of Dams. Since 1950 there have been nine dam failures statewide, with one of the incidents resulting in three deaths. The most recent failure of a dam occurred 1965.[45] Based on these statistics, dam failure is a relatively low likelihood event, particularly in the recent past. However, the severity of the impact related to the potential for loss of life and property associated with failure of a dam can be extreme.

The Draft General Plan contains a number of policies under Emergency Preparedness in the Health and Safety Element that address preparation for and response to a catastrophic event such as a dam failure. These include Goal HS-6, policies HS-6.1 through HS-6.5, and actions HS-53 through HS-A60. In addition State real estate disclosure laws require notification to new property owners for property that lies within any dam inundation area. With these policies and requirements in place this is considered a less than significant impact.

(7) Inundation by Seiche, Tsunami, Extreme High Tides and/or Sea Level Rise. The location (more than 50 miles from the mouth of the Golden Gate) and elevation (lowest elevation in the County is approximately 5 feet above sea level) of the County precludes significant impact due to coastal hazards, such as tsunamis or extreme high tides. No seiche occurrences have ever been documented in Yolo County water bodies. It is possible that sea level rise could reduce the effectiveness of levees within the County (reducing the levee height by raising the base level of the adjacent water body). However, utilizing the most conservative (worst case) estimates of sea level rise[46] by the year 2100, the sea level is projected to rise on the order of 35 inches, which is not enough to

[44] CH2M Hill, undated. Inundation Map of Indian Valley Dam, Sheets 1 to 9. Prepared for YCFCWCD. Part of Statewide Dam Inundation Maps and GIS layers on CD-Rom, acquired from the California OES March 2006.

[45] Governor's Office of Emergency Services, 2004. State of California Multi Hazard Mitigation Plan, September.

[46] California Climate Change Center, 2006. *Our Changing Climate. Assessing the Risks to California.* July.

compromise existing levees; however may lead to additional backwater flooding in the event of storm-induced flooding in the southern portion of the county.

Implementation of Draft General Plan Action HS-A17 would require the County to "coordinate with local, State and federal agencies to define existing and potential flood problem areas, including the possible impacts associated with global climate change, and to maintain and improve levees and other flood control features." With implementation of this Action, potential impacts related sea level rise may be partially addressed, but complete mitigation would not be assured. As described under Impact HYD-3, new development in flood hazard areas would be a significant unavoidable impact. Sea level rise would exacerbate flooding problems, and therefore flooding associated with sea level rise is also a significant impact. See Section IV.F, Global Climate Change for a discussion of level rise related to global climate change.

Impact HYD-3: Build-out of the Draft General Plan would expose more people and structures flood hazards as a result of climate-induced sea level rise. (S)

Mitigation Measure HYD-3: None available.

While implementation of the policies and actions included in the Draft General Plan would reduce the severity of this impact, under build-out of the Draft General Plan new growth would occur within existing and future flood zones under global climate change conditions. There are no additional mitigation measures available to reduce this impact. Therefore, this impact would remain significant and unavoidable. (SU)

(8) Conflict with Plans and Policies of Other Agencies. The hydrology and water resource related policies and actions of the Draft General Plan do not conflict with any of the stated goals of regional flood control or water resources management plans including those of: The Delta Protection Commission (DPC) Land Use and Resource Management Plan for the Primary Zone of the Delta, the Delta Protection Act, The Visioning Statement of the Delta Vision Blue Ribbon Task Force, the Bay Delta Conservation Plan, or the Central Valley Flood Protection Program. The State Delta Protection Commission has jurisdiction over land uses in the Primary Delta Zone. Implementation of the Draft General Plan would not result in environmental impacts to hydrology or water resources stemming from conflict with any of the aforementioned regional plans. As a result, implementation of the Draft General Plan would result in a less-than-significant impact related to policy conflicts with other agencies in regards to hydrology and water quality.

(9) Result in Adverse Impacts from Draft General Plan Policies Compared to 1983 General Plan Policies. A review of the 1983 General Plan indicates that policies related to water resources and flooding in the Land use, Open Space, Safety and Seismic Safety, and Scenic Byways elements are, in general, less rigorous than those proposed under the new Draft General Plan. The Draft General Plan contains goals, policies and actions providing more protections related to water resources and flooding than the policies of the 1983 General Plan. In general, the superseding document results in more stringent protection, and greater accountability in the implementation of water resources and flood control management programs. Therefore, implementation of the Draft General Plan in place of the prior 1983 General Plan would not result in significant adverse physical impacts related to hydrology and water quality as compared to the 1983 General Plan policies.

L. GEOLOGY, SOILS, SEISMICITY AND MINERAL RESOURCES

This section evaluates the geology, soils, seismicity and mineral resources for Yolo County. Background information is based on the Yolo County General Plan Update Background Report,[1] and published and unpublished regional geologic reports and maps from the California Geological Survey (CGS), the United States Geological Survey (USGS) and the Natural Resources Conservation Service (NRCS). Soils are discussed in this section as related to ground stability, construction and erosion; a discussion of soils and agriculture issues is provided in Section IV.B, Agriculture, of this Draft EIR. Potential impacts associated with geology, soils, seismicity and mineral resources resulting from the Draft General Plan are analyzed and mitigation measures are recommended, as appropriate.

1. Setting

This section describes the existing conditions in Yolo County, including the physical environment, the seismic and geologic hazards within the County and the regulatory environment regarding geology, soils, seismicity and mineral resources.

a. Physical Environment. The geology, topography, soils and mineral resources within the County are described below.

(1) Geology and Topography. Roughly the eastern 70 percent of the County is located in the Great Valley geomorphic province of California, and consists of gently sloping to level alluvial plains. The remaining portion of the County is in the Coast Range geomorphic province.[2] Elevations in the County range from slightly above sea level in the southeastern corner of the County to more than 3,000 feet in the western area in the Coast Range. Geologic units in the Great Valley area generally consist of Quaternary alluvium or basin deposits, and the Quaternary Modesto and Riverbank Formations, both of which consist of somewhat older alluvium. Projecting into the valley area northwest of Woodland are the Dunnigan Hills. These consist of dissected and rolling terraces of the Tehama Formation (non-marine sandstone, siltstone, and volcaniclastic[3] rocks).

The western Coast Range portion of the County consists of moderately sloping to very steep uplands and terraces and is characterized by parallel ridges and valleys that trend slightly west of north. The rocks in the Coast Range consist of a number of Quaternary and Cretaceous geologic formations, including upturned marine sandstones, shales, mudstones, and conglomerates, with some volcaniclastic rocks. A small area of ultramafic rocks, one of which may contain serpentinite, occurs along Little Blue Ridge, west of Rumsey.[4]

(2) Volcanism. The Cascades Mountain range extends for more than 700 miles from Fraser River in southern British Columbia, Canada to Lassen Peak in northern California. Most of the

[1] Jones and Stokes, 2005. Background Report for the Yolo County General Plan Update, prepared for Yolo County, January.

[2] California Geological Survey, 2002, *California Geomorphic Provinces, Note 36*, California Dept. of Conservation.

[3] Rocks composed principally of broken rock fragments that are derived from pre-existing rocks or minerals and have been transported from their place of origin, in this case, consisting of volcanic fragments or sediments.

[4] Jones and Stokes, 2005. op. cit.

summits are extinct volcanoes, but Lassen Peak and several others have erupted in the recent past.[5] Three episodes of volcanism have occurred in the vicinity of the Lassen volcanic center in the past 1,100 years. These eruptions occurred at Chaos Crags, Cinder Cone, and lastly at Lassen Peak in 1914-1917. The most destructive explosion in this recent sequence at Lassen occurred on May 21, 1915 when a pyroclastic flow devastated forests as far as 4.1 miles northeast of the summit and lahars swept down several valleys radiating from the volcano. An ash plume rose more than 5.5 miles above the peak, and the prevailing winds scattered the ash across Nevada as far as 300 miles to the east. Lassen Peak is approximately 120 miles to the north-northeast of the County, a similar eruption with southerly winds could produce ash fall in Yolo County. Lassen Peak continued to produce smaller eruptions until about the middle of 1917.

The Clear Lake volcanic field is the westernmost site of recent volcanism in California, and is far to the west of the Cascade Range. The Clear Lake volcanic field contains lava domes, cinder cones, and maars (shallow, flat-floored craters). Mount Konocti, about 20 miles west-northwest of Yolo County, is the largest volcanic feature. Clear lake volcanism has been largely non-explosive, with the latest eruptive activity ending about 10,000 years ago. South of Clear Lake in the Mayacmas Mountains, a large silicic magma chamber provides the heat source for the Geysers, an actively producing geothermal field.

(3) Soils. Yolo County contains important soil resources. Twelve soil associations have been identified in Yolo County, as shown in Table IV.L-1. Seven of the associations are on lowland alluvial fans or are in basins. The remaining five associations are on uplands or terraces. Agricultural soil resources (e.g., Prime Farmland) are described in Section IV.B, Agriculture, of this Draft EIR. Soil characteristics from a geologic hazard perspective (e.g., expansive soils) are discussed below in the Seismic and Geologic Hazards subsection. Table IV.L-2 summarizes soil association characteristics that are not already provided in the legend of Figure IV.L-1.[6]

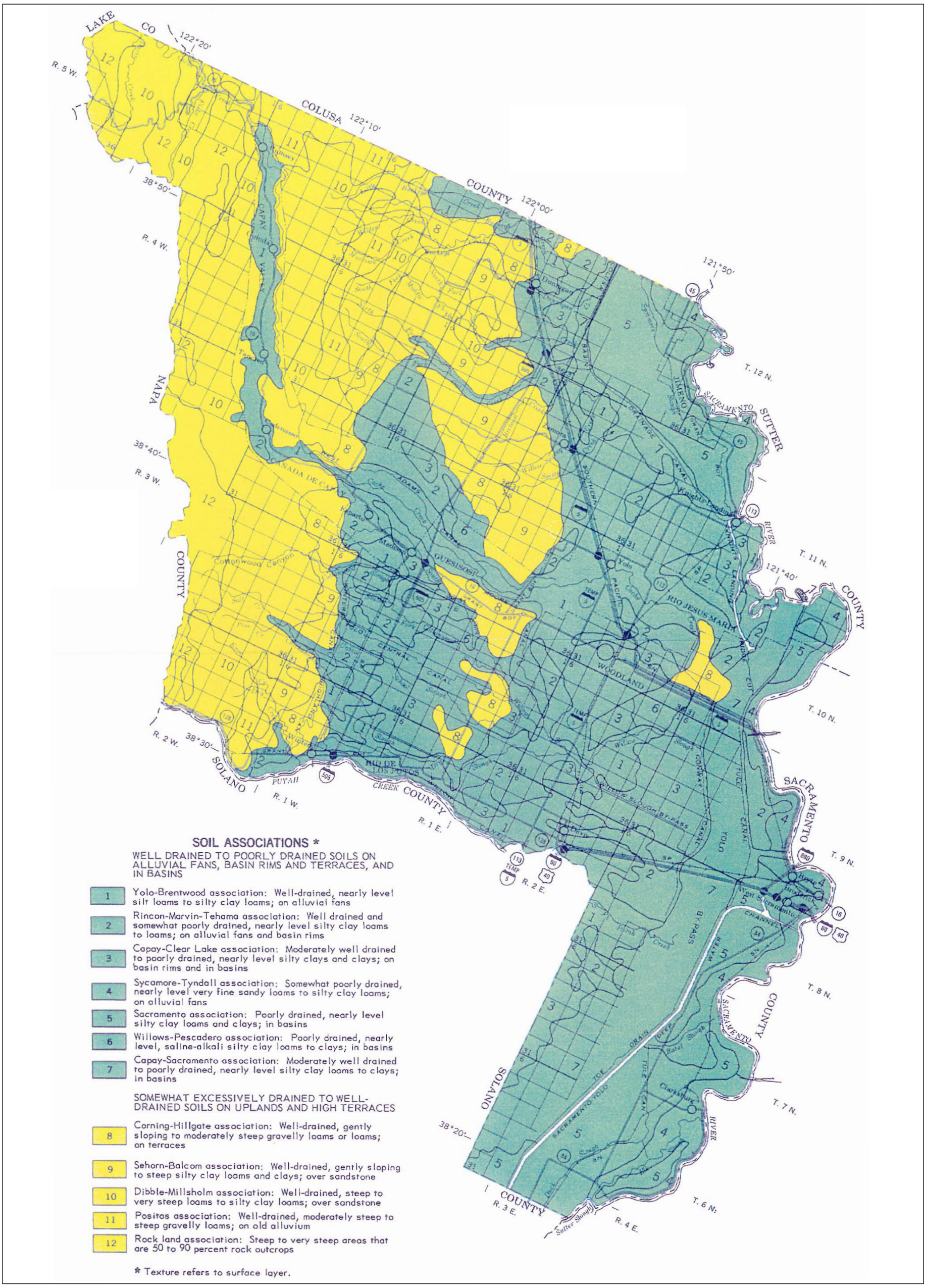
(4) Mineral Resources. Yolo County contains important mineral resources.[7] A variety of minerals were once mined in the County. The chief minerals presently mined are aggregate and natural gas.

Gold and Silver. The McLaughlin Mine is located in the northeastern corner of Yolo County, and extends into Napa and Lake Counties. It ceased gold and silver production operations in 2002. In the past, small amounts of gold and silver were mined from Cache and Putah Creeks. Mercury was mined in the northwestern part of the County, reached a peak of production during the first and second World Wars, and ceased in 1952.

[5] USGS, 2008. California Volcanoes and Volcanics, USGS Cascades Volcano Observatory. Accessed 12/04/08 at: vulcan.wr.usgs.gov/Volcanoes/California/framework.html.

[6] Jones and Stokes, 2005. op. cit.

[7] Jones and Stokes, 2005. op. cit.



SOIL ASSOCIATIONS *

WELL DRAINED TO POORLY DRAINED SOILS ON ALLUVIAL FANS, BASIN RIMS AND TERRACES, AND IN BASINS

1. Yolo-Brentwood association: Well-drained, nearly level silt loams to silty clay loams; on alluvial fans
2. Rincon-Marvin-Tehama association: Well drained and somewhat poorly drained, nearly level silty clay loams to loams; on alluvial fans and basin rims
3. Capay-Clear Lake association: Moderately well drained to poorly drained, nearly level silty clays and clays; on basin rims and in basins
4. Sycamore-Tyndall association: Somewhat poorly drained, nearly level very fine sandy loams to silty clay loams; on alluvial fans
5. Sacramento association: Poorly drained, nearly level silty clay loams and clays; in basins
6. Willows-Pescadero association: Poorly drained, nearly level, saline-alkali silty clay loams to clays; in basins
7. Capay-Sacramento association: Moderately well drained to poorly drained, nearly level silty clay loams to clays; in basins

SOMEWHAT EXCESSIVELY DRAINED TO WELL-DRAINED SOILS ON UPLANDS AND HIGH TERRACES

8. Corning-Hillgate association: Well-drained, gently sloping to moderately steep gravelly loams or loams; on terraces
9. Sehorn-Balcom association: Well-drained, gently sloping to steep silty clay loams and clays; over sandstone
10. Dibble-Millsholm association: Well-drained, steep to very steep loams to silty clay loams; over sandstone
11. Positas association: Well-drained, moderately steep to steep gravelly loams; on old alluvium
12. Rock land association: Steep to very steep areas that are 50 to 90 percent rock outcrops

* Texture refers to surface layer.

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FIGURE IV.L-1

Yolo County 2030 Countywide General Plan EIR

Regional Soils

SOURCE: JONES & STOKES, 2005

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Table IV.L-1: Soil Associations for Yolo County

Soil Association Name	Water Erosion Hazard	Linear Extensibility (shrink-swell)	Corrosivity (uncoated steel)	Soil Limitations for Septic Tank Filter Field
Yolo- Brentwood	None to slight	Yolo: Moderate Brentwood: High	Yolo: Low to Moderate Brentwood: High	Yolo: Moderate to Severe Brentwood: Severe
Rincon-Marvin- Tehema	None to slight	Rincon: Mod/High Marvin: Mod/High Tehema: Moderate	Rincon: Mod/High Marvin: High Tehema: Low/Moderate	Severe
Capay-Clear Lake	None to slight	High for most subtypes	High	Severe
Sycamore- Tyndall	None to slight	Moderate to High	Sycamore: High Tyndall: Low/Moderate	Severe for most subtypes
Sacramento	None to slight	Moderate to High	High	Severe
Willows- Pescadero	None to slight	Moderate to High	High	Severe
Capay- Sacramento	None to slight	High for most subtypes	High	Severe
Corning- Hillgate	Slight to high	Low to High	Low to High	Severe
Sehorn-Balcom	Moderate to very high	Sehorn: High Balcom: Moderate	Sehorn: High Balcom: Moderate	Severe
Dibble- Millsolm	Moderate to very high	Dibble: High Millsolm: Moderate	Dibble: High Millsolm: Moderate	Severe
Positas	Moderate to high	Low to High	Low to High	Severe
Rock land	Very high	--	--	--

Note: See legend on Figure IV.L-1 for thickness, texture, and landform characteristics of the soil associations.
Source: Soil Survey of Yolo County, California, June 1972.

Aggregate. The State of California has mapped the aggregate resources along lower Cache Creek as three Mineral Resource Zones: MRZ-1 comprises 1,458 acres, MRZ-2 comprises 18,452 acres, and MRZ-3 comprises 8,220 acres.[8] The Aggregate Resources Areas, including the extent of MRZ-2, is shown in Figure IV.L-2. Six aggregate mines (listed below) are currently operational in the County; all are located on the stream terraces of Cache Creek. All are commercial operations.[9]

- Syar Industries, Inc. (Madison plant)
- Teichert Aggregates (Esparto plant)
- CEMEX, Inc. (Madison plant)
- Granite Construction Company (Capay plant)
- Teichert Aggregates (Woodland plant)
- Schwarzgruber & Sons (Cache Creek plant)

Natural Gas. In recent years, natural gas has become more important to the regional economy. According to the California Department of Conservation (CDC) there are approximately 25 gas fields located within Yolo County.[10,11] Natural gas has been produced from the Dunnigan Hills northwest of Woodland, from the Fairfield Knolls gas field northeast of Winters, and from the Rumsey Hills area east of Rumsey. Natural gas wells have also been established in Clarksburg, Yolo, and Davis. A large

[8] See subsection 1.b(2) in this Chapter for a description of MRZ Classifications.

[9] Ibid.

[10] CDC, 2000. Energy Map of California, Map S-2, 3rd Edition.

[11] CDC, 2001. Oil, Gas, and Geothermal Fields in California, Map S-1

gas storage area (maximum capacity of 3.25 billion cubic feet) has been identified at the dry Pleasant Creek gas field, located approximately 2.5 miles northwest of Winters (see Figure IV.L-2).[12,13]

(5) Seismic and Geologic Hazards. This section describes the hazards associated with the geologic conditions and the potential for seismic events in the County.

Earthquakes and Surface Rupture. Surface rupture occurs when the ground surface is broken due to fault movement during an earthquake. Regional faults identified by the CGS are shown in Figure IV.L-3. The location of surface rupture generally can be assumed to be along an active major fault trace. The only fault in the County that has been identified by the CGS to be active, or potentially active, and subject to surface rupture (i.e., is delineated as an Alquist-Priolo Earthquake Fault zone) is the Hunting Creek Fault (sometimes referred to as the Hunting Creek-Berryessa Fault). The fault is located in the extreme northwestern corner of the County. Only a very short section of the fault occurs in the County; most of the trace is located in Lake and Napa counties. The Hunting Creek Fault is a right-lateral fault and has an average slip rate of 6 mm per year.[14] The maximum expected earthquake for this fault is estimated to be magnitude (M_w) 6.9 (earthquake magnitude is described more fully in the following paragraph). The only other active or potentially active fault in the County is the Dunnigan Hills Fault, which extends west of Interstate 5 between the town of Dunnigan and northwest of the town of Yolo. The fault has caused Holocene (i.e., the last 11,000 years) displacement, but not during historic (approximately 200 years) times. This fault is considered potentially active, but has not been delineated by the CGS as an Alquist-Priolo Earthquake Fault Zone, indicating that the CGS does not considered it likely to generate surface rupture. A number of older faults (e.g., Capay, Sweitzer, East Valley, and West Valley faults) occur in the western part of the County; however, displacement of these faults apparently occurred more than 1.6 million years ago. Accordingly, these faults are generally considered inactive. No known faults are located in any of the major inhabited areas of the County. The Coast Range-Sierran Block Boundary is partially located in the County, and is discussed below under seismic shaking sources.

Seismic Shaking. Seismic shaking (or ground shaking) is a general term referring to all aspects of motion of the earth's surface resulting from an earthquake, and is normally the major cause of damage in seismic events. The extent of ground shaking is controlled by the magnitude and intensity of the earthquake, distance from the epicenter, and local geologic conditions. Magnitude is a measure of the energy released by an earthquake; it is assessed by seismographs that measure the amplitude of seismic waves. Intensity is a subjective measure of the perceptible effects of seismic energy at a given point and varies with distance from the epicenter and local geologic conditions. The Modified Mercalli Intensity Scale (MMI) is the most commonly used scale for measurement of the subjective effects of earthquake intensity (Table IV.L-2). Intensity can also be quantitatively measured using accelerometers (strong motion seismographs) that record ground acceleration at a specific location, a measure of force applied to a structure under seismic shaking. Acceleration is measured as a fraction or percentage of the acceleration under gravity (g).

[12] CDC, 2006. Annual Report of the State Oil & Gas Supervisor, Division of Oil, Gas and Geothermal Resources. Publication PR06.

[13] Jones and Stokes, 2005. op. cit.

[14] Jones and Stokes, 2005. op. cit.

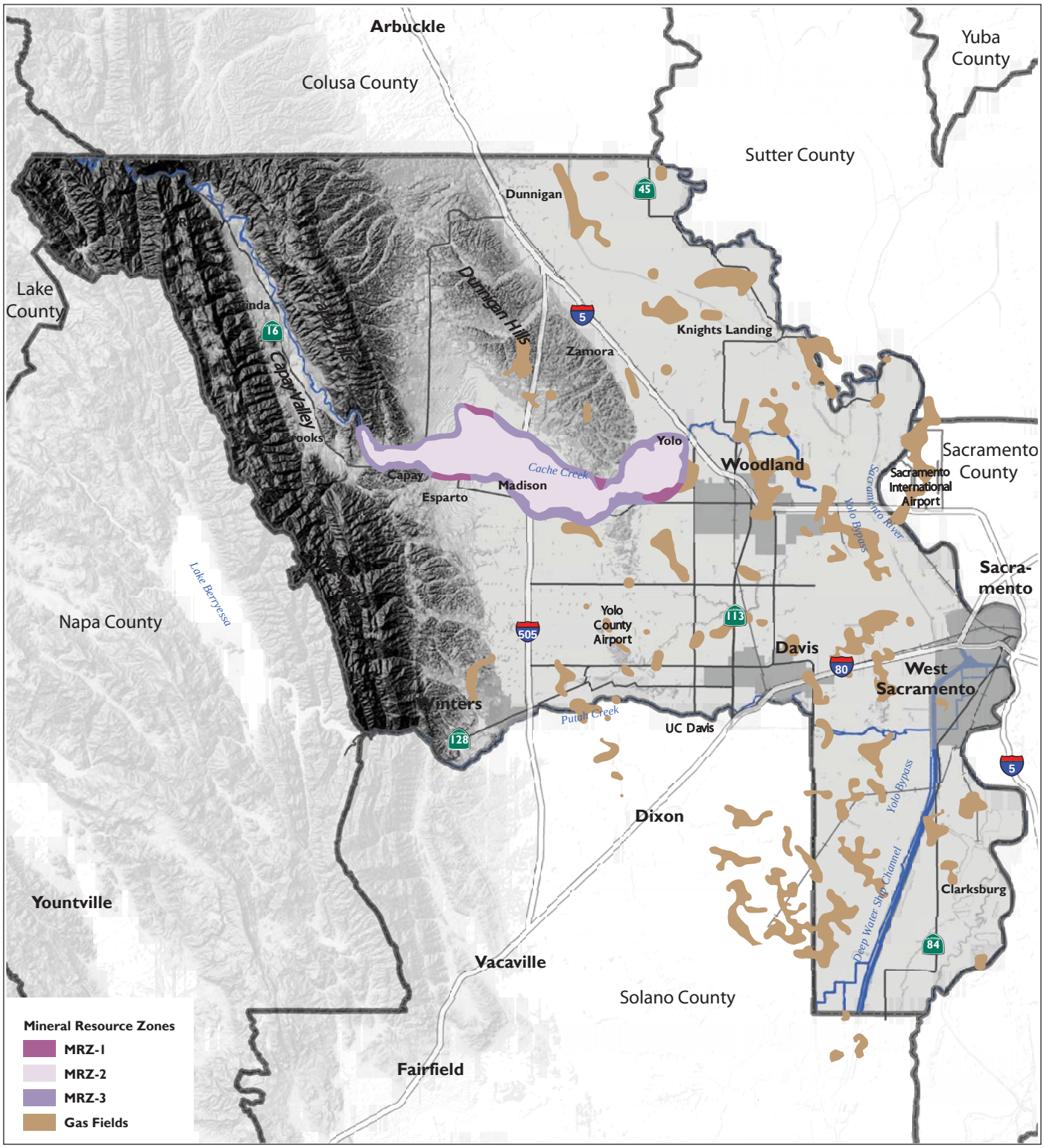

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FIGURE IV.L-2

Yolo County 2030 Countywide General Plan EIR
Regional Mineral and Gas Resources

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SOURCE: COUNTY OF YOL0, 2009.

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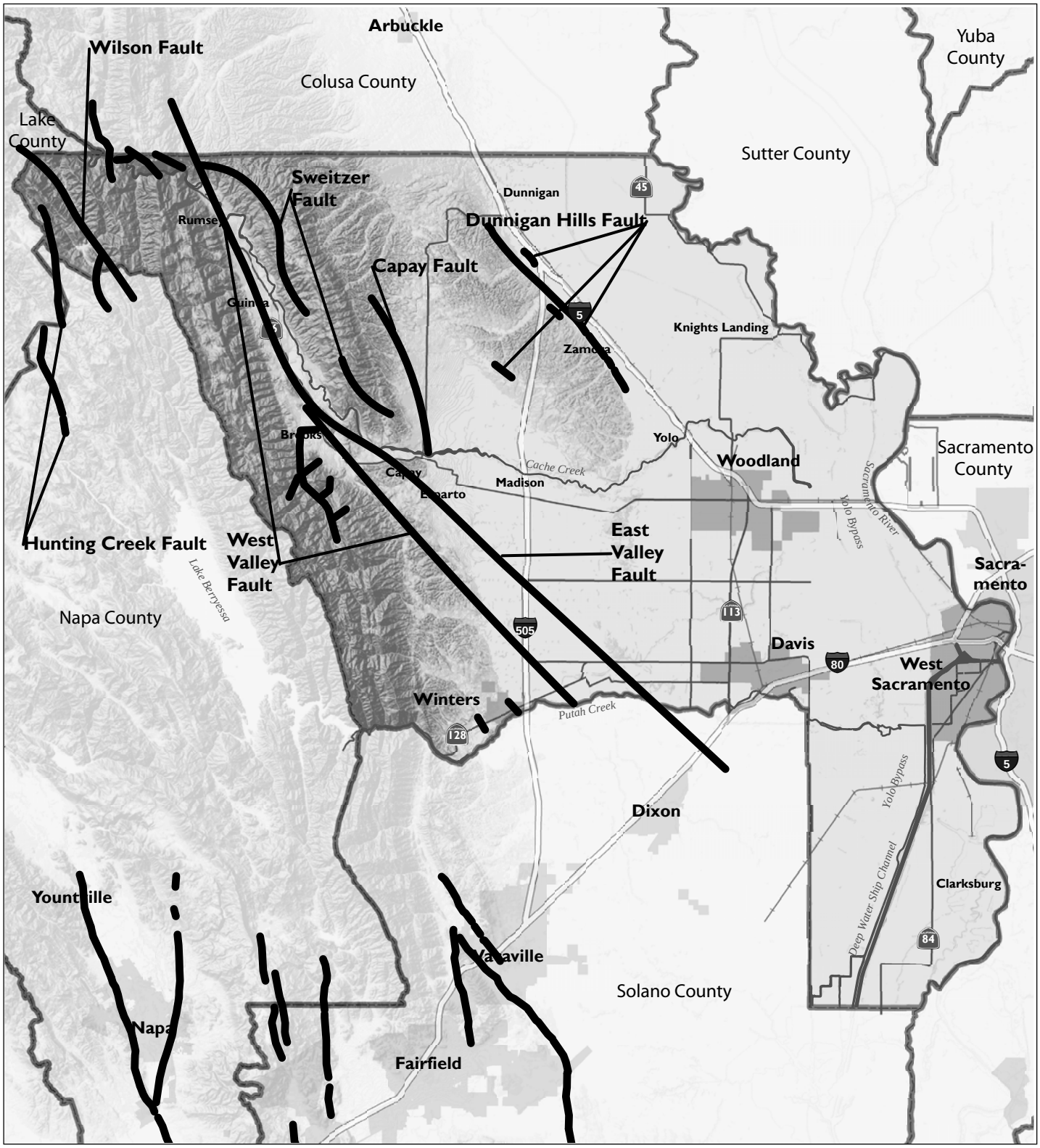

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FIGURE IV.L-3

Yolo County 2030 Countywide General Plan EIR
Faults

SOURCE: USGS, 1996; COTTON/BRIDGES/ASSOCIATES, 2004; YOLO COUNTY GIS, 2009

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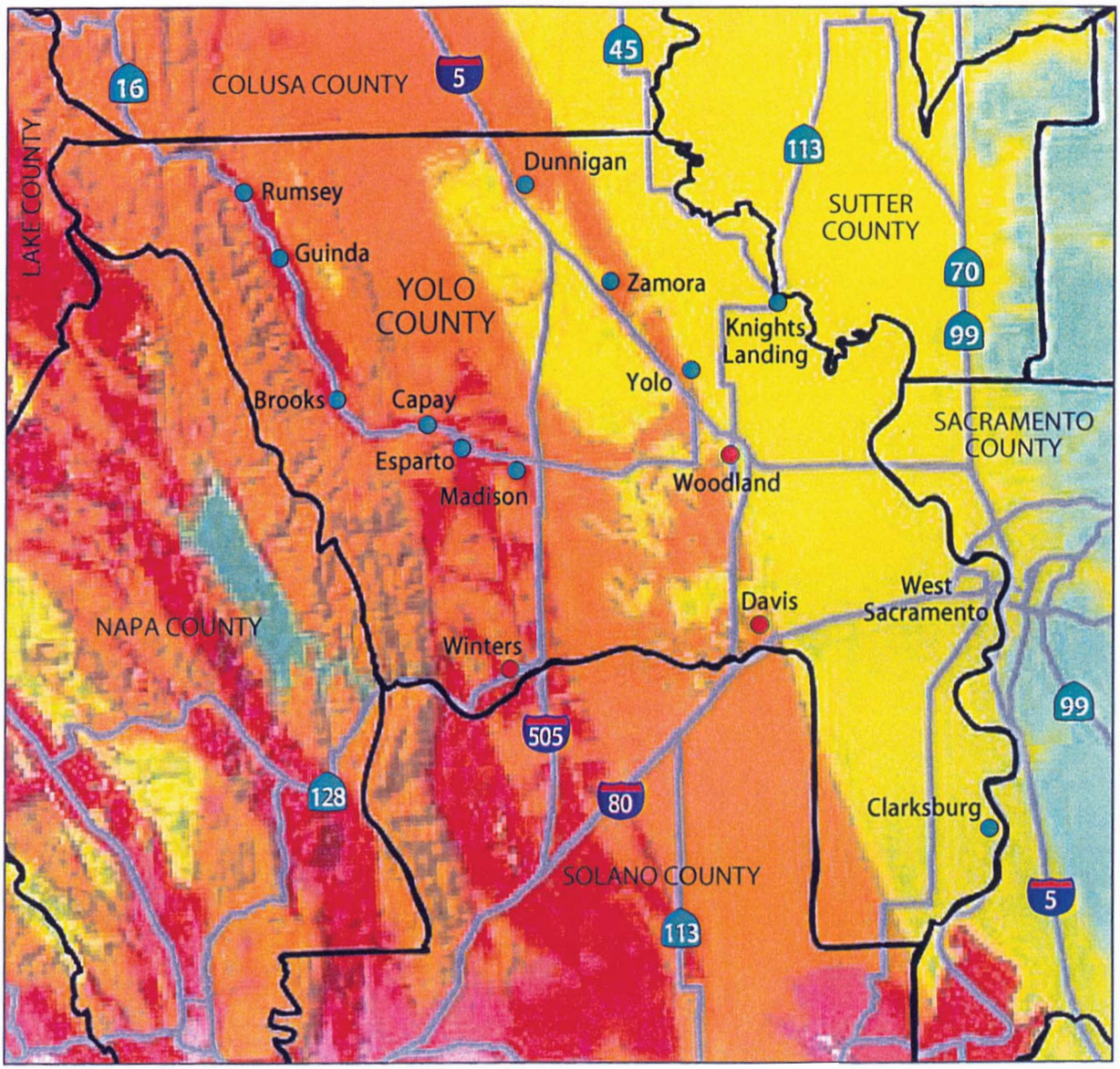
Table IV.L-2: Modified Mercalli Scale

M[a]	Category	Definition
	I	Not felt except by a very few under especially favorable circumstances.
3	II	Felt only by a few persons at rest, especially on upper floors of buildings. Delicately suspended objects may swing.
	III	Felt quite noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibration like passing of truck. Duration estimated.
4	IV	During the day felt indoors by many, outdoors by few. At night some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
	V	Felt by nearly everyone, many awakened. Some dishes, windows, etc., broken; a few instances of cracked plaster; unstable objects overturned. Disturbances of trees, poles, and other tall objects sometimes noticed. Pendulum clocks may stop.
5	VI	Felt by all, many frightened and run outdoors. Some heavy furniture moved; a few instances of fallen plaster or damaged chimneys. Damage slight.
6	VII	Everybody runs outdoors. Damage negligible in building of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving motor cars.
	VIII	Damage slight in specially designed structures; considerable in ordinary substantial buildings, with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Persons driving motor cars disturbed.
7	IX	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken.
8	X	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from river banks and steep slopes. Shifted sand and mud. Water splashed (slopped) over banks.
	XI	Few, if any, (masonry) structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.
	XII	Damage total. Practically all works of construction are damaged greatly or destroyed. Waves seen on ground surface. Lines of sight and level are distorted.

[a] Richter magnitude correlation.
Source: California Geological Survey, 2002, How Earthquakes and Their Effects are Measured.

In addition to the Hunting Creek and Dunnigan Hills faults discussed above, major regional faults outside the County but in the Coast Ranges and in the Sierra Nevada foothills are capable of producing ground shaking in the County. As shown in Figure IV.L-4, the area is subject to range of ground shaking levels. The April 19, 1892 Vacaville-Winters earthquake measured approximately 6.9 on the Richter scale and caused severe damage in Winters and lesser damage in Davis, Woodland, and elsewhere in the County. The 1892 Vacaville-Winters earthquake was once attributed to the large regional feature, referred to as the Midland Fault, which extends into the County a short distance near Winters. The earthquake is now regarded by the CGS to have originated from a segment of a complex zone of faults, referred to as the Coast Range-Sierran Block Boundary (CRSBB), at the edge the western side of the lower Sacramento Valley.[15] The CRSBB forms the western geomorphic boundary

[15] Jones and Stokes, 2005. op. cit.



Level of Earthquake Hazard

These regions are near major, active faults and will on average experience stronger earthquake shaking more frequently. This intense shaking can damage even strong, modern buildings.

Range in Yolo County

Increasing Intensity

These regions are distant from known, active faults and will experience lower levels of shaking less frequently. In most earthquakes, only weaker, masonry buildings would be damaged. However, very infrequent earthquakes could still cause strong shaking here.

LSA

Legend

- Counties
- Cities
- Unincorporated Areas
- Major Roads

N

0 6 12

MILES

Note: Original map prepared for a statewide assessment. Some of the hazard levels do not occur within or near Yolo County.

Source: California Geological Survey, undated.

FIGURE IV.L-4

Yolo County 2030 Countywide General Plan EIR

Regional Ground Shaking Hazard

SOURCE: JONES & STOKES, 2005

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of the Central Valley with the Coast Ranges to the west. The CRSBB is currently recognized as a potential seismic source capable of generating moderate earthquakes that could affect the County.

Recent evaluations of the CRSBB indicate that tectonic compression occurs across the boundary as the Coast Range Block is tectonically pushed beneath the Sierran Block. The result of this active compression is the development of folds and thrust faults within the CRSBB. The faults associated with this zone do not typically propagate to the surface and are, therefore, called "blind thrusts." Because the faults are not expressed at the surface, identification of the locations of the faults cannot typically be determined on the basis of geomorphic evidence. However, the compressional zone is considered capable of generating moderate to large earthquakes that could produce strong seismic shaking throughout the region, including Yolo County.[16] Eleven moderate earthquakes (M 5.8 to 6.8) have been documented along the CRSBB zone during the last 150 years. The 1983 Coalinga earthquake (M 6.7) is a more recent example of an earthquake that occurred on a blind thrust within the CRSBB zone.

Peak Acceleration. Estimates of the peak ground acceleration have been made by the State for the Draft General Plan area based on probabilistic models that account for multiple seismic sources. Under these models, consideration of the probability of expected seismic events is incorporated into the determination of the level of ground shaking at a particular location. The expected peak horizontal acceleration (with a 10 percent chance of being exceeded in the next 50 years) generated by any of the seismic sources potentially affecting the Draft General Plan area is estimated by the California Geological Survey at about 0.21g[17] on the alluvium of the east County, to 0.47g in the foothills below Lake Berryessa and upper Cache Creek area.[18] This level of ground shaking in the Draft General Plan area is a potentially significant hazard.

(6) Liquefaction and Lateral Spreading. Liquefaction is the temporary transformation of loose, saturated granular sediments from a solid state to a liquefied state as a result of seismic ground shaking. In the process, the soil undergoes transient loss of strength, which commonly causes ground displacement or ground failure to occur. Since saturated soils are a necessary condition for liquefaction, soil layers in areas where the groundwater table is near the surface have higher liquefaction potential than those in which the water table is located at greater depths. No map of liquefaction hazard has been prepared on a Countywide basis. Upland areas are at relatively low risk of liquefaction, except in the intermountain valleys underlain by alluvium and shallow groundwater. Liquefaction is expected to be relatively higher in the Great Valley portion of the County, particularly along the floodplains of streams, where the sediments are generally sandier than other areas. Liquefaction may also lead to lateral spreading. Lateral spreading is a form of horizontal displacement of soil toward an open channel or other "free" face, such as an excavation boundary. Lateral spreading can result from either the slump of low cohesion unconsolidated material or more commonly by liquefaction of either the soil layer or a subsurface layer underlying soil material on a

[16] Working Group on Northern California Earthquake Potential, 1996. Database of Potential Sources for Earthquakes Larger Than Magnitude 6 in Northern California, US Department of the Interior OFR 96-705.

[17] Measured as a fraction or percentage of the acceleration compared to gravity (g).

[18] California Geological Survey (CGS), 2008, Probabilistic Seismic Hazards Mapping Ground Motion Page, accessed 29 November 2008, www.consrv.ca.gov/cgs/rghm/pshamap/pshamain.html.

slope, resulting in gravitationally driven movement.[19] Areas most prone to lateral spreading are those that consist of fill material that has been improperly engineered, that have steep, unstable banks, and that have high groundwater tables. The banks along the Deep Water Ship Channel and Turning Basin in West Sacramento may have such a condition. Damage caused by liquefaction and lateral spreading is generally most severe when liquefaction occurs within 15 to 20 feet of the ground surface.[20]

(7) Expansive Soils. Expansion and contraction of volume can occur when expansive soils undergo alternating cycles of wetting (swelling) and drying (shrinking). During these cycles, the volume of the soil changes markedly. As a consequence of such volume changes, structural damage to building and infrastructure may occur if the potentially expansive soils were not considered in building design and during construction. The soils of the Draft General Plan area generally have moderate to high shrink-swell potential and are classified as expansive soils, as shown in Figure IV.L-5.[21]

(8) Slope Stability. Slope failure can occur as either rapid movement of large masses of soil ("landslide") or slow, continuous movement ("creep"). The primary factors influencing the stability of a slope are: 1) the nature of the underlying soil or bedrock, 2) the geometry of the slope (height and steepness), 3) rainfall, and 4) the presence of previous landslide deposits. Landslides are commonly triggered by unusually high rainfall and the resulting soil saturation, by earthquakes, or a combination of these conditions. The general term "landslide" may include a wide range of slope failures, including but not limited to rock falls, deep failure of slopes, earthflows, and shallow debris flows. Some landslides occur as a result of human activities, such as timber harvest, undermining a slope, and improper drainage water management. Steep slopes underlain by Cretaceous rocks along Cache Creek are susceptible to landsliding and numerous large and small landslides have been mapped in this area. However, as shown in Figure IV.L-6, except for the communities of Capay and Brooks, landslides are generally not a significant hazard to life or property in the County. Most of the areas subject to landsliding are in agricultural use (e.g., grazing) or are otherwise undeveloped.

(9) Settlement and Differential Settlement. Settlement or differential settlement could occur if buildings or other improvements were built on low-strength foundation materials (including imported fill) or if improvements straddle the boundary between different types of subsurface materials (e.g., a boundary between native material and fill). Although differential settlement generally occurs slowly enough that its effects are not dangerous to inhabitants, it can cause significant building damage over time. Portions of the Draft General Plan area that contain loose or uncontrolled (non-engineered) fill may be susceptible to differential settlement.

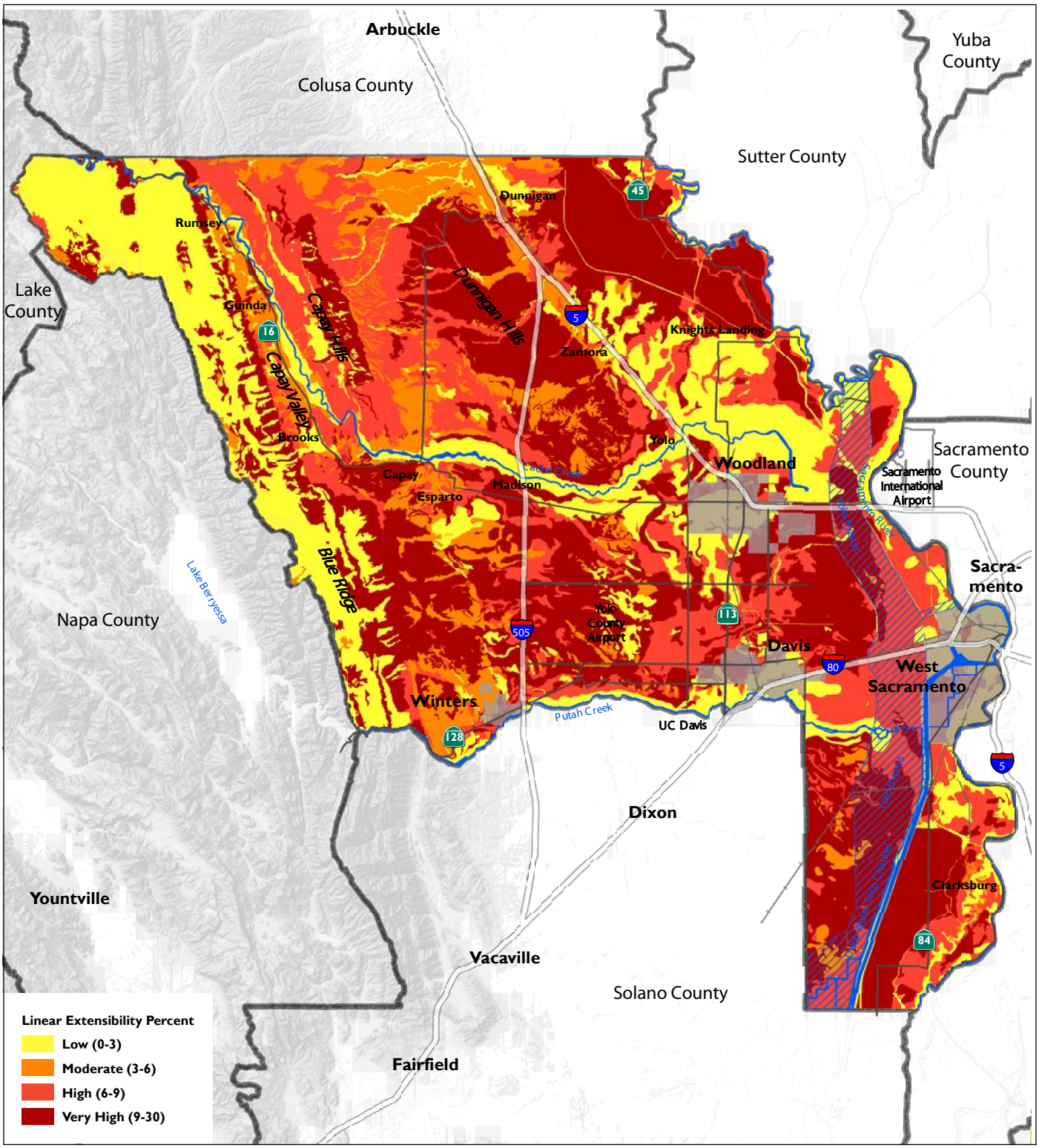
b. Regulatory Framework. This section describes the applicable federal, State and local regulations that pertain to Yolo County.

(1) Federal Regulations – National Earthquake Hazards Reduction Program. The National Earthquake Hazards Reduction Program (NEHRP) was established by the U.S. Congress

[19] Rauch, Alan F., 1997, *EPOLLS: An Empirical Method for Predicting Surface Displacements due to Liquefaction-Induced Lateral Spreading in Earthquakes*, Ph. D. Dissertation, Virginia Tech, Blacksburg, VA.

[20] Jones and Stokes, 2005. op. cit.

[21] Natural Resources Conservation Service, 2007, op. cit.



LSA

FIGURE IV.L-5

Yolo County 2030 Countywide General Plan EIR
Expansive Soils

0 5 10
MILES

SOURCE: NATURAL RESOURCES CONSERVATION SERVICE, 2007; COUNTY OF YOL0, 2009.

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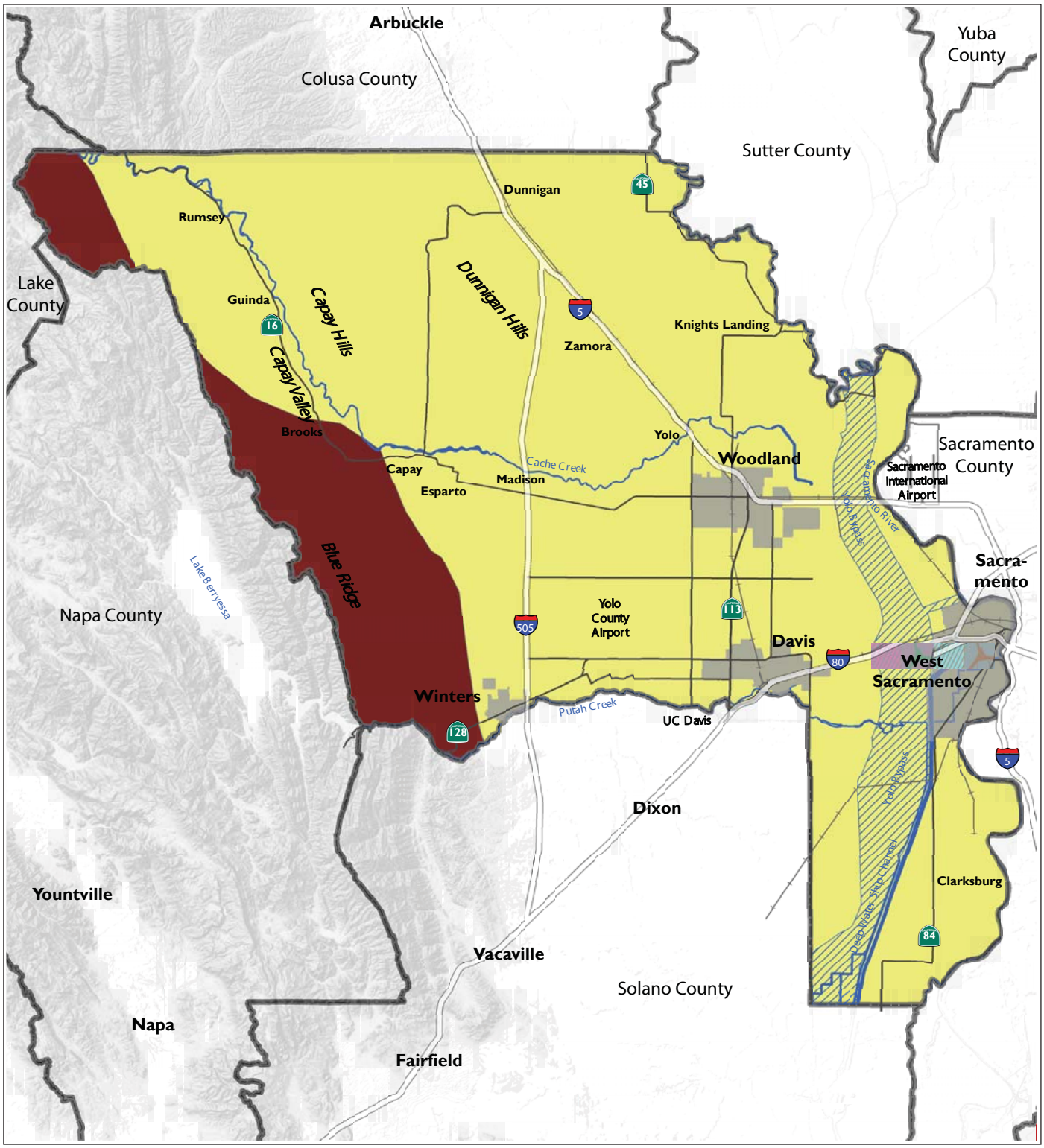

LSA

FIGURE IV.L-6

Yolo County 2030 Countywide General Plan EIR
Landslide Susceptibility

SOURCE: USGS, 2001; COUNTY OF YOLO, 2009.

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when it passed the Earthquake Hazards Reduction Act of 1977, Public Law (PL) 95–124. In establishing NEHRP, Congress recognized that earthquake-related losses could be reduced through improved design and construction methods and practices, land use controls and redevelopment, prediction techniques and early-warning systems, coordinated emergency preparedness plans, and public education and involvement programs. The four basic NEHRP goals remain unchanged:

- Develop effective practices and policies for earthquake loss reduction and accelerate their implementation.
- Improve techniques for reducing earthquake vulnerabilities of facilities and systems.
- Improve earthquake hazards identification and risk assessment methods, and their use.
- Improve the understanding of earthquakes and their effects.

Several key Federal agencies contribute to earthquake mitigation efforts. There are four primary NEHRP agencies:

- National Institute of Standards and Technology (NIST) of the Department of Commerce
- National Science Foundation (NSF)
- United States Geological Survey (USGS) of the Department of the Interior
- Federal Emergency Management Agency (FEMA) of the Department of Homeland Security

Implementation of NEHRP priorities is accomplished primarily through original research, publications, and recommendations to assist and guide State, regional, and local agencies in the development of plans and policies to promote safety and emergency planning.

State. State regulations described below include the California Building Code, Alquist-Priolo Earthquake Fault Zoning Act, Seismic Hazards Mapping Act, regulations pertaining to oil, gas, and geothermal wells, and the Surface Mining and Reclamation Act of 1975.

California Building Code. The (2006) Uniform Building Code (UBC) is published by the International Conference of Building Officials (ICBO), and is the widely adopted model building code in the United States. The (2007) California Building Code (CBC) is another name for the body of regulations known as the California Code of Regulations (CCR), Title 24, Part 2, which is a portion of the California Building Standards Code (CBSC). The CBC incorporates by reference the UBC requirements with necessary California amendments. Title 24 is assigned to the California Building Standards Commission, which, by law, is responsible for coordinating all building standards. Under State law, all building standards must be centralized in Title 24 or they are not enforceable. Compliance with the 2007 California Building Code (CBC) requires that (with very limited exceptions) structures for human occupancy be designed and constructed to resist the effects of earthquake motions. The Seismic Design Category for a structure is determined in accordance with either; CBC Section 1613 - *Earthquake Loads*: or, American Society of Civil Engineers (ASCE) Standard No. 7-05, *Minimum Design Loads for Buildings and Other Structures*. In brief, based on the engineering properties and soil-type of soils at a proposed site, the site is assigned a Site Class ranging from A to F. The Site Class is then combined with Spectral Response (ground acceleration induced by earthquake) information for the location to arrive at a *Seismic Design Category* ranging from A to D; D being the most severe conditions. The classification of the site and related calculations must be determined by a qualified person and are site-specific.

Alquist-Priolo Earthquake Fault Zoning Act (A-PEFZA). Surface rupture is the most easily avoided seismic hazard. The A-PEFZA was passed in December 1972 to mitigate the hazard of surface faulting to structures for human occupancy. The A-PEFZA's main purpose is to prevent the construction of buildings used for human occupancy on the surface trace of active faults. The A-PEFZA only addresses the hazard of surface fault rupture and is not directed toward other earthquake hazards (the Seismic Hazards Mapping Act, passed in 1990, addresses non-surface fault rupture earthquake hazards, including liquefaction and seismically induced landslides). The law requires the State Geologist to establish and map regulatory zones, known as Earthquake Fault Zones, around the surface traces of active faults and to issue appropriate maps. The maps are distributed to all affected cities, counties, and State agencies for their use in planning and controlling new or renewed construction. Local agencies must regulate most development projects within the zones. Projects include all land divisions and most structures for human occupancy. Before a project can be permitted, agencies must require a geologic investigation to demonstrate that proposed buildings will not be constructed across active faults. The evaluation and written report of a specific site must be prepared by a licensed geologist. If an active fault is found, a structure for human occupancy cannot be placed over the trace of the fault and must be set back 50 feet from the fault trace.

Seismic Hazards Mapping Act (SHMA). In 1990, following the Loma Prieta earthquake, the California Legislature enacted the SHMA to protect the public from the effects of strong ground shaking, liquefaction, landslides and other seismic hazards. The SHMA established a State-wide mapping program to identify areas subject to violent shaking and ground failure; the program is intended to assist cities and counties in protecting public health and safety. The SHMA requires the State Geologist to delineate various seismic hazard zones and requires cities, counties, and other local permitting agencies to regulate certain development projects within these zones. As a result, the California Geologic Survey is mapping SHMA Zones and has completed seismic hazard mapping for the portions of California most susceptible to liquefaction, ground shaking, and landslides: primarily the San Francisco Bay area and Los Angeles basin. Before a development permit is granted for a site within a seismic hazard zone, a geotechnical investigation of the site must be conducted and appropriate mitigation measures incorporated into the project design. At the time of the preparation of this Draft EIR, the County has not yet been mapped in conformance with the SHMA.

Oil, Gas, and Geothermal Wells Regulations. The California Department of Conservation's Division of Oil, Gas, and Geothermal Resources oversee the drilling, operation, maintenance, and plugging and abandonment of oil, natural gas, and geothermal wells.[22] The regulatory program emphasizes the development of oil, natural gas, and geothermal resources in the State through sound engineering practices that protect the environment, prevent pollution, and ensure public safety. Other agencies that may be involved in the regulation of drilling wastes include the State Water Resources Control Board and appropriate Regional Water Quality Control Boards, the California Integrated Waste Management Board, the California Air Resources Board and appropriate Air Quality Management Districts or Air Pollution Control Districts, and the Department of Toxic Substances Control.[23] Applicable State law comes from the California Code of Regulations (CCR) Title 14, Natural Resources of the California; Division 2, Chapter 4, Development, Regulation, and Conservation of Oil and Gas Resources. This chapter governs natural gas well drilling, operation, and

[22] Resources Agency, 2007. Publication No. PRC04: California Code of Regulations, Title 14, Division, 2, Chapters 2-4. Division of Gas, Oil and Geothermal Resources, March.

[23] Drilling Waste Management Systems, 2008. State Regulations: California, US Department of Energy: the Argonne National Laboratory Project, accessed 11/28/08 at: web.ead.anl.gov/dwm/contact/index.cfm

abandonment procedures. It provides detailed standards and regulations that operators and local jurisdictions must comply with.[24]

Surface Mining and Reclamation Act of 1975. The principal legislation addressing mineral resources in California is the State Surface Mining and Reclamation Act of 1975 (SMARA) (Public Resources Code Sections 2710–2719), which was enacted in response to land use conflicts between urban growth and essential mineral production. The stated purpose of SMARA is to provide a comprehensive surface mining and reclamation policy that will encourage the production and conservation of mineral resources while ensuring that adverse environmental effects of mining are prevented or minimized; that mined lands are reclaimed and residual hazards to public health and safety are eliminated; and that consideration is given to recreation, watershed, wildlife, aesthetic, and other related values. [25]

SMARA provides for the evaluation of an area's mineral resources using a system of Mineral Resource Zone (MRZ) classifications that reflect the known or inferred presence and significance of a given mineral resource. The MRZ classifications are based on available geologic information, including geologic mapping and other information on surface exposures, drilling records, and mine data; and socioeconomic factors such as market conditions and urban development patterns. The MRZ classifications are defined as follows:

MRZ-1—Areas where adequate information indicates that no significant mineral deposits are present, or where it is judged that little likelihood exists for their presence.

MRZ-2—Areas where adequate information indicates that significant mineral deposits are present, or where it is judged that a high likelihood for their presence exists.

MRZ-3—Areas containing mineral deposits, the significance of which cannot be evaluated from available data.

MRZ-4—Areas where available information is inadequate for assignment into any other MRZ.

SMARA governs the use and conservation of a wide variety of mineral resources. However, certain resources and activities are exempt from the provisions of SMARA. Subject to certain conditions, exempted activities include excavation and grading conducted for farming, onsite construction, or recovery from flooding or other natural disaster. In addition to mineral resource conservation, SMARA regulates surface mining in California. The California Mining and Geology Board have established mine reclamation regulations that fulfill the reclamation requirements of SMARA.

A mining report is required to be submitted annually by mine operators to the Department of Conservation.[26] The report must include such information as the amount of land disturbed during the previous year, acreage reclaimed during the previous year, and amendments made to the reclamation plan. The requirement for an annual monitoring report was added to SMARA in 1990 as a result of

[24] California State Department of Conservation, 2008. Oil, Gas and Geothermal Programs Page, accessed 11/28/08 at: http://www.consrv.ca.gov/dog/Pages/index.aspx.

[25] CGS, 2008. Mineral Resources and Mineral Hazards Mapping Program. Accessed 11/28/08 at: www.consrv.ca.gov/cgs/minerals/Pages/Index.aspx

[26] California Department of Conservation, 2007. *Surface Mining and Reclamation Act and Associated Regulations,* Office of Mine Reclamation, January. Accessed 12/05/08 at: www.conservation.ca.gov/omr/smara/Pages/Index.aspx

AB 3903, Chapter 1101. Reclamation Plan. Before a mining project is approved, a reclamation plan must be prepared and approved by the lead agency. The plan must include such information as the following:

- maximum anticipated depth of extraction,
- quantity and type of materials to be extracted,
- time span of the operation,
- mine waste disposal method,
- manner in which reclamation will be accomplished including erosion control measures,
- post-reclamation land use, and
- how the reclamation will affect future mining in the area.

Additionally, SMARA specifies that lead agencies require financial assurances of each mining operation to ensure reclamation is performed in accordance with the approved reclamation plan. The financial assurances may take the form of surety bonds, irrevocable letters of credit, trust funds, or similar mechanism. Most of the mining operations along Cache Creek are subject to all of SMARA's requirements. However, two of the mines, one of which is inactive, were operating before SMARA was enacted. These "grandfathered" operations are nevertheless subject to certain regulatory requirements, such as providing financial assurances and implementing reclamation plans.[27]

(2) Local Regulations. The Yolo County Municipal Code and the Cache Creek Area Plan contain applicable local regulations as described below.

Yolo County Cache Creek Area Plan. The Off-Channel Mining Plan for Lower Cache Creek (OCMP) together with the Cache Creek Resources Management Plan for Lower Cache Creek (CCRMP) comprise the Cache Creek Area Plan (CCAP). The CCAP describes approaches for managing riparian habitats along Cache Creek from the Capay Dam to I-5, in particular, for restoring habitats, reducing erosion, maintaining flood capacity, and improving water quality. Among the goals of the plan is to promote coordination of local, State, and federal regulation of activities within Cache Creek. The OCMP was established as a comprehensive and integrated planning framework for regulating and protecting the Cache Creek area. The OCMP accommodates gravel mining on the creek terraces (but not in-channel) while emphasizing habitat restoration, open space, and reclamation of mined lands to agricultural use. The OCMP describes a future groundwater recharge and storage program and allows for future recreation opportunities along the creek. The CCRMP is a comprehensive creek management plan that eliminated commercial in-channel aggregate mining, established an improvement program from implementing on-going projects to improve channel stability, and ensured restoration of riparian habitat along creek banks in the future.

Yolo County Code. Regulations provided in the Title 10 of the Yolo County Code are described below.

Chapter 3. The Cache Creek Area Plan In-Channel Maintenance Mining Ordinance was enacted to implement the provisions of the CCAP as related to allowance of in-channel activities. Pursuant to the CCAP, commercial in-channel mining is precluded within Cache Creek. Limited

[27] Jones and Stokes, 2005. op. cit.

excavation activities related to stream stabilization, flood protection, and riparian restoration (referred to as "maintenance mining") may be performed pursuant to the CCRMP and the Cache Creek Improvement Program (CCIP). This maintenance mining is necessary and required in order to protect structures, infrastructure, and land uses along the creek and downstream, from damage from natural creek forces (e.g., flooding, erosion, deposition, washout). Stabilizing the channel banks and profiles pursuant to the CCRMP/CCIP results in reduced erosion, increased in-channel recharge, and additional riparian habitat opportunities. Approved projects requiring excavation of channel banks and removal of riparian vegetation are required to be revegetated consistent with the performance standards set out in the CCRMP and the CCAP upon the completion of excavation activities.

Chapter 4. Off-Channel Surface Mining, Title 10 of the Yolo County code, pertains to both in-channel and off-channel mining within the lower Cache Creek watershed. It sets forth monitoring requirements so that mining activities must be conducted in a way that protects public health and safety and requires that mining operations are adapted to site-specific conditions.

Chapter 5. Surface Mining Reclamation, Title 10 of the Yolo County code (known as the Surface Mining Reclamation Ordinance of Yolo County), ensures reclamation of mined lands to minimize the adverse effects of mining on the environment and to protect public health and safety. It requires that reclamation plans be adapted to site-specific conditions and be designed to reclaim mined areas so as to maximize beneficial uses; in particular, agriculture, wildlife habitat, or recreation.

Regulations provided in Title 7 of the Yolo County Code are described below.

Building Codes. The adopted building codes in effect in Yolo County include:

- 2007 CCR Title 24 as adopted and amended by Yolo County
- 2007 California Building Code based on the 2006 International Building Code
- 2007 California Electrical Code based on the 2005 National Electrical Code
- 2007 California Plumbing Code based on the 2006 Uniform Plumbing Code
- 2007 California Mechanical Code based on the 2006 Uniform Mechanical Code
- 2007 California Fire Code based on the 2006 International Fire Code
- 2005 California Energy Standards

The 2007 CBC, as adopted by the County, includes more stringent requirements for seismic structural engineering, and foundation design guidance than previous CBC editions. Compliance with code enhances seismic safety and minimizes the effects of unstable soils and other geologic hazards by providing superior engineering guidance and recommendations.

Building Permits. Title 7 "Building Regulations" of the Yolo County Municipal Code defines the regulations, conditions, and circumstances requiring application for a Building Permit for projects within the County. In general, project buildings and structures that would need to comply with regulations encapsulated in the above defined codes would require a building permit. There are various exceptions for certain structures dedicated to agricultural uses.

Grading permits. For construction projects that result in one or more acres of land disturbance, coverage under the NPDES Construction General Permit (CGP) is required. A complete discussion of NPDES permitting requirements is included in Section K: Hydrology and Water Quality of this EIR.

As part of the application process for CGP coverage, a Yolo County Grading Permit Application submitted to the Yolo County Planning and Public Works Department may be required.[28] Section 10 of the Yolo County Improvement Standards provides general requirements for grading activities in the County, and notes that grading shall conform to the conditions and terms described in Title 7 (Building Regulations) of the Yolo County Code and the terms of the Improvements Standards, which include conditions under which grading permits for subdivision improvements would be granted.[29] Grading permits are generally *not* required for the following works described below. However, a Flood Hazard Development Permit would be required for any work being done in a FEMA-designated High Hazard Flood Zone. Normal agricultural activities are exempted from grading permit requirements.

- Earthwork as approved by the Building Official, such as grading in an isolated, self-contained area if there is no danger to private or public property.
- Excavation below the finished grade for basements and footings of a building, retaining wall or other structure if such structure is authorized by a valid building permit. This shall not exempt any fill or excavation having an unsupported height greater than 5 feet after the completion of such structure. (Planning Department permits required).
- Mining, quarrying, excavating, processing, stockpiling of rock, sand, gravel, aggregate or clay where established and provided for by law, provided such operations do not affect the lateral support or increase the stresses in or pressure upon any adjacent or contiguous property. (Planning approval required).
- Exploratory excavations under the direction of soil engineers or engineering geologists.
- An excavation which either less than two feet in depth, or which does not create a cut slope greater than five feet in height and steeper than 1.5 horizontal to 1.0 vertical.
- A fill less than one foot in depth and placed on natural terrain with a slope flatter than 5.0 horizontal to 1.0 vertical, or less than three feet in depth, not intended to support structures, which does not exceed 50 cubic yards on any one lot and does not obstruct a drainage course.

Regulations provided in Title 6 of the Yolo County Code are described below.

Septic Systems.[30] Yolo County Code Section 6-8.603 requires a Sewage Disposal Permit for the construction, re-construction, repair, or abandonment of a septic system. The guidelines document provided by Environmental Health of Yolo County provides an extensive discussion of design parameters and requirements, including site concerns and practical guidance in permitting, system selection and sizing.

2. Draft 2030 Countywide General Plan for Yolo County

The following is a list of relevant Draft General Plan policies and actions related to geology, soils, seismicity and mineral resources.

[28] Yolo County, 2009. Grading Permit Application, accessed 03/31/09 at: www.yolocounty.org/Modules/ShowDocument.aspx?documentid=3519

[29] Yolo County Department of Planning and Public Works, 2008. County of Yolo Improvement Standards, 5 August.

[30] Yolo County Environmental Health, 2004. Guidelines to the Planning, Installation, and Maintenance of Septic Systems in Yolo County.

Conservation and Open Space Element

- Policy CO-3.1: Encourage the production and conservation of mineral resources, balanced by the consideration of important social values, including recreation, water, wildlife, agriculture, aesthetics, flood control, and other environmental factors.
- Policy CO-3.2: Ensure that mineral extraction and reclamation operations are compatible with land uses both on-site and within the surrounding area, and are performed in a manner that does not adversely affect the environment.
- Policy CO-3.3: Encourage the extraction of natural gas where compatible with both on-site and surrounding land uses, and when performed in a manner that does not adversely affect the environment.
- Policy CO-3.4: Within the Delta Primary Zone, ensure compatibility of permitted land use activities with applicable, natural gas policies of the Land Use and Resource Management Plan of the Delta Protection Commission.
- Policy CO-5.1: Coordinate with water purveyors and water users to manage supplies to avoid long-term overdraft, water quality degradation, land subsidence and other potential problems.
- Policy CO-5.5: Integrate balanced waste management programs that emphasize multiple benefits and balance competing needs into all aspects of the planning and development process.
- Policy CO-5.6: Improve and protect water quality for municipal, agricultural, and environmental uses.
- Policy CO-5.7: Support mercury regulations that are based on good science and reflect an appropriate balancing of sometimes competing public values including health, food chain, reclamation and restoration of Cache Creek, sustainable and economically viable Delta agriculture, necessary mineral extraction, flood control, erosion control, water quality, and habitat restoration.
- Action CO-A37: Designate and zone lands containing identified mineral deposits to protect them from the encroachment of incompatible land uses so that aggregate resources remain available for the future. (Policy CO-3.1)
- Action CO-A38: Amend the County Code to allow landowners to apply for redesignation of their property when it can be demonstrated that mineral resources are not present or are not economically feasible. (Policy CO-3.1)
- Action CO-A39: Encourage the responsible development of aggregate deposits along Cache Creek as significant both to the economy of Yolo County and the region. (Policy CO-3.1)
- Action CO-A40: Encourage recycling of aggregate materials and products. (Policy CO-3.1)
- Action CO-A41: Regularly review regulations to ensure that they support an economically viable and competitive local aggregate industry. (Policy CO-3.1)
- Action CO-A42: Implement the Cache Creek Area Plan to ensure the carefully managed use and conservation of sand and gravel resources, riparian habitat, ground and surface water, and recreational opportunities.(Policy CO-3.1)
- Action CO-A43: Monitor updates to the State Mineral Resource classification map and incorporate any needed revisions to the County's zoning and land use map. (Policy CO-3.1)
- Action CO-A44: Coordinate individual surface mining reclamation plans so that the development of an expanded riparian corridor along Cache Creek may be achieved. (Policy CO-3.1)
- Action CO-A45: Prohibit commercial mining in or adjoining Putah Creek. (Policy CO-3.1, Policy CO-3.2)
- Action CO-A46: Maintain standards and procedures for regulating surface mining and reclamation operations so that potential hazards and adverse environmental effects are reduced or eliminated. (Policy CO-3.1, Policy CO-3.2)

- Action CO-A47: Ensure that mined areas are reclaimed to a usable condition that is readily adaptable for alternative land uses, such as agriculture, wildlife habitat, recreation, and groundwater management facilities.
- Action CO-A48: Regularly update surface mining and reclamation standards to incorporate changes to State requirements, environment conditions, and County priorities. (Policy CO-3.1)
- Action CO-A49: Consider the exploration, drilling, and extraction of natural gas as compatible with agriculture and open space uses. (Policy CO-3.3)
- Action CO-A50: Evaluate any impacts to identified natural gas fields as part of the development review process. (Policy CO-3.3)
- Action CO-A51: Require that abandoned gas wells be sealed in accordance with State of California Division of Oil, Gas and Geothermal Resources regulations and that all drilling or production facilities be removed. Further require that the disturbed surface area be reincorporated into adjoining agricultural operations or revegetated with native vegetation within one year after abandonment. (Policy CO-3.3)
- Action CO-A52: Maintain and implement local and State criteria and development standards for the production, injection, and drilling of natural gas deposits. Ensure that the construction and operation of natural gas storage facilities meet all safety standards of the State of California Division of Oil, Gas and Geothermal Resources. (Policy CO-3.3)
- Action CO-A80: Develop a County grading ordinance that maintains existing terrain, channels, and vegetation to the extent possible, in order to minimize the disruption of natural systems. (Policy CO-5.5, Policy CO-5.6)
- Action CO-A92: Require the implementation of Best Management Practices (BMPs) to minimize erosion, sedimentation, and water quality degradation resulting from new development and increases in impervious surfaces. (Policy CO-5.5, Policy CO-5.6)

Health and Safety Element

- Policy HS-1.1: Regulate land development to avoid unreasonable exposure to geologic hazards.
- Policy HS-1.2: All development and construction proposals shall be reviewed by the County to ensure conformance to applicable building standards.
- Policy HS-1.3: Require environmental documents prepared in connection with CEQA to address seismic safety issues and to provide adequate mitigation for existing and potential hazards identified.
- Action HS-A1: Require a geotechnical analysis for construction in areas with potential geological hazards and/or for purposes of environmental analysis. Recommendations of the geotechnical analysis shall be implemented. (Policy HS-1.1, Policy HS-1.2, Policy HS-1.3)
- Action HS-A2: Rely upon the most current and comprehensive geological hazard mapping available in the evaluation of potential seismic hazards associated with proposed new development. (Policy HS-1.3)
- Action HS-A3: Continue to participate in the Yolo County Subsidence Network and implement its recommendations. (Policy HS-1.2, Policy HS-1.3)
- Action HS-A4: Integrate geologic hazard information into the County Geographical Information System (Policy___)
- Action HS-A12: Review development proposals to ensure that the need to maintain flood control capacity is balanced with consideration of the environmental health of watercourses that convey floodwaters so as not to cause significant erosion, sedimentation, water quality problems, or loss of habitat. (Policy HS-2.1)

3. Impacts and Mitigation Measures

This section provides an assessment of the potential adverse impacts related to geologic, soils, seismicity and mineral resources associated with implementation of the Draft General Plan, the proposed project. It establishes the thresholds of significance for impacts and then evaluates the Draft General Plan. Where potentially significant impacts of the proposed project are identified, mitigation measures are recommended.

a. Significance Criteria. The Draft General Plan would have a significant geology, soils, or mineral resources impact if it would:

- Expose people or structures to substantial risk of loss, injury, or death involving:
  - Rupture of a known active or potentially active earthquake fault;
  - Strong seismic ground shaking;
  - Seismic-related ground failure, including liquefaction; or
  - Landslides;
- Expose people, structures, or infrastructure to increased risk of injury or damage due to the presence of expansive soils, corrosive soils, soil settlement or compaction, or other geological conditions.
- Result in substantial erosion, loss of top soil, or unstable slope or soil conditions through alteration of topographic features, dewatering, or changes in drainage patterns.
- Result in the loss of availability of a known mineral resource;
- Result in the destruction, covering, or adverse modification of a unique geologic or physical feature;
- Substantially conflict with applicable plans, policies and regulations of other agencies where such conflict would result in an adverse physical change in the environment; or
- Result in new policies that would result in significant adverse physical impacts as compared to the 1983 General Plan policies.

b. Impacts Analysis. The following section provides an evaluation and analysis for the potential impacts of the Draft General Plan for each of the criteria of significance listed above.

(1) Expose People or Structures to Substantial Risk Related to Geohazards. This discussion addresses the first three significance criteria listed above. The growth and changes to land use in the unincorporated County resulting from build-out under the Draft General Plan would result in increased development, approximately 41,435 new residents, and/or other physical changes in the County that could be affected by geological hazards. Build-out under the Draft General Plan would therefore result in additional people and structures being exposed to geohazards, including seismic risks, liquefaction, slope instability, soil settlement or compaction, and adverse soil conditions (e.g., expansive soils, corrosive soils). Some of these geohazards, particularly those related to seismic shaking, could result in injuries and/or fatalities; all of the geohazards discussed could result in damage to structures and property. Existing federal and State programs, including NEHRP, the A-PEFZA, the SHMA and the CBC, are designed to provide accurate and timely information detailing

seismic hazards, impose regulatory requirements regarding geotechnical and soils investigations, provide limitations on the locations of structures for human habitation, impose requirements for hazard notices to potential users, and establish structural standards for requirements for buildings and grading projects. The policies and actions of the Draft General Plan would guide new development and reduce impacts relative to geohazards. It is the stated intent of the Health and Safety Element of the Draft General Plan that it, ". . . ensures that appropriate consideration of both natural and human-made hazards and risks are factored into land use decision-making."

As shown in Table III-2 in Chapter III, Project Description, the increased development (dwelling units, commercial and industrial buildings, schools, public buildings, etc…) would generally take place on land designated for specific plan (3,285 acres), residential (3,088 acres), commercial (651 acres), industrial (1,049 acres), and public and quasi-public uses (7,001 acres). Additionally, farm dwellings and industrial and commercial buildings directly-related to and supporting agriculture can be constructed on land designated for agricultural uses. Implementation of the Draft General Plan would therefore result in additional people and structures being exposed to geohazards, including seismic risks, liquefaction, slope instability, soil settlement or compaction, and adverse soil conditions (e.g., expansive soils, corrosive soils).

The Draft General Plan requires Specific Plans to be prepared for the community areas of Dunnigan, Elkhorn, Knights Landing, and Madison (totaling 3,285 acres) per General Plan Policy CC-3.1, and these four specific plan areas will be subject to subsequent environmental review, likely in the form of future EIRs on the specific plans. For the other land use areas (approximately 3,088 acres designated for residential land uses and 1,700 acres designed for commercial and industrial land uses) where development may occur, the County will consider future applications and make determinations as to their consistency with the General Plan and other regulations and whether they would be allowed to develop by-right (without subsequent discretionary approvals) and/or may rely on this EIR and any subsequent site-level technical studies and resource inventories as required by County staff.

Action AS-H1 of the Draft General Plan specifies that the County "require a geotechnical analysis for construction in areas with potential geological hazards and/or for purposes of environmental analysis". Geologic and seismic hazards vary across the County. Site-specific geologic investigation and analysis by a licensed professional and conducted in accordance with standard industry practices and State provided guidance, such as the CGS Special Publication 117 of 2008, *Guidelines for Evaluating and Mitigating Seismic Hazards in California*, will minimize risk associated with these hazards. For instance, due to the distances involved to major regional faults compared to some parts of California, Yolo county is subject to relatively low risk from seismic shaking; nonetheless, active local faults like the Hunting Creek Fault or the CRSBB may result in significant shaking in the County. Potential impacts from geohazards such as expansive soils (that cover roughly three-quarters of the County) can be mitigated by site-specific geotechnical investigation and implementation of the standard remedial measures (e.g., soil removal, foundation design). Similarly, slope stability issues, such as those in the hills around the Capay Valley and along the western mountains of the County, can be addressed by site-specific geotechnical work. Action AS-H1 specifies that the "recommendations of the geotechnical analysis shall be implemented." In addition, as required by Policy HS-1.2 "all development and construction proposals shall be reviewed by the County to ensure conformance to applicable building standards." Policy CC-4.11 (as modified per Mitigation Measure LU-2b), also addresses the project-specific identification of geological hazards by requiring a geotechnical and/or soils study as determined necessary by County staff.

Implementation of these as well as policies and actions HS-1.1, HS-1.3, AS-H2, AS-H3, and CO-A76 would further reduce potential impacts related to new development and increased exposure to geohazards to a less-than-significant level.

(2) Result in Erosion or Loss of Top Soil Through the Alteration of Topography, Dewatering, or Changes in Drainage Patterns. Build-out under the Draft General Plan would include changes to land use resulting in new development. Development processes could result in changes in drainage patterns or construction-related dewatering activities that result in a significant environmental impact. The Draft General Plan includes policies and actions specifically designed to minimize erosion and preserve top soil. Action CO-A89 requires implementation of BMPs during the development process to minimize erosion to protect water quality, and would minimize soil loss. Action HS-A12 addresses the need to balance maintenance of flood control capacity with environmental concerns, and to minimize erosion and sedimentation (also related to top soil loss). These actions, combined with the development of a Grading Ordinance as required under Action CO-A80 and implementation of Policy CC-4.11, would provide the County with the needed tools and regulatory oversight to ensure erosion associated with new development is minimized and top soil is preserved. Erosion and sedimentation issues are further addressed in Section IV.K, Hydrology and Water Quality of this EIR.

As shown in Table III-8 in Chapter III, Project Description, the increased development would take place primarily in Dunnigan, Esparto, Knights Landing, and Madison (a total at build-out of 3,088 acres for residential uses, and 1,700 acres for industrial and commercial use). These community areas do not have any special characteristics that make them particularly susceptible to erosion.[31] Implementation of the Draft General Plan policies and actions described above, in conjunction with compliance with existing regulatory programs would ensure that Draft General Plan impacts related to erosion, changes in drainage patterns, and potential loss of top soil would be less than significant.

(3) Loss of Availability of Mineral Resources. Adoption and implementation of the Draft General Plan would include changes to land use resulting in new residential, commercial, industrial, agricultural, recreational, and other development activity. The Cache Creek Area Plan (CCAP) was adopted in 1996 as a part of the County's General Plan. This plan regulates and manages the County's significant aggregate (sand and gravel) resources along Cache Creek. There are over 18,000 acres of high-grade aggregate resources (over 900 million tons) in the Cache Creek deposit and the County allows for commercial mining of these resources through a separate policy and regulatory framework contained in the CCAP. The CCAP and all programs and ordinances that implement it were subject to environmental review and permit approval during a comprehensive planning process that took place in 1995 and 1996. The CCAP has a 30-year planning horizon which extends through 2027. The County is presently undergoing a mandatory ten-year review of the off-channel mining components of the CCAP.

In addition, the Draft General Plan contains policies and actions specifically designed to support and promote the responsible management of mineral resources within the County. In part, Policy CO-3.1 calls for the management of mineral resources while balancing production against consideration of social values. In conjunction with Action CO-A30, which protects lands containing identified mineral

[31] Jones and Stokes, 2005. op. cit.

deposits from the encroachment of incompatible land uses, Draft General Plan actions CO-A30 and CO-A36 also ensure mineral resources remain available for the future. Geographic areas for new or expanded development under the Draft General Plan have been selected, in part, with the intent that they not interfere with the continued management of the County's mineral resources. In addition to the policies and actions listed above, implementation of policies and actions CO-3.2 through CO-3.4 and CO-A37 through CO-A50 would further address potential impacts related to new development and loss of mineral resources.

Implementation of the Draft General Plan policies and actions described above, in conjunction with compliance with existing regulatory programs would ensure that Draft General Plan impacts related to growth and potential loss of known mineral resources would be less than significant.

(4) Destruction or Modification of a Unique Geologic Feature. Unique geologic features are not common in Yolo County. The geologic processes in the County are generally the same as those in other parts of the State. The County has not developed an inventory of unique geologic features. However, it is likely that some features stand out as being unique in one way or another within the boundaries of the County. For instance, the type location for "Yolo Series Soil" is located at a particular site on the University of California at Davis. By definition, the documented soil profile at this singular location serves as the reference standard for this particular soil type.[32] A geologic feature is considered unique if it:[33]

- Is the best example of its kind locally or regionally;
- Embodies the distinctive characteristics of a geologic principle that is exclusive local or regional;
- Provides a key piece of geologic information important in geology or geologic history;
- Is a "type locality" of a geologic feature;
- Is a geologic formation that is exclusive locally or regionally;
- Contains a mineral that is not known to occur elsewhere in the County; or
- Is used repeatedly as a teaching tool.

The County considers its rich soils to be significant geological resources and the Draft General Plan contains hundreds of policies that directly and indirectly protect soils. Additionally, the CCAP specifically manages the County's significant Cache Creek aggregate deposits. The Draft General Plan includes one policy specifically designed to protect unique physical features of the County:

- Policy CC-1.15: The following features shall be protected and preserved along designated scenic roadways and routes:
    - Trees and other natural or unique vegetation
    - Landforms and natural or unique features
    - Views and vistas

[32] NRCS, 2000. Official Series Description - Yolo Series. December.

[33] Land Use and Environmental Group, 2007. Guidelines for Determining Significance: Unique Geology, County of San Diego, 30 July.

However, this policy does not include protections for unique *geologic* features. Potential loss of unique geologic features associated with new development under the Draft General Plan would be a significant impact.

Impact GEO-1: Implementation of the Draft General Plan could result in the destruction or modification of a unique geologic feature. (S)

Implementation of the following mitigation measure would ensure that Draft General Plan impacts related to growth and the potential to impact unique geologic features would be less than significant.

Mitigation Measure GEO-1a: The Draft General Plan shall be amended to include the following new policy in the Conservation and Open Space Element.

Policy CO-#: The County's unique geologic or physical features, which include geologic or soil "type localities" and formations or outcrops of special interest, shall be preserved and protected.

Mitigation Measure GEO-1b: The Draft General Plan shall be amended to include the following new action in the Conservation and Open Space Element.

Action CO-A#: The County's unique geologic or physical features, which include geologic or soil "type localities" and formations or outcrops of special interest, shall be researched, inventoried, mapped, and data added to the County GIS database. (LTS)

(5) Conflict with Plans and Policies of Other Agencies. Geology, soils, seismicity and mineral resources issues are less governed by overlying State or regional plans than some policy areas; however, there is a complex regulatory environment for these topics that include both recommended and mandatory policies for local implementation. The Draft General Plan is consistent with the regulatory environment regarding geology, soils, and mineral resources of: the California Building Code, the Alquist-Priolo Earthquake Fault Zoning Act, the Seismic Hazards Mapping Act, and the State Surface Mining and Reclamation Act as described in this DEIR. Additionally, the inclusion of Policy CO-3.4 that requires compatibility of permitted land use activities within the Delta Primary Zone ensures consistency with the Land Use and Resource Management Plan of the Delta Protection Commission. As a result, implementation of the Draft General Plan would result in a less-than-significant impact related to policy conflicts with these agencies as regards geology, soils, seismicity and mineral resources.

(6) Result in Adverse Impacts from Draft General Plan Policies Compared to 1983 General Plan Policies. Based on a review of the 1983 General Plan policies related to geology, soils, seismicity and mineral resources in the Land Use, Conservation, Open Space, and Safety and Seismic Safety elements this analysis determined that the proposed policies of the Draft GP are either equivalent to or more rigorous than those in place currently under the 1983 General Plan. In general, the Draft General Plan would provide more stringent environmental protection and greater accountability in the regulation of development activities that would be affected by geology, soils, and seismicity hazards. Implementation of the Draft General Plan in place of the prior 1983 General Plan would not result in a significant adverse physical impact related to geology, soils, and mineral resources.