Chapter 9
Hydrology, Water Resources, and Water Quality

9.1 Affected Environment

This section describes the affected environment for hydrology, water resources, and water quality in the Plan Area, including the regulatory and environmental settings.

9.1.1 Regulatory Setting

Federal

Clean Water Act

The State Water Resources Control Board (State Water Board) is the state agency with primary responsibility for implementing the Federal Clean Water Act (CWA), which establishes regulations relating to water resource issues. Typically, all regulatory requirements are implemented by the State Water Board through nine regional water quality control boards (Regional Water Boards) established throughout the state. The Plan Area is within the Central Valley Water Board (Region 5).

The CWA is the primary federal law that protects the quality of the nation's surface waters, including lakes, rivers, and coastal wetlands. 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 CWA's primary regulatory tool. The following CWA sections pertain to the Plan Area.

Section 303: Impaired Waters

California adopts water quality standards to protect beneficial uses of state waters as required by CWA Section 303 and the Porter-Cologne Water Quality Control Act of 1969 (discussed below). Under Section 303(d) of the CWA, states, territories, and authorized tribes are required to develop a list of water quality-limited segments. In California, the State Water Board develops the list of water quality-limited segments; EPA approves each state's list. Waters on the list do not meet water quality standards, even after point sources of pollution have installed the minimum required levels of pollution control technology. Section 303(d) also establishes the total maximum daily load (TMDL) process to guide the application of state water quality standards. *TMDL* is defined as the sum of the individual waste load allocations from point sources, load allocations from nonpoint sources and background loading, plus an appropriate margin of safety. A TMDL defines the maximum amount of a pollutant that a water body can receive and still meet water quality standards. TMDLs can lead to more stringent National Pollutant Discharge Elimination System (NPDES) permits (CWA Section 402). Section 303(d) impaired waters in the Plan Area are described for each major surface water feature in Section 9.1 of this chapter, *Affected Environment*.

Section 401: Water Quality Certification

Under CWA Section 401, applicants for a federal permit or license to conduct activities that may result in the discharge of a pollutant into waters of the United States must obtain certification from the state in which the discharge would originate or, if appropriate, from the interstate water

pollution control agency with jurisdiction over affected waters at the point where the discharge would originate. Therefore, all projects that have a federal component and may affect state water quality (including projects that require federal agency approval, such as issuance of a CWA Section 404 permit, discussed below) must comply with CWA Section 401. In California, the authority to grant water quality certification has been delegated to the State Water Board, and certification is issued by one of the nine geographically separated Regional Water Boards. Water quality certifications require evaluation of potential effects in light of water quality standards and CWA Section 404 criteria governing discharge of dredged and fill materials into waters of the United States. Under the CWA, the Regional Water Board must issue or waive a Section 401 Water Quality Certification for a project to be permitted under CWA Section 404.

Section 402: Permits for Discharge to Surface Waters

CWA Section 402 regulates point- and nonpoint-source discharges to surface waters through the NPDES program, administered by EPA. In California, the State Water Board is authorized by EPA to oversee the NPDES program through the Regional Water Boards (see related discussion in this section under *Porter-Cologne Water Quality Control Act*). The NPDES program provides for both general permits (those that cover a number of similar or related activities) and individual permits. The NPDES Stormwater Program regulates municipal, construction, industrial, and California Department of Transportation (Caltrans) stormwater discharges.

Municipal Stormwater Activities

CWA Section 402 mandates permits for municipal stormwater discharges, which are regulated under the NPDES General Permit for Municipal Separate Storm Sewer Systems (MS4) (MS4 Permit). EPA defines an MS4 as "any conveyance or system of conveyances (roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, human-made channels, and storm drains) owned or operated by a state, city, town, county, or other public body having jurisdiction over storm water, that are designed or used for collecting or conveying storm water." Phase I MS4 regulations cover municipalities with populations greater than 100,000, certain industrial processes, or construction activities disturbing an area of 5 acres or more. Phase II (Small MS4) regulations require that stormwater management plans be developed by municipalities with populations smaller than 100,000 and construction activities disturbing 1 or more acres of land. The County operates under a Small MS4 permit, as required by Phase II of the NPDES, which currently covers the urbanized area around the city of Chico (discussed further under *Stormwater Management Program,* below).

MS4 permits require that cities and counties develop and implement programs and measures to reduce the discharge of pollutants in stormwater discharges to the maximum extent possible, including management practices, control techniques, system design and engineering methods, and other measures, as appropriate. As part of permit compliance, these permit holders have created stormwater management plans for their respective locations. These plans outline the requirements for municipal operations, industrial and commercial businesses, construction sites, and planning and land development. These requirements may include multiple measures to control pollutants in stormwater discharge. During implementation of specific projects under the program, project applicants will be required to follow the guidance contained in the stormwater management plans as defined by the permit holder in that location.

The State Water Board is advancing Low Impact Development (LID) in California as a means of complying with municipal stormwater permits. LID incorporates site design, including using

vegetated swales and retention basins and minimizing impermeable surfaces to manage stormwater to maintain a site's predevelopment runoff rates and volumes.

Caltrans Municipal Stormwater Permit

The State Water Board has identified Caltrans as an owner/operator of an MS4 pursuant to federal regulations. Caltrans' MS4 Permit covers all Caltrans rights-of-way, properties, facilities, and activities in the state.

Caltrans' MS4 Permit contains three basic requirements.

1. Caltrans must comply with the requirements of the Construction General Permit (see below).
2. Caltrans must implement a year-round program in all parts of the state to effectively control stormwater and non-stormwater discharges.
3. Caltrans storm water discharges must meet water quality standards through implementation of permanent and temporary (construction) Best Management Practices (BMPs), to the Maximum Extent Practicable, and other measures as the State Water Board determines to be necessary to meet the water quality standards.

To comply with the permit, Caltrans developed the Statewide Storm Water Management Plan (SWMP) to address stormwater pollution controls related to highway planning, design, construction, and maintenance activities throughout California. The SWMP assigns responsibilities within Caltrans for implementing stormwater management procedures and practices as well as training, public education and participation, monitoring and research, program evaluation, and reporting activities. The SWMP describes the minimum procedures and practices Caltrans uses to reduce pollutants in stormwater and non-stormwater discharges. It outlines procedures and responsibilities for protecting water quality, including the selection and implementation of BMPs.

Construction Activities

The General NPDES Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (Order 2009-0009-DWQ) (Construction General Permit) regulates stormwater discharges for construction activities CWA Section 402. Dischargers whose projects disturb 1 or more acres of soil, or whose projects disturb less than 1 acre but are part of a larger common plan of development that in total disturbs 1 or more acres, are required to obtain coverage under the Construction General Permit. The Construction General Permit requires the development and implementation of a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP must list BMPs that the discharger will use to protect stormwater runoff and document the placement and maintenance of those BMPs. Additionally, the SWPPP must contain a visual monitoring program; a chemical monitoring program for "non-visible" pollutants, to be implemented in case of a BMP failure; and a monitoring plan for turbidity and pH for projects that meet defined risk criteria (State Water Resources Control Board 2013). The requirements of the SWPPP are based on the construction design specifications detailed in the final design plans of a project and the hydrology and geology of the site expected to be encountered during construction.

Dewatering Activities

While small amounts of construction-related dewatering are covered under the Construction General Permit, the Central Valley Water Board has also adopted a General Order for Dewatering and Other Low Threat Discharges to Surface Waters (General Dewatering Permit). This permit

applies to various categories of dewatering activities and likely would apply to the proposed BRCP if construction required dewatering in greater quantities than that allowed by the Construction General Permit and discharged the effluent to surface waters. The General Dewatering Permit contains waste discharge limitations and prohibitions similar to those in the Construction General Permit. To obtain coverage, the applicant must submit an NOI and a Pollution Prevention and Monitoring Program (PPMP) to the Central Valley Water Board. The PPMP must include a description of the discharge location, discharge characteristics, primary pollutants, receiving water, treatment systems, spill prevention plans, and other measures necessary to comply with discharge limits. A representative sampling and analysis program must be prepared as part of the PPMP and implemented by the permittee, along with recordkeeping and quarterly reporting requirements during dewatering activities. For dewatering activities that are not covered by the General Dewatering Permit, an individual NPDES permit and waste discharge requirements (WDRs) must be obtained from the Central Valley Water Board.

Section 404: Permits for Fill Placement in Waters and Wetlands

CWA Section 404 regulates the discharge of dredged and fill materials into "waters of the United States," which are defined at 33 CFR 328.3, 40 Code of Federal Regulations [CFR] 230.3. Waters of Section 404 permits are issued by the U.S. Army Corps of Engineers (USACE) for all discharges of dredged or fill material into waters of the United States before proceeding with a proposed activity. Wetlands are defined in the regulations and USACE delineates and verifies wetlands through jurisdictional determinations (33 CFR 328.3, 40 CFR 230.3).

Applicants must obtain a permit from USACE for all discharges of dredged or fill material into waters of the United States, including wetlands, before proceeding with a proposed activity. As part of the wetland delineation and verification process, USACE will determine whether the wetlands in the project area are isolated and therefore not regulated under Section 404. The Section 404 permits are linked to the issuance of Section 401 Water Quality Certifications. If waters are deemed isolated (not waters of the United States) a Section 404 permit is not required. However, WDRs are required by the State Water Board or Regional Water Boards in lieu of a Section 401 Water Quality Certification because isolated waters are considered to be waters of the State

Compliance with Section 404 requires compliance with other environmental laws and regulations. USACE cannot issue an individual permit or verify the use of a general permit until the requirements of NEPA, ESA, and NHPA (Chapter 7, *Cultural Resources*) have been met. In addition, USACE cannot issue or verify any permit until a 401 Water Quality Certification or a waiver of certification has been issued by the State or Regional Water Quality Control Board. Section 404 permits may be issued for only the least environmentally damaging practical alternative (i.e., authorization of a proposed discharge is prohibited if there is a practical alternative that would have fewer significant effects and lacks other significant consequences). Certain activities identified at 40 USC 232.3 are exempt from the Section 404 of the Clean Water Act.

Rivers and Harbors Act

This Rivers and Harbors Act of 1899 prohibits the construction of infrastructure (e.g., bridges) over or in navigable waterways of the United States without Congressional approval and prohibits the fill of, or discharge of contaminated sediment to, waters of the United States without approval of USACE.

Section 10

Section 10 requires authorization from the USACE for the construction of any structure in or over navigable waters of the United States, the excavation/dredging or deposition of material in these waters, or any obstruction or alteration in navigable water.

National 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. The Federal Emergency Management Agency (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%) chance of being flooded in any one year based on historical data.

State

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act (Porter-Cologne Act), passed in 1969, complements the CWA. 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, although much of its daily implementation authority is delegated to the Regional Water Boards, which are responsible for implementing CWA Sections 401, 402 and 303(d). In general, the State Water Board manages both water rights and statewide regulation of water quality, while the Regional Water Boards focus exclusively on water quality within their regions.

The Porter-Cologne Act provides for the development and periodic review of Water Quality Control Plans (basin plans) for each region. The *Basin Plan for the Sacramento and San Joaquin Rivers Basin* (Basin Plan) (California Regional Water Quality Control Board 2009) identifies beneficial uses of the river and its tributaries and water quality objectives to protect those uses. Basin plans are implemented primarily by using the NPDES permitting system to regulate waste discharges so that water quality objectives are met (see discussion of the NPDES system under CWA above). Basin plans are updated every 3 years and provide the technical basis for determining WDRs and taking enforcement actions.

Central Valley Regional Water Quality Control Board

The Central Valley Regional Water Board is responsible for implementing its Basin Plan for the Sacramento and San Joaquin Rivers Basin (California Regional Water Quality Control Board 2009). The Central Valley Regional Water Board Basin Plan was last updated in 2009.

Beneficial uses represent the services and qualities of a water body (i.e., the reasons the water body is considered valuable). The Central Valley Regional Water Board basin plan describes beneficial uses for the waters in the Sacramento River watershed. Table 9-1 lists the beneficial uses for water bodies that are within or have influence on the hydrology of the Plan Area and could be affected by covered activities.

Table 9-1. Designated Beneficial Uses for Water Bodies within the Plan Area

Beneficial Uses	Big Chico Creek	Butte Creek (below Chico, including Butte Slough)	Sacramento River (Shasta Dam to Colusa Main drain)	Feather River (Fish Barrier Dam to Sacramento River)
Municipal and Domestic			X	X
Agriculture—Irrigation	X	X	X	X
Agriculture—Stock Watering	X	X	X	
Industrial Process Water				
Industrial Service Supply			X	
Hydropower			X	
Rec-1—Contact	X	X	X	X
Rec 1—Canoeing & Rafting	X	X	X	X
Rec-2—Other Non-Contact	X		X	X
Freshwater Habitat—Warm	X	X	X	X
Freshwater Habitat—Cold	X	X	X	X
Migration—Warm			X	X
Migration—Cold	X	X	X	X
Spawning—Warm	X	X	X	X
Spawning—Cold	X		X	X
Wildlife Habitat	X	X	X	X
Navigation			X	X

Source: California Regional Water Quality Control Board 2009.
X = Present or Potential Beneficial Use.

Water quality objectives represent the standards necessary to protect and support designated beneficial uses. The Regional Water Boards have set water quality objectives for all surface waters in their respective regions (including the Sacramento River Basin) for the following substances and parameters: ammonia, bacteria, biostimulatory substances, chemical constituents, color, dissolved oxygen (DO), floating material, oil and grease, pH, pesticides, radioactivity, salinity, sediment, settleable material, suspended material, tastes and odors, temperature, toxicity, and turbidity. Water quality objectives can consist of numerical and/or narrative criteria.

Another method the Central Valley Regional Water Board uses to implement the basin plan criteria is by issuing WDRs. WDRs are issued to any entity that discharges to a surface water body and does not meet certain water quality criteria such as those related to sediment. The WDR/NPDES permit also serves as a federally required NPDES permit (under the CWA) and incorporates the requirements of other applicable regulations.

State Implementation Plan

In 1994, the State Water Board and EPA agreed to a coordinated approach for addressing priority toxic pollutants in inland surface waters, enclosed bays, and estuaries of California. In March 2000, the State Water Board adopted a State Implementation Plan (SIP) for priority toxic pollutant water quality criteria contained in the California Toxics Rule (CTR). The SIP applies to discharges of toxic pollutants into inland surface waters, enclosed bays, and estuaries of California subject to regulation

under the state's Porter-Cologne Act (Division 7 of the Water Code) and the federal CWA. Such regulation may occur through the issuance of NPDES permits or other relevant regulatory approaches. The goal of this policy is to establish a standardized approach for permitting discharges of toxic pollutants to non-ocean surface waters in a manner that promotes statewide consistency. As such, SIP is a tool to be used in conjunction with watershed management approaches and, where appropriate, the development of TMDLs to ensure achievement of water quality standards (water quality criteria or objectives and the beneficial uses they are intended to protect, as well as the state and federal antidegradation policies).

California Department of Fish and Game

Under Sections 1601–1607 of the California Fish and Game Code, CDFW is responsible for the protection and conservation of the state's fish and wildlife resources. CDFW regulates projects that affect the flow, channel, or banks of rivers, streams, and lakes. Sections 1601 and 1603 require public agencies and private individuals respectively to notify and enter into a streambed or lakebed alteration agreement with CDFW before beginning construction of a project that will divert, obstruct, or change the natural flow or the bed, channel, or bank of any river, stream, or lake, or use materials from a streambed.

Section 1601 contains additional prohibitions against the disposal or deposition of debris, waste, or other material containing crumbled, flaked, or ground pavement where it can pass into any river, stream, or lake. Sections 1601–1607 may apply to any work undertaken within the 100-year floodplain of any body of water or its tributaries, including intermittent stream channels. In general, however, it is construed as applying to work within the active floodplain and/or associated riparian habitat of a wash, stream, or lake that provides benefit to fish and wildlife. Sections 1601–1607 typically do not apply to drainages that lack a defined bed and banks, such as swales, or to very small bodies of water and wetlands such as vernal pools.

Senate Bill 5

Senate Bill (SB) 5, signed into California state law on October 10, 2007, enacts the Central Valley Flood Protection Act (CVFPA) of 2008. The following list identifies the requirements of the California Department of Water Resources (DWR) and the Central Valley Flood Protection Board (CVFPB) under SB 5.

- Requires preparing and adopting a Central Valley Flood Protection Plan (CVFPP) by 2012 (described below).
- Requires establishing 200-year protection as the minimum urban level of flood protection, effective with respect to specific development projects as of 2015 or 2025.
- Sets deadlines for cities and counties in the Central Valley to amend their general plans and their zoning ordinances to conform to the CVFPP within 24 months and 36 months (i.e., approximately 2014 and 2015), respectively, of its adoption.
- Obligates Central Valley counties to develop flood emergency plans within 24 months of adoption of the CVFPP.
- Requires DWR to propose amendments to the California Building Standards Code (CBSC) to protect areas with flood depths anticipated to exceed 3 feet for the 200-year flood event. SB 5 requires that CBSC amendments be designed to reduce the risk of flood damage and increase safety.

SB 5 prohibits local governments from entering development agreements or approving entitlements or permits that result in construction of a new residence in a flood zone unless one of these three conditions are met.

- Flood management facilities a level of protection necessary to withstand a 200-year flood event.
- The development agreement or other entitlements include conditions that provide protections necessary to withstand a 200-year flood event.
- The local flood management agency has made adequate progress on construction of a flood protection system that shall result in protections necessary to withstand a 200-year flood even by 2025.

Central Valley Flood Protection Plan

The CVFPP, as set forth in Water Code, Section 9614, was adopted on June 29, 2012. The CVFPP proposes a "systemwide investment approach" for integrated, sustainable flood management in areas currently protected by facilities of the State Plan of Flood Control. The CVFPP includes the following elements.

- A description of the Flood Management System, its performance, and the challenges to modifying it.
- A description of the facilities included in the State Plan of Flood Control.
- A description of probable impacts of projected climate change, land-use patterns, and other potential challenges.
- An evaluation of needed infrastructure improvements and identification of facilities recommended for removal.
- A description of both structural and nonstructural methods for providing an urban level of flood protection to currently urbanized areas in the Central Valley.

California Department of Pesticides Regulation

California Department of Pesticides Regulation (DPR) is the lead agency for regulating the registration, sales, and use of pesticides in California. It is required by law to protect the environment, including surface waters, from environmentally impacts of pesticides by prohibiting, regulating, or controlling the uses of such pesticides. DPR has both a Surface Water and Groundwater Protection Program that addresses sources of pesticide residues in surface waters and have preventive and response components that reduce the presence of pesticides in surface and groundwater. The preventive component includes local outreach to promotion of management practices that reduce pesticide runoff and prevent continued movement to groundwater in contaminated areas. In order to promote cooperation to protect water quality from the adverse effects of pesticides, DPR and the State Water Board signed a Management Agency Agreement (MAA). The MAA, and its companion document, *The California Pesticide Management Plan for Water Quality*, are intended to coordinate interaction, facilitate communication, promote problem solving, and ultimately assure the protection of water quality.

Local

Butte County General Plan 2030

Goals, policies, and actions from the County General Plan 2030 that pertain to hydrology and water quality are described in Water Resources Element (Butte County 2012). These policies and actions are designed to protect, maintain, and restore water resources within the county. In addition, the Health and Safety Element addresses flood management. These goals and policies are summarized below.

Water Resources Element

Goals

Goal W-1: Maintain and enhance water quality.

Goal W-2: Ensure an abundant and sustainable water supply to support all uses in Butte County.

Goal W-3: Effectively manage groundwater resources to ensure a long-term water supply for Butte County.

Goal W-5: Promote water conservation as an important part of a long-term and sustainable water supply.

Goal W-6: Improve streambank stability and protect riparian resources.

Policies

Policy W-P1.1: County planning and programs shall be integrated with other watershed planning efforts, including best management practices, guidelines and policies of the Central Valley Regional Water Quality Control Board (CVRWQCB).

Policy W-P1.2: The County shall cooperate with State and local agencies in efforts to identify and eliminate or minimize all sources of existing and potential point and non-point sources of pollution to ground and surface waters, including leaking fuel tanks, discharges from storm drains, auto dismantling, dump sites, sanitary waste systems, parking lots, roadways and logging and mining operations.

Policy W-P1.3: Regulations that protect water quality from the impacts from agricultural activities shall be maintained.

Policy W-P1.4: Where appropriate, new development shall be Low Impact Development (LID) that minimizes impervious area, minimizes runoff and pollution and incorporates best management practices.

Policy W-P1.5: Pest-tolerant landscapes shall be encouraged to minimize the need for pesticides.

Policy W-P1.7: Agriculture, logging, mining, recreational vehicle use and other open space uses shall follow best management practices to minimize erosion and protect water resources.

Policy W-P2.1: The County supports solutions to ensure the sustainability of community water supplies.

Policy W-P2.2: The County shall continue the Four-County Memorandum of Understanding (MOU) with Colusa, Glenn, Tehama and Sutter Counties, and shall continue to foster regional cooperation with other counties and water purveyors.

Policy W-P2.4: The County's State Water Project allocation should be fully utilized within Butte County.

Policy W-P2.8: The County supports Area of Origin water rights, the existing water right priority system and the authority to make water management decisions locally to meet the county's current and future needs, thereby protecting Butte County's communities, economy and environment.

Policy W-P2.9: Applicants for new major development projects, as determined by the Department of Development Services, shall demonstrate adequate water supply to meet the needs of the project, including an evaluation of potential cumulative impacts to surrounding groundwater users and the environment.

Policy W-P3.1: The County shall continue to ensure the sustainability of groundwater resources, including groundwater levels, groundwater quality and avoidance of land subsidence, through a basin management objective program that relies on management at the local level, utilizes sound scientific data and assures compliance.

Policy W-P3.2: Groundwater transfers and substitution programs shall be regulated to protect the sustainability of the County's economy, communities and ecosystem, pursuant to Chapter 33 of the Butte County Code.

Policy W-P3.3: The County shall protect groundwater recharge and groundwater quality when considering new development projects.

Policy W-P5.2: New development projects shall identify and adequately mitigate their water quality impacts from stormwater runoff.

Policy W-P5.3: Pervious pavements shall be allowed and encouraged where their use will not hinder mobility.

Policy W-P5.4: Temporary facilities shall be installed as necessary during construction activities in order to adequately treat stormwater runoff from construction sites.

Policy W-P5.5: Stormwater collection systems shall be installed concurrently with construction of new roadways to maximize efficiency and minimize disturbance due to construction activity.

Policy W-P6.1: Any alteration of natural channels for flood control shall retain and protect riparian vegetation to the extent possible while still accomplishing the goal of providing flood control. Where removing existing riparian vegetation is unavoidable, the alteration shall allow for reestablishment of vegetation without compromising the flood flow capacity.

Policy W-P6.2: Where streambanks are already unstable, as demonstrated by erosion or landslides along banks, tree collapse, or severe in-channel sedimentation, proponents of new development projects shall prepare a hydraulic and/or geomorphic assessment of on-site and downstream drainageways that are affected by project area runoff.

Health and Safety Element

Goals

HS-2: Protect people and property from flood risk

HS-3: Prevent and reduce flooding

Policies

HS-P2.1: The County supports the efforts of regional, State and federal agencies to improve flood management facilities along the Sacramento River while conserving the riparian habitat of the river.

HS-P2.2: The County supports the efforts of private landowners and public agencies to maintain existing flood management facilities.

HS-P2.3: The County supports the Flood Mitigation Plan and the Flooding Mitigation Action Plan in the Butte County Multi-Jurisdictional All-Hazard Pre-Disaster Mitigation Plan (MHMP).

HS-P2.4: Development projects on lands within the 100-year flood zone, as identified on the most current available maps from FEMA, shall be allowed only if the applicant demonstrates that it will not create any additional risk or conflict (several categories identified).

HS-P2.5: The lowest floor of any new construction or substantial improvement within Flood Zones A, AE, AH and shaded Zone X, as shown in Figure HS-1 or the most current maps available from FEMA, shall be elevated 1 foot or more above the 100-year flood elevation. (County Flood Ordinance Sec. 26-22). Within urban or urbanizing areas, as defined in Government Code 65007, the lowest floor of any new construction or substantial improvements shall be elevated a minimum of 1 foot above the 200-year flood elevation.

HS-P2.6: After General Plan 2030 and the Zoning Ordinance are amended to be consistent with the Central Valley Flood Protection Plan, scheduled for adoption in July 2012, the County shall make specific findings prior to approval of a development agreement, subdivision or discretionary permit or other discretionary entitlement, or any ministerial permit that would result in the construction of a new residence. The County shall make findings that it has imposed conditions that will protect the property to the urban level of flood protection, as defined in Government Code Section 65007, in urban and urbanizing areas, or to the national Federal Emergency Management Agency standard of flood protection in non-urbanized areas.

HS-P3.1: Watersheds shall be managed to minimize flooding by minimizing impermeable surfaces, retaining or detaining stormwater and controlling erosion.

HS-P3.2: Applicants for new development projects shall provide plans detailing existing drainage conditions and specifying how runoff will be detained or retained on-site and/or conveyed to the nearest drainage facility and shall provide that there shall be no increase in the peak flow runoff to said channel or facility.

HS-P3.3: All development projects shall include stormwater control measures and site design features that prevent any increase in the peak flow runoff to existing drainage facilities.

Butte County Integrated Water Resources Plan

The County adopted an Integrated Water Resources Plan (IWRP) that establishes water management policies and priorities, as well as programs and projects to implement those policies. The Butte County IWRP policies focus on local water resource issues and cooperative water management with other entities.

Butte County Groundwater Management Plan

The California Groundwater Management Act, or Assembly Bill (AB) 3030, was adopted by the California legislature in 1992, and it created provisions in the California Water Code Sections 10750 et seq. to manage the safe production, quality, and proper storage of groundwater. Adoption of a Groundwater Management Plan (GMP) is not required by law, although it is encouraged.

The Butte County AB 3030 Groundwater Management Plan (Butte County GMP) documents the County's existing groundwater management programs and discusses potential future actions that could increase the effectiveness of groundwater management.

Areas managed under existing AB 3030 GMPs by a local agency (CWC § 10750.2[b]), and are therefore excluded from inclusion in the Butte County GMP, are those areas within the borders of the Biggs-West Gridley Water District, Butte Water District, Richvale Irrigation District, and Western Canal Water District. Areas overlying the groundwater basin that are regulated by the Public Utilities Commission (CWC § 10750.7[a]), and therefore excluded from inclusion in the Butte County GMP, include those areas within the service area of the California Water Service Company (Chico),

and the California Water Service Company (Oroville). In addition, the foothill and mountain areas of the County do not overlie groundwater basins, as defined in DWR Bulletin 118-2003, and are therefore not included under the Butte County GMP.

Butte County Stormwater Management Program

Butte County's Stormwater Management Program fulfills the requirements of the Small MS4 permit (Phase II), and the program is managed at the state level by the State Water Board. The program was fully implemented by July 1, 2008. Currently, Butte County's Small MS4 Permit covers the urbanized area around the city of Chico. The program includes: unlawful discharge detection and elimination; pollution prevention for County facilities and operations; construction site stormwater runoff control; postconstruction stormwater management for new development and re-development; BMPs to address specific activities identified in the regulations, such as unlawful discharge; public participation/involvement; and public education and outreach.

The Department of Public Works and the Development Services Department are responsible for planning, inspection, enforcement, and permit clearances for construction projects in the county. The Department of Public Works is responsible for the county's stormwater drainage system.

Butte County Ordinances

Groundwater Conservation Ordinance

The Butte County Groundwater Conservation Ordinance (Chapter 33 of the Butte County Code) is intended to conserve groundwater by regulating water transfers that have a groundwater component to outside of the county. A permit is required for groundwater exportation outside the county as well as for groundwater pumping as a substitute for surface water exported outside the county. The ordinance prohibits permits for water transfers outside of the county if the proposed activity would adversely affect the county's groundwater resources.

Groundwater Management Ordinance

In February 2004, the County Board of Supervisors adopted the Butte County Groundwater Management Ordinance (Chapter 33A of the Butte County Code) that requires the development and monitoring of basin management objectives (BMOs) associated with groundwater quality and elevations and land subsidence. BMOs are locally developed guidelines for groundwater management that describe actions to be taken by well owners in response to well-monitoring data. BMOs were incorporated into California Water Code Section10750 et seq., allowing for local development of AB 3030 GMPs. Effective January 1, 2003, a BMO is one of the mandatory components in an overall groundwater management plan required to receive grant funding from DWR for groundwater-related studies, construction of groundwater projects, or groundwater quality projects.

Stormwater Management and Discharge Control Ordinance

The Butte County Stormwater Management and Discharge Control Ordinance (Chapter 50 of the Butte County Code) gives the County the legal authority to protect and enhance the water quality of watercourses and water bodies within the unincorporated MS4 permitted area of the county in a manner consistent with the CWA, the Porter-Cologne Act, and the County Stormwater Management

Program, by reducing pollutants in stormwater discharges to the maximum extent practicable and by prohibiting non-stormwater discharges from entering the storm drain system.

Onsite Wastewater Ordinance

Butte County's Wastewater Ordinance regulates individual onsite wastewater treatment and disposal systems within unincorporated areas of the county. The ordinance was recently updated in 2010 to be more consistent with applicable requirements of the Central Valley Regional Water Board's basin plan and to incorporate other changes based on the current state of knowledge and advances in practices and technologies for onsite wastewater treatment and dispersal. The Butte County Division of Environmental Health is responsible for permitting and inspecting onsite wastewater systems. As part of this effort, the majority of septic systems in the Chico Area are being replaced with sewer connections to reduce nitrate contamination of the groundwater.

Flood Hazard Prevention Ordinance

The Butte County Flood Hazard Prevention Ordinance (Chapter 26, Article IV of the Butte County Municipal Code) requires that all applications for new construction or subdivisions within flood hazard areas are reviewed by the Department of Development Services. Further, the ordinance requires that the lowest floor of any new construction or substantial improvement within Flood Zones A, AE, AH and shaded Zone X be elevated 1 foot or more above the regulatory flood elevation. Applicants must demonstrate that development within the floodplain will not raise the existing flood level such that neighboring properties are adversely affected.

City of Oroville 2030 General Plan

The City of Oroville 2030 General Plan's Open Space, Natural Resources, and Conservation Element (City of Oroville 2009b) includes goals, policies, and actions intended to protect water quality and quantity in creeks, lakes, natural drainages, and groundwater basins in Oroville. These City of Oroville General Plan goals, policies, and actions follow the general issues in the County General Plan 2030, with some variations to fit the City's jurisdiction and perspective. Because they generally agree with and support the County General Plan 2030 goals and policies, they are not separately listed.

City of Gridley 2030 General Plan

The City of Gridley 2030 General Plan's Conservation Element and Public Facilities Element (City of Gridley 2010) includes the goals, policies, and implementation strategies intended to maintain and improve surface water and groundwater quality and to ensure efficient local use of water. These City of Gridley General Plan goals, policies, and implementation strategies follow the general issues in the County General Plan 2030, with some variations to fit the City's jurisdiction and perspective. Because they generally agree with and support the County General Plan 2030 goals and policies, they are not separately listed.

Chico 2030 General Plan

The Chico 2030 General Plan's Parks Public Facilities and Services Element, Open Space and Environment Element, and Safety Element (City of Chico 2011b) include goals, policies, and actions intended to conserve local water resources, improve local surface water and groundwater quality, provide adequate drainage, and provide flood protection. These City of Chico General Plan goals,

policies, and actions follow the general issues in the County General Plan 2030, with some variations to fit the City's jurisdiction and perspective. Because they generally agree with and support the County General Plan 2030 goals and policies, they are not separately listed.

Chico Sanitary System Management Plan

The City of Chico Sanitary Sewer Management Plan was prepared in compliance with requirements of the State Water Board Order No. 2006-0003, which requires all public wastewater collection system agencies in California with greater than 1 mile of sewers to be regulated under General Waste Discharge Requirements. The Sanitary Sewer Management Plan is a compilation of the policies, procedures (including a Sanitary Sewer Overflow Response Plan), and activities that are included in the planning, management, operation, and maintenance of the city of Chico's sanitary sewer system. The Sanitary Sewer Overflow Response Plan establishes guidelines for responding to sewer spills to minimize the volume and eliminate the cause of sewage releases, contain spilled sewage, minimize public contact with spilled sewage, mitigate the impact of spilled sewage, and meet regulatory reporting requirements.

City of Biggs General Plan 1997 – 2015

The City of Biggs General Plan's Conservation and Recreation Element and Public Facilities Element (City of Biggs 2011) includes goals, policies, and programs intended to ensure that local water supplies (groundwater) are ample, to maintain surface water and groundwater quality, to provide for the safe collection, transport, and discharge of stormwater, and to protect people and property from flooding. These City of Biggs General Plan goals, policies, and actions follow the general issues in the County General Plan 2030, with some variations to fit the City's jurisdiction and perspective. Because they generally agree with and support the County General Plan 2030 goals and policies, they are not separately listed.

9.1.2 Environmental Setting

Surface Hydrology

Precipitation

Annual precipitation in the Plan Area ranges from less than 20 inches in the western valley area (along the Sacramento River) to about 30 inches along the foothills (western boundary of the Plan Area) because precipitation increases with elevation. Rainfall is more than 80 inches in the eastern Cascade Range and Sierra Nevada. Up to 4,000 feet above sea level, most of the precipitation falls as rain, whereas above 4,000 feet, a considerable portion of winter precipitation occurs as snow (Butte County Association of Governments 2012:Figure 3-5). About 80% of the precipitation in the Plan Area occurs in the winter and spring months (November–March). Although the Cascade Range and Sierra Nevada are outside the Plan Area, rivers and streams that flow through the Plan Area originate in these high-rainfall mountain areas (e.g., Feather River, Butte Creek). A large fraction of the rainfall in the Plan Area is retained in the soils and provides moisture for natural vegetation, orchards, and crops, or percolates to the shallow groundwater. Rainfall along the foothill region may be retained in the vernal pool complexes (with impervious soils or hardpan) or may recharge the deeper aquifer units (e.g., Tuscan or Laguna formations) that underlie the Plan Area. Some stormwater runoff occurs during each rainfall event, and higher stream flows with some local flooding may occur during major storms.

Watersheds and Rivers

Figure 9-1 shows the major rivers, stream, canals, and other hydrologic features within the Plan Area. Butte County is located on the east bank of the Sacramento River, and the Feather River flows through the Plan Area (with Lake Oroville to the east). The Thermalito Afterbay and Feather River are within the Plan Area. There are no Section 10 waterways in the Plan Area. Table 9-2 lists the watersheds for several major streams in the county, which are identified by the stream network and topography, although drainage patterns in the agricultural regions of the Plan Area are more difficult to characterize. Watersheds of the Plan Area are defined in the USGS National Hydrography Dataset (2012:Butte County Association of Governments 2015).

Table 9-2. Watersheds and Water Inventory Units in the Plan Area of Butte County

Watershed	Acres
Angel Slough	39,153
Big Chico Creek	8,842
Gilsizer Slough-Snake River	21,819
Honcut Creek	88,590
Jewett Creek-Sacramento River	8,017
Lower Butte Creek	165,636
Lower Feather River	210
Lower Middle Fork Feather River	1,149
Lower North Ford Feather River	2,124
Middle Butte Creek	89,965
Mud Creek	52,602
Pine Creek	30,824
Sacramento River	6,242
Upper Feather River	47,171
West Branch Feather River	1,860
Total	564,204

Source: USGS National Hydrography Dataset (NHD) (2012) in Butte County Association of Governments 2015.

The riparian corridors in the county are a very important element in the BRCP because they provide habitat for a variety of species within the Plan Area (see Chapter 6, *Biological Resources*). The major streams in the Plan Area with riparian corridors include (from north to south) Pine Creek, Rock Creek, Big Chico Creek, Little Chico Creek, Butte Creek, Little Dry Creek, Dry Creek, Wyandott Creek, and Honcut Creek (southern boundary of the county). The riparian and floodplain lands along the Sacramento River and Feather River are also important habitat corridors for the BRCP. Major project levees on the left bank (east) of the Sacramento River begin near the southern County boundary (with Glenn County), and begin on the right bank (west) of the Sacramento River at Ord Ferry. During very high runoff events, a portion of the Sacramento River flows into the Butte Sink portion of the county downstream of the mouth of Big Chico Creek. Much of this portion of the Sacramento River floodplain is protected in various wildlife refuge areas located along the river within the Plan Area.

Big Chico Creek originates on Colby Mountain in Tehama County. Big Chico Creek drains the northwestern portion of the Plan Area and flows 46 miles from its origin to the Sacramento River at the western boundary of the Plan Area. Big Chico Creek flows through the city of Chico's Bidwell Park, One Mile dam, the California State University, Chico campus, and Bidwell Golf Course before joining Mud Creek, Rock Creek, Lindo Channel, and ultimately the Sacramento River. The majority of Big Chico Creek flow enters in the upper third of the creek's drainage (Big Chico Creek Watershed Alliance 2011a:1). Flows in Big Chico Creek are typically highest January through April and lowest in September and October.

Butte Creek drains the central to southwestern portion of the Plan Area. Butte Creek originates on the western slope of the Sierra Nevada. Butte Creek enters the Sacramento Valley southeast of Chico and meanders to the southwest to the initial point of entry into the Sacramento River at Butte Slough. Butte Creek also enters the Sacramento River through the Sutter Bypass and Sacramento Slough. Flows in Butte Creek are typically highest January through April and lowest in September and October.

The Feather River originates in the Sierra Nevada, above Oroville Reservoir and east of the Plan Area, and flows southward from Oroville through the Plan Area. Flows from Wyandott Creek join Honcut Creek which flows into the Feather River at the south end of the county. Flows in the lower Feather River are highly regulated for hydroelectric power production, flood control, water supply, and fish protection flows. The great majority of the county surface water supplies originate from the Feather River. Figure 9-2 shows the irrigation and water districts in the county (located in the Plan Area) that receive their water supplies from Thermalito Forebay.

There are various types of wetlands found in the Plan Area, including, but not limited to: vernal pools, marshes, seeps, and emergent (seasonal) wetlands. Vernal pools are seasonally flooded depressions that typically are found in grasslands and have soils that allow them to collect precipitation and runoff from surrounding uplands and stay flooded longer than the surrounding uplands (California Wetland Information System 2014). Some vernal pools are connected through swales and ephemeral drainages to surface tributary systems, which connect to major creeks and rivers. Marshes are wetlands frequently or continually inundated with water, characterized by emergent soft stemmed vegetation adapted to saturated soil conditions (U.S. Environmental Protection Agency 2014). Marshes typically occur in poorly drained depressions, and in shallow water along the boundaries of lakes, ponds, and rivers (U.S. Environmental Protection Agency 2014). They receive water through precipitation, shallow groundwater, overbank flooding, and backwater flooding. Seeps have groundwater-driven hydrology. Seeps and marshes may be perennial and have water seasonally or throughout the year, depending on water source(s) and location. Emergent wetlands are in scattered locations throughout the Plan Area, generally near creeks, rivers, or areas that receive agricultural drainage (e.g., Butte Sink).

Human-made water bodies within the Plan Area include impoundments, irrigation canals, agricultural drains, managed wetlands, and flooded rice fields. The largest impoundments in the Plan Area are the Thermalito Afterbay and Thermalito Forebay, both associated with Lake Oroville, all of which are own and operated by DWR. Thermalito Forebay is an offstream reservoir that conveys generating and pumping water between the Thermalito Power Canal and the Thermalito Power Plant at the Lake Oroville dam. Thermalito Afterbay is an offstream reservoir for water storage and is the major agricultural water supply diversion for Butte County Water Districts and Irrigation Districts. Smaller impoundments for water storage and livestock are also present in the Plan Area. Managed wetlands occur primarily in the western part of the Plan Area and are

associated with federal and state wildlife refuges (e.g., Sacramento River NWR, Llano Seco NWR, Gray Lodge Wildlife Area), mitigation bank areas (e.g., Dale Ranch Vernal Pool Conservation Bank, Porter Ranch Mitigation Bank, Shauna Downs Mitigation Bank, and Meridian Ranch Mitigation Bank), or provided private hunting clubs (Butte County 2001). These areas are flooded, particularly during the winter, to a shallow depth to provide habitat for migrating or wintering waterfowl, as well as for hunting. These wetlands support emergent aquatic vegetation if soils are moist much to all of the year. Rice fields are the dominant form of agriculture in the southwestern portion of the Plan Area. They are flooded from April to September for the rice growing season, and many are flooded again from October to January for rice decomposition and water fowl feeding and nesting habitat (Butte County 2001).

Groundwater Hydrology

This section includes information on groundwater aquifers (water-bearing geological formations) located below the Plan Area and the groundwater pumping, depth to groundwater, and the seasonal and long-term variations in the groundwater elevations (i.e., drawdown) within the Plan Area.

The Plan Area encompasses a small portion of the Sacramento Valley Groundwater Basin and a portion of the Foothill Groundwater Basin (California Department of Water Resources 2005). The Sacramento Valley Groundwater Basin extends north to south from Red Bluff to the Sacramento-San Joaquin Delta and is bordered by the Coast Ranges to the west and the Cascade Range and Sierra Nevada to the east. It covers an area of 4,900 square miles, which includes all of Sutter and parts of Butte, Glenn, Tehama, Colusa, Yuba, Yolo, Solano, Placer, and Sacramento Counties. The Sacramento Valley Groundwater Basin is composed of several geological layers (alluvial or volcanic deposits) that provide the aquifers used for county groundwater pumping.

DWR reports land and water use within the county using geographical water inventory units and sub-units corresponding to the major water districts or watershed boundaries used for water accounting. The Plan Area encompasses several subbasins. Figure 9-3 shows these sub-units which are used in the county water inventory and planning documents, including the GMP. Table 9-3 gives a general summary of the area and water supply resources (surface and groundwater pumping for the water inventory sub-units within the Plan Area of the county; part of the Mountain unit is located outside of the Plan Area).

The Butte County Department of Water and Resource Conservation have undertaken a major effort to monitor the groundwater resources and groundwater uses within the County. The County, in cooperation with DWR and supported by competent consultants, has produced a GMP, an IWRP, several water inventory and analysis reports, and a groundwater model to assist in management and planning efforts. The most detailed description of the groundwater resources and uses is the Butte County Groundwater Inventory Report (California Department of Water Resources 2005).

Table 9-3. Summary of Butte County Water Inventory Units and Water Supplies

Inventory Unit	Inventory Sub-Unit	Total Area (acres)	Irrigated with Surface (acres)	Surface Water Supply (TAF/yr)	Irrigated with GW (acres)	Irrigation Wells (number)	M&I Wells (number)	Domestic Wells (number)	Total GW Pumping (TAF/yr)	GW Applied Rate (AF/acre)	Recharge from GW (TAF/yr)	Net GW Pumping (TAF/yr)
Vina	Vina	74,395	900	3	35,800	621	55	2,096	138	3.3	27	111
West Butte	Durham/Dayton	40,000	4,000	13	26,600	568	40	1,195	95	3.2	19	76
	M&T	8,200	6,000	20	2,100	38	0	18	7	3.2	2	5
	Angel Slough	5,400	300	1	3,700	43	0	8	10	2.7	2	9
	Llano Seco	18,400	5,000	17	1,100	16	0	1	2	1.6	0	2
	Western Canal (33%)	14,750	1,300	65	1,000	36	0	15	7	4.1	1	6
East Butte	Pentz	1,900	–	0	0	39	0	172	0	0.0	0	0
	Esquon	11,600	7,000	25	3,100	108	0	291	17	4.6	4	13
	Cherokee	14,700	1,500	5	4,900	62	0	104	24	4.7	6	18
	Western Canal (67%)	30,000	26,000	150	2,300	76	0	32	15	5.3	4	11
	Richvale	39,400	33,000	182	35	72	0	87	0	5.9	0	0
	Thermalito	25,500	500	2	4,500	56	0	140	22	4.2	5	17
	Biggs-West Gridley	34,000	27,300	180	2,500	92	4	246	13	5.1	4	9
	Butte	21,400	15,000	70	6,100	183	8	571	27	3.6	6	21
	Butte-Sink	10,300	4,500	15	100	11	0	4	6	8.0	0	6
North Yuba	North Yuba	47,500	4,000	13	12,000	178	8	504	50	3.9	14	36
Foothill	Total (3 sub-units)	217,600	6,500	22	140	86	28	2,604	3	2.9	2	1
Mountain	Mountain	410,000	2,500	8	100	11	20	1,954	2	2.0	1	1
	Butte County	1,025,045	145,300	791	106,075	2,296	163	10,042	439		96	344

Source: Butte County 2001.
TAF = thousand acre-feet.
AF = acre-feet.

Hydrogeologic Units

The main hydrogeologic unit and source of groundwater in the county is the Tuscan Formation (California Department of Water Resources 2005). Other units that supply lesser amounts of groundwater to the county are the Laguna, Riverbank, and Modesto Formations. The Tuscan and Laguna Formations are the source of water for deeper wells such as irrigation and municipal wells.

Tuscan Formation

The Tuscan Formation is considered an important deep system that is theorized to underlie most of the valley area. It extends from east of Redding to west of Oroville and from the Cascade Range and Sierra Nevada into the subsurface about 5 miles west of the Sacramento River (California Department of Water Resources 2005:2-8).

The Tuscan Formation consists of four units, Units A through D (Butte County 2004). The total thickness of the Tuscan Formation ranges from about 1,700 feet in the east to approximately 300 feet at the westward extent (California Department of Water Resources 2005:2-8). Unit A is the oldest (deepest) deposit and is approximately 250 feet thick. Unit B is approximately 600 feet thick and lies on Unit A. Unit C is 600 feet thick and overlies Unit B. Unit D is not present in the county. Units A and B (Lower Tuscan aquifer) contain the majority of groundwater in the Tuscan Formation (Butte County 2004:2-3, 2001:3-11). Unit C (Upper Tuscan aquifer) contains groundwater in the western portion of the valley, and acts as a confining layer above Unit B (Butte County 2004:2-3). Units A, B, and C are all exposed on the east side of the valley along the foothills. Unit D is the youngest unit and is exposed only in localized areas northeast of Red Bluff and is not present in the county.

Tuscan Formation groundwater in the Sacramento Valley region is contained primarily within the pore spaces of the reworked sand and gravel layers. Much of the groundwater in the Tuscan Formation is confined by layers of impermeable clays, lahars, or tuff breccia. The permeable layers of the Unit B sediments compose the main aquifer material for groundwater storage in the valley. The fine-grained, consolidated lahars of Unit C form thick, low permeability confining layers for groundwater contained in the more permeable sediments of Unit B. Although the Tuscan Formation is unconfined where it is exposed near the valley margin, at depth the Tuscan Formation is confined and forms the major aquifer system in the county (California Department of Water Resources 2005:2-1).

Laguna Formation

The Laguna Formation is located along the eastern edge of the Sacramento Valley, from Oroville southward to Lodi. The only surface exposures of the formation within the county occur southwest of Oroville. The thickness of the Laguna Formation is difficult to determine because the base of the unit is rarely exposed. Estimates of the maximum thickness range from 180 feet to 1,000 feet (Butte County 2001:3-12: 2-4).

Quantitative water-bearing data for the Laguna Formation is limited, especially in the county area. Wells completed in the finer-grained sediments of the Laguna Formation yield only moderate quantities of water.

Riverbank Formation

The Riverbank Formation consists of gravel, sand, and silt eroded from the surrounding Coast Ranges, Klamath Range, Cascade Range, and Sierra Nevada and deposited in the Sacramento Valley. Exposures of the Riverbank Formation within the county are observed primarily west of Oroville and southward. Thickness of the Riverbank Formation ranges from less than 1 foot to over 200 feet, depending on location (Butte County 2001:3-12).

The thickness of the Riverbank Formation can be a limiting factor to the water-bearing capabilities of the formation. The Riverbank Formation is moderately to highly permeable and yields moderate quantities of water to domestic and shallow irrigation wells. It also provides water to deeper irrigation wells that have multiple zones of perforation. Well yields are higher in areas where concentrations of gravel and sand are present. Groundwater occurs generally under unconfined conditions.

Modesto Formation

The Modesto Formation consists of gravel, sand, and silt eroded from the surrounding Coast, Klamath, and Cascade ranges and the Sierra Nevada and deposited in the Sacramento Valley. Exposures of the Modesto Formation are present along most of the major streams and rivers within the county. The Modesto Formation is widespread throughout the Sacramento Valley, occurring from Redding southward into the San Joaquin Valley. The most notable occurrences are found along the Sacramento and Feather rivers. Similar to the Riverbank Formation, the Modesto Formation ranges in thickness from less than 10 feet in many of the terraces and along the margins of the valley to nearly 200 feet across the valley floor (California Department Water Resources 2005:2-11).

Like the Riverbank Formation, the thickness of the Modesto Formation limits the water-bearing capabilities of the formation. These deposits provide water to domestic and shallow irrigation wells, as well as to deeper wells with multiple zones of perforations. In locations where gravel and sand predominate, groundwater yields are moderate. Lesser yields are found in areas with high silt and clay content. Groundwater occurs generally under unconfined conditions.

Groundwater Pumping and Levels

Ninety percent of the agricultural and municipal wells are completed in the upper 600 feet and 750 feet of the aquifer, respectively. The Modesto and Riverbank formations and younger stream channel and basin deposits comprise the shallower groundwater bearing units, reaching from ground surface to maximum depth of about 200 feet. Many domestic wells draw water from this aquifer system. There are no general layers of clay separating these geological strata; the water levels in each layer are similar, and most deep wells are screened within several hundred feet of the aquifer layer(s). The groundwater resources of the county can be most easily understood by considering all of the wells to be located within one large aquifer that extends from the Sacramento River to the foothills. The groundwater elevations (i.e., water table) generally slope to the southwest, with water elevations (in wells) of about 150 to 175 feet in the vicinity of Chico and 150 to 175 feet in the vicinity of Oroville. The water elevations decrease to about 100 feet at Honcut, at the southwest corner of Thermalito Forebay, and along the border with Glenn County. The groundwater elevation is approximately 50 feet at the southwest corner of the county where Cherokee Canal meets Angel Slough.

The county groundwater elevations are controlled by the rivers and streams that form the boundaries of the county. Recharge from the rivers and streams occurs during periods of runoff and flow; seepage (e.g., springs) from the shallow groundwater to the creek channels and streams may occur during the spring and early summer because the creek channels are the lowest surface elevations throughout the Plan Area. The general southwestward water elevation pattern within the county is disrupted by a moderate groundwater depression under the city of Chico resulting from municipal pumping for the city's water supply. There is a groundwater mound near the Thermalito Afterbay associated with recharge from the facility. The extensive well monitoring in the county indicates that the depth to groundwater throughout most of the Plan Area is relatively shallow, generally ranging from less than 5 feet along Butte Sink to about 50 feet along the foothill boundary of the Sacramento Valley Groundwater Basin. Groundwater management is generally protecting the existing groundwater resources to provide sustainable pumping that is balanced by the recharge to the aquifers from upstream areas (where the aquifer is exposed), from the streams, rivers, and impoundments (Thermalito Forebay), and from rainfall infiltration and irrigation deep percolation.

The existing groundwater pumping from the county and the Plan Area is the basic data needed for effective groundwater management in the county. The Butte County GMP is based on the observed groundwater levels as well as historical and current groundwater trends based on the county's extensive groundwater monitoring program. Seasonal drawdown, which is caused by pumping for irrigation and fall flooding of rice fields, with winter–spring recharge from rainfall, streamflow, and irrigation practices, must be balanced for sustainable groundwater use. A long-term decline in the groundwater levels would indicate that the current groundwater pumping is greater than the sustainable yield of the aquifer (i.e., recharge capacity). Groundwater levels are dependent on the balance between groundwater extraction (pumping) or natural discharge (seepage) and recharge from rainfall, irrigation, and streams. Groundwater extraction or natural discharge represents the groundwater losses, whereas recharge represents groundwater replenishment (sources).

Numerous groundwater wells are used for both crop irrigation and drinking water supply in the Plan Area. The Sacramento Valley portion of the county has approximately 10,000 wells (Butte County 2005). Although groundwater provides 30–31% of the total water supply in the county, approximately 75% of the county's residential water supply (municipal or individual) is extracted from groundwater (Butte County 2010). The average depth of domestic wells in the county is about 150 feet. Irrigation and municipal wells have a greater average depth than domestic wells. The average depth for irrigation wells is about 350 feet, and the average depth for municipal wells is about 450 feet (California Department of Water Resources 2005).

Groundwater levels are monitored in the Sacramento Valley region of the county by a number of different private and public agencies, such as DWR, Butte County Department of Water and Resource Conservation (BCDWRC), and the California Water Service Company (CWSC). DWR has maintained the largest long-term groundwater level monitoring grid for over the last 50 years in the Sacramento Valley region of the county (California Department of Water Resources 2005; Butte County Water Commission 2010). CWSC currently measures monthly groundwater levels in approximately 60 municipal groundwater supply wells in the Chico urban area. These are typically deep wells that draw from the Tuscan Formation aquifer system (Butte County Water Commission 2010).

Groundwater level is monitored on a semi-annual basis. Groundwater levels typically fluctuate seasonally and from year to year. Seasonal fluctuation of groundwater levels is usually highest in the spring and lowest following the irrigation season in the fall months (Butte County Water

Commission 2010). Spring to fall fluctuation of groundwater levels in the unconfined portion of the aquifer system averages only 1 to 2 feet during years of normal precipitation and years of drought. Groundwater levels rise during the summer months as the upper aquifer recharges due to flood irrigation for rice production (Butte County Water Commission 2010).

Long-term fluctuations in groundwater level are of primary concern for water supply and environmental effects. These fluctuations occur when there is a difference between the volume of water recharged into the aquifer and the volume of water removed from the aquifer, either by extraction or natural discharge to surface water bodies. Long-term changes can be attributed to various factors including changes in groundwater extraction volumes or variations in recharge associated with wet or dry climatic cycles. The DWR Butte County Groundwater Inventory Analysis (2005) indicates that the amount of annual groundwater extraction is currently within the aquifer sustainable yield in the aquifer system beneath the Sacramento Valley region of the county. Although increased groundwater extraction can decrease groundwater levels over time if extraction volumes exceed those of recharge, the decrease in groundwater levels is not expected to change the rate of groundwater recharge, which is primarily based upon soil infiltration characteristics.

Review of historical hydrographs for long-term comparison of spring-to-spring groundwater levels indicates a decline in groundwater levels associated with the 1976–77 and 1987–94 droughts, were followed by a recovery in groundwater levels to pre-drought conditions of the early 1970s and 1980s (California Department of Water Resources 2005). The most recent groundwater level data for 2009 indicate that the southern portion of the Plan Area (i.e., Biggs-West Gridley, Richvale, and Western Canal areas) shows no significant declining trend in groundwater levels. However, wells within the Chico urban area show declining water levels ranging from less than 5 feet to more than 20 feet, and with the below-average precipitation during water years 2007 through 2009, levels continued to decline. Areas east of Durham and within Chico experienced the most significant declining trends, with groundwater levels averaging approximately 20 feet below the previous levels recorded in the mid-1980s (Butte County Water Commission 2010). Generally, however, the groundwater elevations in the county are stable, with no long-term decline; this indicates that the existing pumping (highest in dry years) should be sustainable.

Surface Water Quality

The following sections discuss specific water quality parameters and contaminants of concern in creeks and rivers in the Plan Area.

Total Suspended Solids and Turbidity

Total suspended solids (TSS) are suspended or colloidal particles in water which do not readily settle out by gravity. Streams carry much more suspended sediment during high flow periods. In surface water, TSS is indicative of upstream scouring, bank erosion, and agricultural return flow transporting and depositing sediment. Suspended sediment is considered a pollutant by the Central Valley Regional Water Board and can transport other contaminants (e.g., phosphorus) and hydrophobic contaminants (e.g., organochlorine pesticides).

Turbidity is the reduction of water clarity due to the presence of suspended or colloidal particles and is commonly used as an indicator for the general condition of water clarity. Turbidity in surface water is comprised of naturally occurring and/or introduced organic matter and inorganic minerals, such as silt, clay, industrial waste, sewage, and algae. It is quantified according to the amount of light which is reflected by the suspended particles and is measured in nephelometric turbidity units (NTUs). Turbidity is closely related to TSS, but also includes plankton and other organisms (Murphy 2009).

Water Temperature, Salinity (Electrical Conductivity), and pH

Water temperature affects the concentration of DO and is an important water quality variable for aquatic life. The Basin Plan water temperature objective requires that the temperature not exceed 56°F in the Sacramento River from Keswick Dam to Hamilton City, and not exceed 68°F from Hamilton City to the I Street Bridge during periods when temperature increases would be detrimental to the fishery (California Regional Water Quality Control Board 2009). In addition, the Basin Plan water temperature objective also requires that the temperature not deviate more than 5°F from ambient river temperature.

Electrical conductivity (EC) of water is directly related to the concentration of total dissolved solids (TDS). TDS and EC are general indicators of salinity and are regulated under the Basin Plan. Basin Plan objectives for the Feather River from the Fish Barrier Dam at Oroville to the Sacramento is 150 micromhos/cm or less in well-mixed waters of the Feather River.

Potential of hydrogen (pH) represents the effective concentration (activity) of hydrogen ions in water is reported on a scale from 0 (acidic) to 14 (alkaline). The Basin Plan objective for pH is between 6.5 and 8.5, and discharges cannot result in changes of pH that exceed 0.5 above normal ambient pH with designated cold or warm beneficial uses.

Water Quality of Major Surface Water Features

Surface water quality in the Plan Area is variable depending on the water body. Several of the larger water bodies in the Plan Area are listed as impaired according to Section 303(d) of the CWA (Section 9.1, *Regulatory Setting*). The following list of 303(d) listed impaired water bodies is based on the 2010 303(d) list. Table 9-4 summarizes water quality impairments in major surface waters in the Plan Area and the sources of these impairments.

Table 9-4. CWA Section 303(d)-Listed Impaired Water Bodies and Associated Potential Sources for Major Water Bodies within the Plan Area Watershed

Water Body	Listed Pollutants	Associated Potential Sources
Big Chico Creek	Mercury	Resource Extraction
Butte Creek	Mercury pH	Resource Extraction Source Unknown
Feather River, Lower (Lake Oroville Dam to Confluence with Sacramento River)	Chlorpyrifos Group A Pesticides Mercury PCBs Unknown Toxicity	Agriculture Agriculture Resource Extraction Unknown Unknown
Sacramento River (Red Bluff to Knights Landing)	DDT Dieldrin Mercury PCBs Unknown toxicity	Agriculture Agriculture Resource Extraction Source Unknown Source Unknown

Source: State Water Resources Control Board 2010.

PCBs = Polychlorinated biphenyls.
DDT = Dichlorodiphenyltrichloroethane.

Big Chico Creek

Water quality in Big Chico generally meets state standards and is protective of designated beneficial uses. Potential sources of water quality impairment in the watershed include erosion from forest and rangeland roads, urban runoff in Chico residential and commercial areas, and agricultural runoff and associated pesticides, fertilizers, etc. in the lower watershed reach. Big Chico Creek is 303(d) listed as impaired for mercury (State Water Resources Control Board 2010).

Butte Creek

Overall water quality in Butte Creek is considered to be good to excellent in the upper portions of the watershed but degrades in quality lower in the system. Water quality generally varies seasonally, corresponding to precipitation and diversions, as well as annually, depending on drought or wet conditions. Major storm events typically increase turbidity and mobilize pollutants and salts, and low flows can reduce water quality by concentrating contaminants. Within the county, Butte Creek is 303(d) listed as impaired for mercury, due to resource extraction, and pH (State Water Resources Control Board 2010).

Lower Feather River

EPA and the Central Valley Regional Water Board have classified the lower Feather River (from the Oroville Dam to the confluence with the Sacramento River) as 303(d) impaired for diazinon,

chlorpyrifos, Group A pesticides,[1] mercury, and unknown toxicity (State Water Resources Control Board 2010).

Sacramento River

The Sacramento River and its tributaries are generally characterized as having good overall water quality, with relatively cool water temperatures, low biochemical oxygen demand, medium to high DO, and low mineral and nutrient content. Snowmelt serves as the primary water source for the river system. Further downstream, as water flows through the Central Valley, the river receives various pollutants and constituents associated with human activities, and water quality typically decreases. Major sources of added constituents include eroded soils, agricultural return flows, urban runoff, and discharges from municipal wastewater treatment facilities.

Known contaminants in the Sacramento River include dioxin (from paper mills), mercury, organophosphate pesticides, and constituents in acid mine drainage, agricultural runoff, and municipal non-point source pollution (U.S. Geological Survey 2011). Both total mercury and methyl-mercury have been detected at elevated levels in samples from the American, Feather, and Sacramento Rivers by the California State Toxic Substance Monitoring Program (U.S. Geological Survey 2011). Several reaches of the Sacramento River and its tributaries have been classified as impaired. The state's 303(d) list indicates that the reach bordering the Plan Area is impaired for dichlorodiphenyltrichloroethane (DDT), dieldrin, mercury, polychlorinated biphenyls (PCBs), and unknown toxicity (State Water Resources Control Board 2010).

Groundwater Quality

This section includes information on the quality of groundwater resources within the county and the Plan Area.

Since 2001, the Butte County Groundwater Quality Trend Monitoring Program has collected annually measurements for temperature, pH, and EC on 10 wells throughout the county, as required by Chapter 33A. Data is consistently collected at the height of the irrigation season each July/August to establish baseline levels across the county so that any future changes in water quality can be detected and further investigation and monitoring can subsequently be developed. Overall, the results of the water quality sampling indicate that groundwater in the basin is high quality, low in TDS, free of saline intrusion, and is in good health (Butte County Water Commission 2010). Although these data may provide good information on salinity, they neither fully characterize the quality of local groundwater nor provide enough information to ensure that water is safe to drink (Butte County Water Commission 2010).

According to the Department of Toxic Substances Control (DTSC), the county has two groundwater contamination plumes: the Central Plume and the Southwest Plume. Both plumes are contaminated with perchloroethylene (PCE), an organic compound originating from former dry cleaner operations, and are located in Chico. The Central Plume is the largest contaminated groundwater plume in the county, with an area of approximately 1 by 1.5 miles in size, and is located in downtown Chico. PCE concentrations have been as high as 2,900 parts per billion (ppb), causing two public wells to be closed by the CWSC in 1990. In July of 1995, DTSC installed a remediation well and

[1] Group A pesticides include aldrin, dieldrin, chlordane, endrin, heptachlor, heptachlor epoxide, hexachlorocyclohexane (including lindane), endosulfan, and toxaphene.

pump, which continue to remove a significant amount of PCE from the groundwater. The Southwest Plume extends about 2 miles in length and seven blocks in width in the southwest portion of Chico. In 1991, 14 private wells were shut down due to PCE contamination. In 1992, a carbon treatment unit was installed in Well 46 near the center of the plume which has significantly reduced PCE concentrations, but the average is still not below California Department of Public Health (DPH) Maximum Contaminant Level for Drinking Water of 5 ppb. Therefore, treatment is expected to continue.

Nitrate contamination of groundwater from septic tank leakages has been documented in the Chico area of the county. A Nitrate Compliance Plan, adopted by the Board of Supervisors on September 25, 2001, provides for case-by-case evaluation of non-residential septic systems and recognizes that sewer connection may not be practical or feasible in all cases.

Flooding

Butte County completed an assessment of flood hazards as part of the county's Flood Mitigation Plan. Several water bodies within the Plan Area were identified as being located within a FEMA-designated 100-year floodplain or other principal flood hazard areas. Flooding is an important safety issue in the Local Agencies' general plans. Flooding in Rock Creek and Keefer Slough has resulted in inundation of SR 99, SR 32, and county roadways, and adversely affected agricultural and residential areas around Chico and the unincorporated community of Nord. Figure 9-4 shows the FEMA-identified areas within the 100-year floodplain in the Plan Area; they are primarily located along the Sacramento River, along the Feather River, and along Butte Creek and Cherokee Canal.

Floods can occur as a result of extreme precipitation, whereby water levels of drainage ways, such as streams, creeks, and rivers, are overwhelmed by high flows from stormwater runoff that causes overtopping of banks and inundates the surrounding area. There are a number of levees in the county that provide various levels of protection for the citizens and property in the county from flooding hazards. There are also dams that serve as water storage features in the county and surrounding areas. Failure of these flood control and water storage features could lead to inundation of populated areas of the Plan Area. Figure 9-5 shows a map of the potential dam inundation areas within the Plan Area for dam and levee failures. The county and the cities of Chico, Biggs, Gridley, and Oroville are all located within dam inundation areas. However, the city of Gridley is not protected by levees.

There are a number of levees constructed by both private individuals and government agencies within the Plan Area. Many of these are aging and may need repair and maintenance in order to adequately control flood flows. Given the number of levees, and the fact that most are owned or maintained by private individuals or other public agencies, it is not feasible for Local Agencies' general plans and policies to completely address maintenance and improvements to all levees to the extent necessary to entirely eliminate risks from levee failure.

In addition, FEMA recently adopted new criteria for determining whether an area is protected by a levee from the 100-year flood. These criteria consider whether a particular segment of levee has been certified to meet the criteria to withstand the 100-year flood event. Due to these new criteria, a number of levees have been deemed to be uncertified by FEMA when they developed the 2011 FIRMs. This change in criteria led to significant areas along surface waters as being designated as being in some form of flood zone that were not before the change. The levees on the following creeks were not designed or constructed to provide the FEMA 100-year level of protection: Butte Creek

downstream of the Skyway, Hamlin Slough, Little Chico Creek downstream of the Butte Creek Diversion Channel, Comanche Creek, and Cherokee Canal. During intense storms, water could flow over the top or otherwise breach these levees and break out of the channel, not returning to the main channel for several thousand feet downstream, if at all. Therefore, areas on the landside of these levees are shown on the 1998 and 2000 FIRMs as being subject to inundation in the base flood (i.e., flood that has a 1% chance of occurring in any year). FEMA is in the process of developing flood plans for potential levee failures along Sycamore Creek, Mud Creek, Big Chico Creek, and the west side of the Feather River (Butte County 2012).

Flood control projects on Little Chico Creek, Big Chico Creek, and Lindo Channel have helped attenuate the amount of runoff that flows through the city of Chico, reducing potential flooding problems. However, portions of the Chico adjacent to Little Chico Creek are identified as being at risk of flooding during a 100-year event. FEMA and DWR are in the process of evaluating whether various flood control infrastructure meet 100-year flood protection standards. These agencies have taken the position that various levees and flood control structures, for which adequate data is unavailable, cannot be certified or accredited as adequate to provide the required 100-year level of flood protection. As part of the flood remapping effort for the county, FEMA has indicated that areas of Chico previously mapped as protected from flooding, such as Sycamore Creek and Mud Creek, will be reclassified as subject to a 1% per year chance of flooding unless the levees are accredited. The reclassification of these areas would result in the imposition of flood insurance requirements on property owners and enhanced building permit requirements for areas in a mapped floodplain. The City of Chico and the County have entered into a Provisionally Accredited Levee (PAL) agreement with FEMA in order to postpone a reclassification of flood hazard areas until the levees are accredited (City of Chico 2011a).

Portions of the county would be subject to inundation caused by dam failure. The failure of the Oroville Dam or Thermalito Afterbay Dam, although considered unlikely, would have the potential to inundate a substantial portion of southwestern Butte County. A major seismic event, if sufficiently intense, would be the most likely cause of dam failure as a number of geologic faults have been identified in the Oroville area. The Oroville Dam could withstand a 6.5-magnitude earthquake, which is considered to be the largest credible event projected for the region. In addition, the western edge of the county is within the inundation areas of the Shasta Dam, Black Butte Dam, and Whiskeytown Dam. The Magalia Dam on Little Dry Creek (Paradise) has been found to have inadequate stability under seismic loading conditions.

9.2 Environmental Consequences

This section incorporates by reference the impact determinations presented for hydrology, water resources, and water quality in the Local Agencies' general plan EIRs (as described in more detail in Chapter 3, Section 3.3, *Resource Chapter Organization and NEPA/CEQA Requirements*).[2] The significance findings and mitigation measures of each of the general plan EIRs are compiled in Appendix C. The Lead Agencies have reviewed these analyses and found them to be appropriate for the purposes of this EIS/EIR.

[2] These previous CEQA documents are available collectively for public review at the BCAG offices (2580 Sierra Sunrise Terrace, Suite 100 Chico, CA 95928-8441). Individual general plans and EIRs are also available at each of the respective land use agencies.

9.2.1 Methods for Impact Analysis

The BRCP would not provide individual project approvals or entitlements for any private or public development or infrastructure projects. Accordingly, this EIS/EIR does not provide CEQA or NEPA coverage for individual covered activities and does not function as a *programmatic* or *umbrella* CEQA or NEPA document for regional development and infrastructure projects. The BRCP EIS/EIR evaluates only the adverse and beneficial environmental effects associated with the decisions of the Local Agencies, water and irrigation districts, and Caltrans to approve, permit, and implement the BRCP. Accordingly, the methods for analyzing direct impacts on water resources (including hydrology and surface and groundwater quality) are tailored to evaluate the decisions of the Local Agencies, water and irrigation districts, and Caltrans to approve, permit, and implement the BRCP. This EIS/EIR also incorporates the impact determinations of the Local Agencies' general plan EIRs to analyze indirect impacts on water resources (including hydrology and surface and groundwater quality).

In adopting the EIRs for the local general plans, each Local Agency determined the programmatic impacts on water quality and hydrology (runoff and drainage) would be mitigated to a less-than-significant level through the implementation of general plan policies and the adoption of specific actions or mitigation measures. All potential effects on groundwater resources, such as reduction in groundwater levels or overdraft of the aquifer would also be reduced to less-than–significant level through the implementation of general plan policies and the associated actions or strategies. All potential effects on local flooding would also be mitigated to a less-than-significant level through the implementation of general plan policies and mitigation measures identified in the EIRs for the general plans. It is assumed that all covered activities approved by the participating local jurisdictions would be consistent with the policies of the respective general plan and would be subject to any mitigation measures identified, such that impacts would be adequately mitigated. For development-related activities, no additional mitigation measures are identified in this EIS/EIR chapter beyond the policies identified in the general plans and mitigation measures identified in the general plan EIRs. The impact analysis related to those activities within Local Agencies' jurisdictions is organized into short-term and long-term effects where appropriate. Short-term effects would typically be those associated with construction, and long-term effects would typically be those associated with recurring maintenance or increased impervious surfaces associated with permanent development.

A qualitative impact analysis was performed activities within water and irrigation districts as they have not been analyzed in previous CEQA documents. These activities include: rerouting of existing canals; replacement of water delivery structures; replacement of large weirs; mowing and trimming vegetation along service roads; and removing aquatic vegetation from canals. Potential impacts on water resources could occur primarily during construction or maintenance of these activities. A qualitative impact analysis was performed for the conservation strategy. The impact analysis is organized into short-term and long-term effects where appropriate.

The methodology for evaluating impacts on hydrologic and water resources within and outside Local Agencies' jurisdictions also incorporates standard BMPs required by Caltrans during construction of transportation projects and summarized in Appendix D. The analysis assumes that Caltrans would implement these BMPs, when appropriate, during transportation projects within the Plan Area.

Potential impacts from implementing the BRCP on water supply facilities in the Plan Area are addressed in Chapter 12, *Public Services and Public Utilities*, and potential impacts on aquatic habitat for covered species are discussed in Chapter 6, *Biological Resources*, and are not discussed in this chapter.

9.2.2 Significance Criteria

In accordance with Appendix G of the State CEQA Guidelines, the action alternatives would be considered to have a significant effect if they result in any of the conditions listed below. Closely related CEQA thresholds have been combined in the list below. However, all CEQA significance thresholds have been considered in the analysis.

- Violate any water quality standards or waste discharge requirements, or otherwise substantially degrade water quality.
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge, resulting in a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted).
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff, in a manner that would result in substantial erosion, siltation, or flooding onsite or offsite.
- Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff.
- Place housing within a 100-year flood hazard area or place structures that would impede or redirect flood flows within a 100-year flood hazard area, as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map
- Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam.
- Contribute to inundation by seiche, tsunami, or mudflow.

The largest lake in the Plan Area is the Thermalito Forebay. Although high winds can produce large waves and a downwind increase in the water elevation, the levees are designed to provide sufficient freeboard to prevent any damage from seiche (oscillating) waves. There is no risk of damages from a tsunami (ocean wave) following a seismic event in the county, and there are no steep mountain slopes in the Plan Area that would be subject to damaging mudflows following high intensity rainfall or a seismic event. Because these hydrological events are not expected in the Plan Area, the potential for the proposed action to contribute to inundation by seiche, tsunami, or mudflow will not be discussed in the analysis for any of the alternatives.

9.2.3 Impacts and Mitigation Measures

Alternative 1—No Action (No Plan Implementation)

As discussed in Section 2.3.1, *Alternative 1—No Action (No Plan Implementation)*, under Alternative 1, project proponents would apply for permits on a project-by-project basis, without a coordinated and comprehensive effort to minimize and mitigate biological impacts through the BRCP. Under the Alternative 1, urban development and public infrastructure projects would continue to occur pursuant to the approved general plans of the Local Agencies and BCAG's regional plan(s). These include residential, commercial, and industrial development as well as construction, maintenance, and use of urban infrastructure, parks, recreational facilities, public services, and similar types of urban land uses. Other activities that would occur under Alternative 1 are construction and maintenance of public infrastructure projects outside of urban areas, including public infrastructure projects in and over streams (e.g. bridge replacements). No regional conservation strategy or conservation measures would be implemented; therefore, benefits to or impacts on hydrology and water quality would not occur.

Impact WQ-1: Violate any water quality standards or waste discharge requirements, or otherwise substantially degrade water quality (NEPA: less than significant; CEQA: less than significant)

The County and the Cities of Chico, Oroville, and Gridley determined that implementation of their general plans and activities that would occur under those general plans may have short-term and/or long-term effects on water quality that would violate water quality standards (i.e., water quality objectives, beneficial uses, TMDLs), WDRs, or otherwise degrade water quality. The City of Biggs determined that implementation of its general plan would result in less-than-significant impacts. Short-term and long-term effects of the implementation of the Local Agencies' general plans are described below.

Short-Term Effects

The Local Agencies' general plans state that construction and grading activities for residential and commercial development projects could degrade water quality in the short term by increasing the potential for soil erosion and associated contaminants from stormwater discharges, thereby resulting in higher sediment loads, turbidity, and other contaminants in receiving waters. Contaminated runoff from project sites during and potentially immediately following construction could ultimately be transported offsite via drainage channels. Many construction-related wastes (i.e., solvents, lawn chemicals, paint, petroleum products, metals, and other materials) have the potential to degrade existing water quality in the short term. Project construction activities that are implemented without mitigation could violate water quality standards or cause direct harm to aquatic organisms. For example, pollutants from construction could enter 303(d)-Listed Impaired Water Bodies of Butte Creek, the Lower Feather River, and the Sacramento River (Table 9-4) since these rivers are designated as impaired by unknown sources for pH and unknown toxicity. However, general plan policies and provisions (i.e., building codes) and continued implementation of city and county standards (i.e., grading and erosion control ordinances) would ensure that water quality impacts are addressed (City of Chico 2011a). Where appropriate, new development projects would incorporate LID measures to minimize impervious area, minimize runoff and pollution, and incorporate BMPs (Butte County 2010).

Long-Term Effects

Water quality can be affected in the long term by non-point source pollution from increased runoff volumes primarily as a result of the increase of impervious surfaces (e.g., pavements and buildings) under operating conditions of permanent development. For example, development of new roads, bridges, and parking lots would result in an increase in the potential for oil, grease, and other contaminates from vehicles to accumulate on these impervious surfaces and enter water bodies through runoff (City of Gridley 2009; City of Oroville 2009a; Butte County 2010; City of Chico 2011a; City of Biggs 2013). Long-term water quality impacts that could violate water quality standards could occur from increased impervious surfaces within the Plan Area. These impacts could result in the loss of wetland and riparian habitat, introduction of urban pollutants, introduction of dry weather discharges (e.g., from pavement watering, water leaks), and reduced groundwater recharge. The loss of land and riparian habitat from the increase in impervious surfaces, the resulting downstream sedimentation can reduce in-channel habitat, cause channel widening, and cause flooding at flow constriction points (e.g., culverts and road crossings). Alterations to the storm runoff peak and increased storm flow volume result from reduced natural groundwater recharge and uptake from native soils and vegetation. Larger and faster runoff peaks restrict natural groundwater recharge, deposition of sediment and pollutants from the water column, and floodplain connectivity Increases in developed areas can result in loss of vegetative cover, which reduces the potential for bio-filtration of pollutants and increases pollutant transport. Pollutants, including sediment, nutrients, and toxic chemicals, are naturally removed from surface waters to a degree through soil infiltration and vegetative uptake. Disconnection of an aquatic resource to its natural floodplain, loss of wetlands, and reduction in riparian areas would reduce this natural filtration function.

Other non-point pollution sources, which could result in long-term water quality impacts would include agricultural activities (e.g., livestock operations, pesticide application), industrial activities (e.g., auto body and repair shops), and urban activities (landscape and infrastructure maintenance) (City of Gridley 2009; City of Oroville 2009a; Butte County 2010; City of Chico 2011a; City of Biggs 2013). For example, pollutants from non-point sources could enter 303(d)-Listed Impaired Water Bodies of Butte Creek, the Lower Feather River, and the Sacramento River (Table 9-4) since these rivers are designated as impaired by agricultural sources for chlorpyrifos, Group A pesticides, DDT and dieldrin.

However general plan policies and stormwater programs address potential impacts on water quality. Specifically, the Local Agencies cooperate with state and local agencies in efforts to identify and eliminate or minimize all sources of existing and potential point and non-point sources of pollution to ground and surface waters, including leaking fuel tanks, discharges from storm drains, auto dismantling, dump sites, sanitary waste systems, parking lots, and roadways.

Individual projects carried out by Local Agencies, Caltrans, and water and irrigation districts may be required to implement BMPs to avoid violating water quality requirements or waste discharge requirements. For example, Caltrans requires specific BMPs to be implemented during construction and operation of projects to reduce project-site discharges that might affect the water quality of receiving waters. These BMPs are summarized in Appendix D and would be used on any Caltrans project. In addition, individual projects carried out by Local Agencies and Caltrans are required to comply with NPDES regulations (as described in Section 9.1.1, *Regulatory Setting*).

NEPA Determination: Under Alternative 1, new development considered in all Local Agencies' general plan implementation could increase non-point source pollution from increased impervious

surfaces and increased sediment loads in receiving waters. Further, Alternative 1 would result in increased potential for urban contaminants to be directly and indirectly introduced to surface water and groundwater through construction, agricultural, and urban development activities. However, implementation of applicable general plan policies, Butte County's Stormwater Management Program and Stormwater Management and Discharge Control Ordinance, and other applicable federal, state, and local regulations would ensure that there would be no adverse effect. Impacts would be less than significant. No mitigation is required.

CEQA Determination: Under Alternative 1, new permanent development part of general plan implementation could increase non-point source pollution as a result of increasing impervious surfaces, increasing sediment loads in receiving waters, increasing the potential urban contaminants to be directly and indirectly introduced to surface water and groundwater through construction, agricultural, industrial, and urban activities. Implementation of applicable general plan policies, Butte County's Stormwater Management Program and Stormwater Management and Discharge Control Ordinance, and other applicable federal, state, and local regulations would ensure that this impact would be less than significant. No mitigation is required.

Impact WQ-2: Substantially deplete groundwater supplies or interfere substantially with groundwater recharge (NEPA: less than significant; CEQA: less than significant)

The City of Biggs determined that implementation of its general plan would result in less-than-significant impacts. However, the County and the Cities of Chico, Oroville, and Gridley determined that implementation of their general plans and activities that would occur under the general plans would result in increased groundwater pumping and reduced groundwater recharge during and following construction. This increased pumping and reduced recharge could potentially result in reduced groundwater supplies or interfere with groundwater pumping from existing wells for existing or permitted land uses. Some urban development and agricultural uses would involve groundwater use. New construction could include impervious surfaces, which would decrease the amount of land area available for rainfall to infiltrate into the ground and recharge the underlying water table. In addition, increased contaminants from domestic septic systems or from unintentional discharge of contaminants would potentially degrade groundwater quality and could limit existing uses of groundwater for domestic and municipal uses. Further, minor reductions in irrigation water could reduce the volume of groundwater recharge.

The Local Agencies' general plans contain actions and policies designed to maintain groundwater supplies and sustain groundwater resources. Major development projects must provide an evaluation of potential cumulative impacts on surrounding groundwater users and the environment. The Butte County Groundwater Management Plan and Groundwater Management Ordinance requires that groundwater transfers and substitution programs be regulated to protect the sustainability of the county's economy, communities, and ecosystem. New development must adopt BMPs for water use efficiency and demonstrate specific water conservation measures. The general plans also contain policies and actions designed to promote groundwater recharge, minimize impervious land cover, and prevent groundwater contamination from septic systems, leaking storage tanks, or chemical waste disposal practices.

NEPA Determination: Under Alternative 1, increased groundwater pumping and reduced groundwater recharge as part of general plan implementation could result in reduced groundwater supplies or interfere with groundwater pumping from existing wells for existing or permitted land uses. This effect could be adverse. However, implementation of applicable general plan policies,

goals, actions, and implementation strategies, the Butte County Groundwater Management Plan and Groundwater Conservation Ordinance, and other applicable local, state, and federal regulations would ensure that there would be no adverse effect. Impacts would be less than significant. No mitigation is required.

CEQA Determination: Under Alternative 1, increased groundwater pumping and reduced groundwater recharge as part of general plan implementation could result in reduced groundwater supplies or interfere with groundwater pumping from existing wells for existing or permitted land uses. This effect could be significant. However, implementation of applicable general plan policies, goals, actions, and implementation strategies, the Butte County Groundwater Management Plan and Groundwater Conservation Ordinance, and other applicable local, state, and federal regulations would ensure that the impact would be less than significant. No mitigation is required.

Impact WQ-3: Substantially alter the existing drainage pattern of the site or area or substantially increase the rate or amount of surface runoff in a manner that would result in substantial erosion, siltation, or flooding onsite or offsite (NEPA: less than significant; CEQA: less than significant)

The City of Biggs determined that implementation of its general plan would result in less-than-significant impacts. However, the County and the Cities of Chico, Oroville, and Gridley determined that implementation of their general plans would result in alterations to drainage patterns and cause an increase in the volume and rate of surface runoff during pre- and post-construction, potentially resulting in substantial erosion, siltation, or flooding. In addition, increased stormwater runoff resulting from the increased amount of impervious surfaces could create erosive velocities and higher bank shear stress. This could cause bank and bed erosion and/or sedimentation in drainages and streams in the Plan Area. Sedimentation could increase the rate of deposition in natural receiving waters and reduce conveyance capacities, which could result in an increased risk of flooding in the Plan Area. Minor increases in tributary flows could also exacerbate creek bank erosion and/or cause destabilizing channel incision by altering the channel-forming flow (City of Oroville 2009a; City of Gridley 2009; Butte County 2010; City of Chico 2011a; City of Biggs 2013).

The Local Agencies have adopted general plan policies and stormwater programs designed to address these potential impacts. These policies require developers in the Plan Area to prepare an assessment of the existing runoff conditions and the potential effects of runoff from the development project, and specify measures to be implemented to ensure postconstruction runoff conditions will not exceed preconstruction runoff conditions (Butte County 2010). Additionally, Caltrans requires specific BMPs to be implemented during construction and operation of projects to reduce runoff, erosion, and siltation. These BMPs are summarized in Appendix D and would be used on any Caltrans project that would take place under Alternative 1.

NEPA Determination: Under Alternative 1, general plan implementation would potentially alter the existing drainage and cause an increase in the volume and rate of surface runoff. This could result in substantial erosion, siltation, or flooding due to development projects part of implementation of the Local Agencies' general plans. This would have an adverse effect on drainage patterns within the Plan Area. Implementation of general plan policies, goals, actions, and/or implementation strategies designed to minimize the impact of erosion, siltation, and flooding, in conjunction with the Butte County Stormwater Management Program, Butte County Stormwater Management and Discharge Control Ordinance, and other applicable local, state, and federal regulations, would ensure that these effects would not be adverse. Impacts would be less than significant. No mitigation is required.

CEQA Determination: Under Alternative 1, general plan implementation would potentially alter the existing drainage and cause an increase in the volume and rate of surface runoff in the Plan Area. This could result in substantial erosion, siltation, or flooding due to development projects part of implementation of the Local Agencies' general plans. This could be a significant impact. Implementation of general plan policies, goals, actions, and/or implementation strategies designed to minimize the impact of erosion, siltation, and flooding, in conjunction with the Butte County Stormwater Management Program, Butte County Stormwater Management and Discharge Control Ordinance, and other applicable local, state, and federal regulations, would ensure that potential effects would be less than significant. No mitigation is required.

Impact WQ-4: Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff (NEPA: less than significant; CEQA: less than significant)

The City of Biggs determined that implementation of its general plan would result in less than significant impacts (City of Biggs 2013). However, the County and the Cities of Chico, Oroville, and Gridley determined that implementation of their general plans and activities that would occur under their general plans would result in more impervious surfaces associated with residential, commercial, industrial development, and would thereby increase stormwater runoff to levels that could exceed the capacity of existing or planned stormwater drainage systems (City of Oroville 2009a; City of Gridley 2009; Butte County 2010; City of Chico 2011a).

Further, as discussed for Impact WQ-1, the County and the Cities of Chico, Oroville, and Gridley determined that implementation of their general plans could degrade water quality by increasing non-point source pollution from increased runoff volumes as a result of increasing impervious surfaces (e.g., pavements and buildings); increasing sediment loads in receiving waters by increasing erosion through construction activities; increasing the potential for pollutants (e.g., oil and grease) to accumulate on road surfaces due to increases in traffic; and contributing to the pollutant load of stormwater runoff and water bodies through agricultural activities (e.g., livestock operations) and urban activities (e.g., landscape and infrastructure maintenance). However, the City of Biggs determined that implementation of its general plan would result in less than significant impacts (City of Biggs 2013).

The Local Agencies have adopted general plan policies, goals, actions and/or implementation strategies designed to minimize the impact of erosion, siltation, and flooding. The Butte County Stormwater Management Program, Butte County Stormwater Management and Discharge Control Ordinance, and other applicable local, state, and federal regulations also minimize this impact. The Local Agencies also require developers to prepare an assessment of the existing runoff conditions and the potential effects of runoff from the development project and specify the measures to be implemented to ensure postconstruction runoff conditions will not exceed preconstruction runoff conditions (Butte County 2010).

NEPA Determination: Under Alternative 1, increases in impervious surfaces associated with development projects and related construction activities part of general plan implementation could introduce sediment and other pollutants to stormwater runoff and potentially contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or add substantial sources of polluted runoff. This could be an adverse effect. Implementation of Local Agency general plan policies, goals, actions and/or implementation strategies, stormwater programs

and ordinances, and other applicable local, state, and federal regulations would ensure that these effects would not be adverse. Impacts would be less than significant. No mitigation is required.

CEQA Determination: Under Alternative 1, increases in impervious surfaces associated with development projects and related construction activities part of general plan implementation could introduce sediment and other pollutants to stormwater runoff and potentially contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or add substantial sources of polluted runoff. This could be a significant impact. Implementation of Local Agency general plan policies, goals, actions and/or implementation strategies, stormwater programs and ordinances, and other applicable local, state, and federal regulations would ensure that this impact would be less than significant. No mitigation is required.

Impact WQ-5: Place housing within a 100-year flood hazard area or place structures that would impede or redirect flood flows within a 100-year flood hazard area (NEPA: less than significant; CEQA: less than significant)

The county includes areas currently designated as 100-year flood zones (Figure 9-4), and the Local Agencies' general plans allow occupied development within these flood hazard areas. Implementation of Alternative 1 would potentially place housing within a 100-year flood hazard area or place structures that would impede or redirect flood flows within a 100-year flood hazard area, as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map. In addition, development within 100-year flood zones could result in a significant impact by impeding or redirecting flood flows. However, several Local Agency policies and actions are designed to prevent flooding of occupied developments (with elevated structures) and restrict new development within the 100-year flood zone, as identified on the most current available maps from FEMA. In addition, flood control projects, such as the construction of new channels, levees/dikes, flood walls, and retention/detention basins would help to alleviate potential flooding impacts. Recent state legislation provides additional precautions against placing habitable structures within areas prone to floods. The County will update General Plan 2030 within 24 months of adoption of the CVFPP to reflect the CVFPP policies and to identify state and local flood management facilities and flood hazard zones. Therefore, although implementation of the Local Agencies' general plans could allow limited new development within the 100-year flood hazard zone, Local Agency policies and actions, the Butte County Flood Hazard Prevention Ordinance, Butte County Flood Mitigation Plan, and other local, state, and federal regulations would ensure that 100-year flood hazard zone impacts would be less than significant.

NEPA Determination: Under Alternative 1, implementation of the general plans could allow limited new development within the 100-year flood hazard zone. However, Local Agency policies and actions designed to prevent flooding of occupied developments and restrict new development within the 100-year flood zone, in combination with the Butte County Flood Hazard Prevention Ordinance, Butte County Flood Mitigation Plan, and other local, state, and federal regulations, would ensure that effects associated with 100-year flood hazard zone impacts would not be adverse. Impacts would be less than significant. No mitigation is required.

CEQA Determination: Under Alternative 1, implementation of the general plans could allow limited new development within the 100-year flood hazard zone. However, Local Agency policies and actions designed to prevent flooding of occupied developments and restrict new development within the 100-year flood zone, in combination with the Butte County Flood Hazard Prevention Ordinance, Butte County Flood Mitigation Plan, and other local, state, and federal regulations, would

ensure that impacts associated with 100-year flood hazard zones would be less than significant. No mitigation is required.

Impact WQ-6: Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam (NEPA: significant and unavoidable; CEQA: significant and unavoidable)

Under Alternative 1, people and structures would be exposed to a significant risk of loss, injury, or death involving flooding, including flooding as a result of levee or dam failure in the Plan Area. The County and the Cities of Chico, Gridley, and Oroville determined that implementation of their general plans would allow for occupied development within designated 100-year flood zones. The City of Biggs determined that implementation of its general plan would result in less-than-significant impacts. Design of all new development in levee and dam inundation areas is required to consider risks resulting from failure of these levees and dams because Local Agency general plan policies, in combination with the Butte County Flood Hazard Prevention Ordinance, Butte County Flood Mitigation Plan, and other local, state, and federal regulations would reduce potential flooding impacts on people and property that are a result of a levee or dam failure. Some of the Local Agencies' general plan EIRs determined this impact to be less than significant because implementation of general plan update policies and implementation of city and county standards would ensure the flooding is adequately addressed (City of Gridley 2009; City of Chico 2011a; City of Biggs 2013).

However, some general plan EIRs determined that activities that would occur under the general plans could expose people or structures to the risk of loss, injury, or death due to flooding because the plans and policies do not completely eliminate risks to people and property since the County does not control or maintain all levees and dam facilities (City of Oroville 2009a; Butte County 2010). As stated in the County general plan EIR, it is not within Butte County's authority to require or complete maintenance and improvements to levees in the County owned and maintained by private individuals and other public agencies (Butte County 2010). Dams within and around Butte County that pose risks to people and property resulting from dam inundation are owned and/or operated by other agencies (i.e., Department of Water Resources, U.S. Bureau of Reclamation, irrigation districts). In addition, recently-adopted policies by FEMA would de-certify a number of levees in the County, which indicates that larger areas of the County would be subject to levee inundation than realized under previous policies. Seismic activity in the region could also cause dam failure. The County general plan EIR concluded, therefore, that it is not feasible for its general plan to completely address improvements to all dams to the extent necessary to eliminate risks from dam failure, and this impact would be significant and unavoidable.

NEPA Determination: Under Alternative 1, implementation of the Local Agencies' general plans would expose people and structures to a significant risk of loss, injury or death involving flooding, including as a result of levee or dam failure. Although implementation of the policies and actions in the Local Agencies' general plans would reduce risks associated with levee failure, they would not eliminate risks to people and property. In addition, federal policies and seismic activity is out of the control of the Local Agencies' and could add to these risks. Therefore, this would effect would be significant and unavoidable.

CEQA Determination: Under Alternative 1, implementation of the Local Agencies' general plans would expose people and structures to a significant risk of loss, injury or death involving flooding, including as a result of levee or dam failure. Although implementation of the policies and actions in

the Local Agencies' general plans would reduce risks associated with levee failure, it would not eliminate risks to people and property. In addition, federal policies and seismic activity is out of the control of the Local Agencies' and could add to these risks. Therefore, this impact would be significant and unavoidable.

Alternative 2—Proposed Action

Under Alternative 2, covered activities would include the existing, planned, and proposed land uses over which the Permit Applicants have land use authority; state and local transportation projects; maintenance of water delivery systems (e.g., WCWD canals and similar delivery systems); habitat restoration, enhancement, and management actions (conservation measures); and adaptive management and monitoring activities. Most covered activities would require individual permits and approvals pursuant to the Local Agencies' general plans and land use regulations or the requirements of the implementing agency (such as Caltrans and irrigation districts) and would undergo subsequent project-level CEQA and relevant NEPA review for construction and operations-related impacts; some covered activities, however, may be exempted from environmental review requirements due to project characteristics including small projects or infill projects. Covered activities within the Local Agencies' jurisdictions include development or maintenance of residential, commercial, public, or industrial facilities; recreational facilities; transportation facilities; pipeline facilities; utility service and waste management facilities; and flood control and stormwater management facilities. The following analysis of Alternative 2 references the analysis of Alternative 1 because impacts for these covered activities would be the same.

Potential impacts on water resources could occur primarily during construction or maintenance of covered activities within water and irrigation districts. These activities have not been analyzed in previous CEQA documents.

The proposed BRCP conservation strategy and conservation measures have not been analyzed in previous CEQA documents and include habitat management and enhancement, habitat restoration, general maintenance, AMMs, and species population enhancement. Not all conservation measures would result in physical changes to the environment, thus the following conservation measures have the potential, either during construction or maintenance, to impact water resources: CM4–CM12 CM14 and Activities to Improve Urban Stormwater Water Quality. The remaining four conservation measures (i.e., CM1, CM2, CM3, and CM13) are not anticipated to result in physical changes to the environment and thus would have very low potential or no potential to affect water resources; therefore, they are not discussed below.

Impact WQ-1: Violate any water quality standards or waste discharge requirements, or otherwise substantially degrade water quality (NEPA: less than significant; CEQA: less than significant)

Implementation of covered activities within and outside of the UPAs, within the water and irrigation districts, and for CM4–CM12 CM14 and Activities to Improve Urban Stormwater Water Quality could result in significant impacts on surface and groundwater quality in the Plan Area in the in the short- and long-term. Construction and maintenance activities which result in ground and/or channel disturbances could increase water turbidity. The use of heavy equipment during construction, as well as the use of chemicals (e.g., pesticides) during construction or maintenance, could result in inadvertent pollutant spills or releases to drainage systems and migrate to surface waters and

groundwater. Increases in impervious surfaces associated with permanent development could result in additional pollutant runoff.

Short-Term Effects

Covered Activities within UPAs

Under Alternative 2, short-term impacts on water quality primarily from covered construction activities within the UPAs would be the same as under Alternative 1, Impact WQ-1. These include physical impacts on vernal pools and other wetlands in the Plan Area resulting from fill associated with the construction of residential, commercial, and industrial developments. As described in Chapter 2, *Proposed Action and Alternative*s, the Permit Applicants are seeking a Programmatic General Permit (PGP) under Section 404 from USACE to accompany the BRCP. If issued, this PGP would streamline the permitting process for certain activities covered by the BRCP that would result in the discharge of dredged or fill material into waters of the United States. As part of the evaluation to issue a PGP under Section 404, USACE must follow EPA's Section 404(b)(1) regulations. If a PGP is not issued, covered activities that fill or otherwise alter a USACE jurisdictional wetland would still be required to obtain a Section 404 permit from USACE.

Individual projects carried out by Local Agencies and Caltrans may be required to implement BMPs to avoid violating water quality requirements or waste discharge requirements. For example, Caltrans requires specific BMPs to be implemented during construction and operation of projects to reduce project-site discharges that might affect the water quality of receiving waters. These BMPs are summarized in Appendix D and would be used on any Caltrans project that would take place under Alternative 2. In addition, individual projects carried out by Local Agencies and Caltrans are required to comply with NPDES regulations (as described in Section 9.1.1, *Regulatory Setting*).

Furthermore, as discussed below under *Conservation Strategy*, AMMs from the BRCP would eliminate or reduce physical and water quality impacts on vernal pools and other wetlands. AMMs would be implemented during the design and construction phases of covered activities. Those AMMs that would be protective of water quality are AMM1, 4–8, 11, 12, 14–16, 18–21, 26, and 27. These AMMs are presented in detail in Chapter 5 of the BRCP.

Covered Activities outside UPAs

Covered activities outside UPAs, including wastewater management facilities, transportation facilities, and agriculture-related service facilities, could increase the potential to violate water quality standards or waste discharge requirements over the short-term. Implementation of these covered activities would include the construction of up to 5 miles of trunk sewer line construction associated with the WWTP in Chico and up to 3 miles of new mainline to the Gridley WWTP; construction of new roads and rural bridges, replacement of rural bridges, and rural road improvements and reconstruction; and construction of agricultural processing facilities and alternative energy facilities (e.g., wind turbine towers). For a detailed description of the projects that would be implemented as covered activities outside the UPAs, as well as their locations, please see the Chapter 2 of the BRCP.

Earth-disturbing activities, such as grading, trenching, excavation (e.g., as would take place for covered activities such as construction of sewer lines, agricultural processing facilities, and alternative energy facilities), as well as pavement removal and demolition activities, could potentially cause erosion and the subsequent release of sediment to adjacent water bodies or

drainage areas (e.g., agricultural drainages) in the Plan Area. Further, the use of construction equipment could result in pollutant spills or leaks. Trenching and excavation associated with certain covered activities (e.g., pipeline installation during development of wastewater management facilities) could reach the depth of the water table, exposing an immediate and direct path for contaminants to enter the groundwater.

In-channel work associated with covered activities could increase surface water turbidity and other pollutant loads (e.g., fuel and oil from leaking construction equipment, concrete, and asphalt) in the immediate area as well as downstream. Covered transportation facility projects that require activity within streams, canals, and other water bodies include roadway and bridge construction and replacement projects. These projects could involve building new or replacing existing bridges and associated supports, increasing bridge widths, and improving guardrails and drainage. Additionally, cofferdams and in-stream excavation for bridge foundation construction may be required.

Sewer line construction could result in the inadvertent discharge of sewage if the process entails connecting new lines to existing, operating lines. If a considerable release of raw sewage infiltrates to the water table, it could adversely affect groundwater quality through the potential introduction of pathogens.[3] Surface waters could be similarly affected either directly or indirectly if the discharge is released to an area that drains to surface waters in the Plan Area. With the exception of culverts placed in small, intermittent drainages along roads within the right of way (ROW) of new facilities, activities associated with the construction of waste and wastewater management facilities are not expected to include development of in-water structures. For example, new sewer lines that would require stream crossings are expected to be bored under or placed above stream channels, thus minimizing the risk for direct effects on surface water quality for those activities. In addition, the County's Stormwater Management and Discharge Ordinance, Onsite Wastewater Ordinance, and other County-required BMPs during grading and construction activities would be enforced during these types of construction activities to reduce sediment from activities from entering surface waters.

Covered Activities within Water and Irrigation Districts

Covered activities within water and irrigation districts (West Canal Water District, Biggs-West Gridley Water District, Butte Water District, and Richvale Irrigation District [Figure 9-2]) include rerouting up to 12 miles of existing canals, averaging 55 feet wide, that are operated by the water and irrigation districts over the term of the BRCP. Each of the four districts uses open canals comprised of compact earth to convey water throughout the rice fields within their districts. Some portions of the existing decommissioned canals may be reclaimed to a natural state by removing any concrete and other non-natural materials and restored to better functioning habitat. Other decommissioned canals may be converted to agricultural uses, planted with trees, continued to be used as canals, or used to store riprap or other materials. Construction activities required for rerouting existing canals, reclaiming existing decommissioned canals, and planting trees would result in ground disturbance, consequently increasing the risk of erosion and sedimentation in site drainage areas, the stormwater drainage system, and nearby surface waters, and increase the risk of pollutant spills from construction equipment (e.g., fuel, oil, coolants).

[3] The term *pathogens* refers to viruses, bacteria, and protozoa that pose human health risks.

Conservation Strategy

The implementation of certain conservation measures (i.e., CM4–CM12 and CM14) would require ground-disturbing activities during the construction phase, including excavation, grading, site clearing, seed and vegetation planting, and installation or modification of water irrigation and drainage infrastructure (Chapter 2, *Proposed Action and Alternatives*, Table 2-4). These activities would temporarily disturb soils, potentially resulting in erosion from wind and rain and consequently transport sediment to nearby surface waters (e.g., rivers, streams, wetlands), which could significantly impact water quality and aquatic habitat. Sediment can affect surface water quality through interference with photosynthesis, oxygen exchange, and the respiration, growth, and reproduction of aquatic species. Other pollutants, such as nutrients (e.g., fertilizer in soils), trace metals, and pesticides that can adsorb to soil and sediment could be transported with soil/sediment to downstream locations and adversely affect water quality. For example, pollutants from construction could enter 303(d)-Listed Impaired Water Bodies of Butte Creek, the Lower Feather River, and the Sacramento River (Table 9-4) since these rivers are designated as impaired by unknown sources for pH and unknown toxicity. The potential effects of construction activities associated with the conservation measures on aquatic habitat are discussed in Chapter 6, *Biological Resources*.

In addition to erosion-related water quality effects, construction activities involving heavy construction equipment (e.g., backhoes, excavators, dozers) carry the risk of introducing contaminants (e.g., fuels, lubricants, hydraulic fluids, coolants) into the environment. Activities such as grading, excavation, or other work near streams would require the use of heavy construction equipment and could result in accidental fuel and/or oil spills or leaks, potentially contaminating groundwater (through soil infiltration) or surface water. In-channel activities, such as the ones that would take place under CM9–CM11, listed below, would directly impact surface water quality in the short term at the indicated locations:

- Placement of spawning gravel—Up to 30,000 cubic yards of spawning gravels would be placed within Big Chico Creek, Little Creek, Butte Creek, Little Dry Creek, Rock Creek, and/or Mud Creek.
- Removal of fish passage barriers—Fish passage barriers such as debris build-up, large boulders, and existing non-functional fish ladders could be removed at Pine Creek, Rock Creek, Mud Creek, Big Chico Creek, Lindo Channel, Little Chico Creek, Butte Creek, and Little Dry Creek.
- Installation of fish screens—Up to 25 existing diversions along Big Chico and Butte Creeks in the Cascade Foothills, Northern Orchards, and Basin CAZs would be modified by installing fish screens, moving, consolidating, or otherwise modifying to reduce entrainment loss of juvenile salmonids.

The restoration of wetlands, as would take place under CM4, and the enhancement of wetlands, as would take place under CM5, may result in localized impacts on water quality at those restored/enhanced locations due to an increase in pathogens via metabolic waste (i.e., droppings) from migratory birds, for example. However, this would not be expected to substantially compromise water quality because properly functioning wetlands act as natural filters of pollutants such as nutrients, pathogens, and metals through sedimentation and plant uptake, among other mechanisms.

Long-Term Effects

Covered Activities within UPAs

Under Alternative 2, longer term impacts on water quality from covered activities within the UPAs (i.e., increase impervious surface areas associated with development under implementation of the general plans and recurring maintenance) would be the same as under Alternative 1, Impact WQ-1, and would be less than significant.

Covered Activities outside UPAs

Recurring maintenance activities associated with wastewater management facilities would reoccur over the 50-year permit term that could impact water quality include excavating, trenching, removing or storing overburden materials, and replacing force mains, effluent lines, trunk/sewer lines, discharge lines, reclamation lines, and mainlines and all related appurtenant infrastructure. To the extent that any of the activities would result in soil disturbances, inadvertent spills/leaks of chemicals or other water pollutants, or the accidental discharge of sewage, surface water and groundwater quality could be significantly impacted, as previously discussed above under short-term effects. Without natural filtration mechanisms, these urban pollutants have the potential to concentrate and be transported throughout the watershed by stormwater runoff. In addition, the maintenance activities associated with wastewater treatment lines have the potential to result in a discharge of sewage into receiving waters. As discussed above, compliance with NPDES, BMPs, and the BRCP AMMs would help to reduce the potential effect on receiving water quality as a result of these urban pollutants.

Some maintenance activities would include in-channel work. For example, maintenance of bridges and associated drainage structures would include in-stream operation of equipment to repair and prevent streambed scour; debris and woody debris removal from bridge piers and pilings; vegetation management (e.g., pesticide application, vegetation removal) beneath and adjacent to bridge structures; and erosion/sediment control beneath and adjacent to bridge structures. Maintenance activities associated with wastewater management facilities, flood control and stormwater management, and vegetation management are not expected to include in-channel work.

Covered Activities within Water and Irrigation Districts

Covered recurring maintenance activities within water and irrigation districts include the replacement of water conveyance structures (weirs, siphons, pipes and water elevation control check structures); replacement of pipes extending from canals and ditches to irrigated fields; replacement of laterals; mowing and trimming of vegetation to maintain service road widths throughout the districts; and removal of vegetation and debris from canals, ditches, and laterals. Most maintenance activities are expected to be completed in the winter after the water conveyance structures have been dewatered. Smaller projects would generally be completed every year and larger projects less frequently (i.e., every 4 to 5 years). As previously discussed, any ground disturbing activities, use of heavy construction equipment or chemicals (e.g., pesticides, fertilizer), or any in-channel activities could result in significant water quality impacts. For example, pollutants from non-point sources such as use of pesticides or fertilizers could enter 303(d)-Listed Impaired Water Bodies of Butte Creek, the Lower Feather River, and the Sacramento River (Table 9-4) since these rivers are designated as impaired for, Group A pesticides, DDT and dieldrin. Recurring maintenance activities within the water and irrigation districts, such as replacement of weirs, pipes, and vegetation maintenance, would increase the risk for significant, although relatively short-term,

periodic water quality effects through the potential introduction of sediment and turbidity to nearby surface waters and of other pollutants to surface waters and groundwater.

Maintenance activities associated with implementation of certain BRCP conservation measures, such as the application of herbicides, as would occur with non-native plant control as part of habitat management activities (e.g., CM5, *Enhance Protected Natural Communities for Covered Species*) if performed near streams or drainage areas, could potentially introduce toxic chemicals to adjacent water bodies via air drift and precipitation runoff, or affect water quality through increases in turbidity (e.g., through erosion). Although these activities would take place periodically, and thus impacts would be short-term, impacts on water quality could be potentially significant.

Activities to improve urban stormwater water quality (see BRCP Section 5.4.4), which would support the Cities of Chico, Oroville, Gridley and Biggs in obtaining funding to implement programs to improve urban stormwater quality and support compliance with NPDES stormwater systems for MS4s, would be expected to benefit water quality in the Plan Area over the long term. Actions that could be funded could include LID measures, such as construction of stormwater retention ponds, stormwater curb extensions, and bioretention systems.

Implementation of certain BRCP AMMs intended to protect natural communities and covered species habitat would help protect water quality. These AMMs would be implemented during the design and construction phases of covered permanent development projects inside and outside of the UPAs, and others would be implemented specifically for all roadway construction and maintenance actions. Those AMMs that would be protective of water quality are AMM1, 4–8, 11, 12, 14–16, 18–21, 26, and 27. These AMMs are presented in detail in Chapter 5 of the BRCP.

NEPA Determination: Covered activities within and outside the UPAs, as well as within the water and irrigation districts, and CM4–CM12 CM14, and Activities to Improve Urban Stormwater Water Quality could result in adverse effects on surface and groundwater quality in the Plan Area in the short- and long term. Construction and maintenance activities that result in ground and/or channel disturbances could increase water turbidity. The use of heavy equipment during construction, as well as the use of chemicals during maintenance, could result in inadvertent pollutant spills or releases to drainage, which could migrate to surface and groundwater. The expansion of wastewater effluent and reclamation lines and the maintenance of wastewater lines could result in the discharge of sewage to surface or groundwater. Increases in impervious surfaces associated with development over the long term could result in increases in pollution runoff. Adherence to applicable federal, state, and local regulations, including Butte County's Stormwater Management Program, Stormwater Management and Discharge Control Ordinance, and implementation of applicable BRCP AMMs would ensure that the effect would not be adverse. Impacts would be less than significant. No mitigation is required.

CEQA Determination: Covered activities within and outside the UPAs, as well as within the water and irrigation districts, and CM4–CM12 CM14, and Activities to Improve Urban Stormwater Water Quality could result in significant impacts on surface and groundwater quality in the Plan Area in the short- and long term. Construction and maintenance activities which result in ground and/or channel disturbances could increase water turbidity. The use of heavy equipment during construction, as well as the use of chemicals during maintenance, could result in inadvertent pollutant spills or releases to drainage, which could migrate to surface and groundwater. The expansion of wastewater facilities could result in the discharge of sewage to surface or groundwater. Increases in impervious surfaces with development over the long-term could result in increases in

pollution runoff. Adherence to applicable federal, state, and local regulations, including Butte County's Stormwater Management Program, Stormwater Management and Discharge Control Ordinance, and implementation of applicable BRCP AMMs, would ensure that impacts on surface and groundwater quality are less than significant. No mitigation is required.

Impact WQ-2: Substantially deplete groundwater supplies or interfere substantially with groundwater recharge (NEPA: less than significant; CEQA: less than significant)

Short-Term Effects

Covered Activities within UPAs

Under Alternative 2, impacts on groundwater supplies from covered construction activities within the UPAs would be the same as under Alternative 1, Impact WQ-2. If shallow groundwater dewatering is required for excavation for sewer lines and other underground construction activities, these impacts would be temporary and are not expected to have a large or permanent impact on groundwater supplies.

Covered Activities outside UPAs

Under Alternative 2, construction of covered activities within the Plan Area but outside the UPAs would not likely have direct effects on groundwater resources; construction effects would most likely affect surface water runoff and water quality and are described for Impact WQ-1 and Impact WQ-3. Any necessary shallow groundwater dewatering activities would be temporary and are not expected to have a large or permanent impact on groundwater supplies.

Covered Activities within Water and Irrigation Districts

The construction of covered facilities within water and irrigation districts would not likely have any effects on groundwater resources. There are relatively few irrigation wells within the water and irrigation districts, and any construction of new or replacement wells would follow well spacing guidelines and BMPs to minimize any effects on nearby wells. If shallow groundwater dewatering is required for excavation for canal re-routing and other underground construction activities, these impacts would be temporary and are not expected to have a large or permanent impact on groundwater supplies. Some activities may have benefits on groundwater recharge due to increases in pervious areas associated with the reclamation of existing decommissioned canals to their natural states and the conversion of canals to agricultural uses.

Conservation Strategy

None of the conservation measures are expected to have any direct or indirect impacts on groundwater resources. Protection of the grassland and vernal pool areas may allow the existing groundwater recharge of the exposed aquifer layers (e.g., Tuscan and Laguna formations), but because the conservation measures generally preserve or enhance the natural habitat areas, the natural infiltration of rainfall and deep percolation to the shallow groundwater would also be preserved. There would be no impacts from any of the protection measures on groundwater resources. None of the construction activities associated with the habitat restoration measures would have any direct or indirect effects on groundwater resources.

Long-Term Effects

Covered Activities within UPAs

Under Alternative 2, impacts on groundwater resources from covered activities within the UPAs would be the same as under Alternative 1, Impact WQ-2. Some urban development and agricultural uses allowed by the Local Agencies' general plans would use groundwater, and this increased demand on groundwater could result in a net deficit in aquifer volume or significantly lower groundwater levels. In addition, development could include additional impervious surfaces, which would decrease the amount of land area available for rainfall to infiltrate into the ground and recharge the underlying water table.

Covered Activities outside UPAs

Maintenance activities outside the UPAs would not likely have any direct or indirect effects on groundwater resources; these activities would most likely affect surface water runoff and water quality and are described for Impact WQ-1 and Impact WQ-3.

Covered Activities within Water and Irrigation Districts

Maintenance activities within water and irrigation districts could potentially have an indirect effect on groundwater recharge because some of the activities may involve rerouting of distribution canals and lining of some canals to conserve water for delivery. This could reduce the groundwater recharge below the lined canals. As indicated in Table 9-3, there is a relatively small amount of groundwater pumping within the irrigation and water districts; most of the water is delivered to the fields and orchards from the canals. Some of the activities would help maintain surface water and groundwater connectivity. The vast majority of the distribution canals would remain unlined and continue to provide infiltration to the shallow groundwater. Even if some canals are lined for delivery efficiency, the large amount of recharge from the canal network and applied water would continue to provide a large amount of groundwater recharge. Consequently, the overall magnitude of the change in recharge volume would be small.

Conservation Strategy

None of the maintenance and operation activities associated with any conservation measures would have any direct or indirect adverse effects on groundwater resources. However, CM4, which would include restoration of wetlands, could assist groundwater percolation and improve groundwater quality in areas where there are appropriate soils.

NEPA Determination: Covered activities under Alternative 2 would result in increased groundwater pumping, particularly for development projects implemented within the UPAs, and could reduce groundwater recharge by increasing impervious surface areas. In addition, some urban development and agricultural uses allowed by the general plans would use groundwater, and this increased demand on groundwater could result in reduced groundwater levels. Any necessary shallow groundwater dewatering activities would be temporary and are not expected to have a large or permanent impact on groundwater supplies. Therefore, Alternative 2 would have the potential to result in reduced groundwater supplies within the Plan Area, which would be an adverse effect. It is not likely that implementation of covered activities outside UPAs, within water and irrigation districts, or implementation of the conservation measures would have any direct or indirect effects on groundwater resources. General plan policies, goals, actions, and/or implementation strategies of the Local Agencies were designed to minimize the impact of groundwater pumping, reduced

groundwater recharge, and groundwater pollution, and therefore would help reduce the severity of this effect. Adherence to general plan policies, the Butte County Groundwater Management Plan and Groundwater Ordinances, and other applicable local, state, and federal regulations would ensure that this effect would be not be adverse. Impacts would be less than significant. No mitigation is required.

CEQA Determination: Covered activities under Alternative 2 would result in increased groundwater pumping, particularly for development projects implemented within the UPAs, and could reduce groundwater recharge by increasing impervious surface areas. In addition, some urban development and agricultural uses allowed by the general plans would use groundwater, and this increased demand on groundwater could result in reduced groundwater levels. Any necessary shallow groundwater dewatering activities would be temporary and are not expected to have a large or permanent impact on groundwater supplies. Therefore, Alternative 2 would have the potential to result in reduced groundwater supplies within the Plan Area, and this impact could be potentially significant. It is not likely that implementation of covered activities outside UPAs, within water and irrigation districts, or implementation of the conservation measures would have any direct or indirect impacts on groundwater resources. General plan policies, goals, actions, and/or implementation strategies of the Local Agencies were designed to minimize the impact of groundwater pumping, reduced groundwater recharge, and groundwater pollution, and therefore would help reduce the severity of this impact. Adherence to general plan policies, the Butte County Groundwater Management Plan and Groundwater Ordinances, and other applicable local, state, and federal regulations would ensure that this impact would be less than significant. No mitigation is required.

Impact WQ-3: Substantially alter the existing drainage pattern of the site or area or substantially increase the rate or amount of surface runoff in a manner that would result in substantial erosion, siltation, or flooding onsite or offsite (NEPA: less than significant; CEQA: less than significant)

Under Alternative 2, impacts related to drainage, surface runoff, and erosion or siltation within the UPAs would be the same under Alternative 1, Impact WQ-3.

Site grading or excavation needed to construct any of the covered activities outside the UPAs, as well as within the water and irrigation districts, has the potential to block, reroute, or temporarily detain and impound surface water in existing drainages, which would result in increases and decreases in flow rates, velocities, and water surface elevations. Changes in drainage patterns would vary depending on the specific conditions at each individual project location. For example, surface drainage paths blocked by construction activities could result in the temporary ponding of drainage water, causing decreases in drainage flow rates downstream of the new facilities. In addition, in-stream channel work, such a pile driving for bridge construction, may involve the use of coffer dams, which would temporarily alter stream flows.

Paving, compaction of soil, and other activities that would increase land imperviousness would result in decreases in precipitation infiltration into the soil, and consequently increase drainage runoff flows into receiving drainages and increase the risk for localized flooding. As described under Impact WQ-1, increases in impervious surface area can result in an increase flow velocity, as well as the peak and quantity of stormwater runoff. The velocity and erosive force of stormwater runoff can cause scouring of streambanks and channel erosion, which can lead to downstream sedimentation. Downstream sedimentation can reduce in-channel habitat and cause channel widening and flooding

at flow constriction points, such as culverts and road crossings. Alterations to the stormwater runoff peak and increased storm flow volume result from reduced natural infiltration and uptake from native soils and vegetation. Larger and faster runoff peaks restrict natural groundwater recharge and thus increase the risk for localized flooding. Increased storm flow volume causes flooding of developed areas, particularly when flood control structures are inadequate or floodplain areas have been disconnected from stream channels.

The implementation of certain conservation measures (i.e., CM4–CM11) could alter the existing drainage pattern of areas where implementation occurs through the creation and restoration of certain types of habitat in the short term. For example, site clearing of debris and existing vegetation, and site grading, as could take place with riparian habitat restoration, could result in increased erosion, runoff volume, and velocity. BRCP AMMs identified in the conservation strategy would reduce or avoid substantial site runoff, erosion, and/or inadvertent flooding in the short term as discuss further below (e.g., AMM 8: Implement Standard Urban Stormwater Management Plans). Conservation measures are intended to restore, enhance, and preserve natural habitat function for the preservation of covered species in the long-term and are overall expected to reduce or avoid substantial site runoff, erosion and/or inadvertent flooding. For example, establishing properly functioning wetland areas, as would take place with implementation of CM5, would improve water quality and flood control by slowing flow velocity and causing sediment and pollutants to settle and absorb into wetland vegetation and bottom sediments. Activities to improve urban stormwater water quality (see BRCP Section 5.4.4), which would support the Cities of Chico, Oroville, Gridley and Biggs in obtaining funding to implement programs to improve urban stormwater quality, would potentially fund actions that would slow runoff velocities and support onsite drainage through construction of stormwater retention irrigation holding ponds, vegetated buffer strips, bioretention systems, and pervious pavement to substitute for asphalt and concrete. These measures could be implemented at drainage areas near Big Chico Creek, Lindo Channel, Little Chico Creek, Sycamore/Mud Creek, Butte Creek, and the Feather River.

Actions implemented as part of other conservation measures, such as CM9–CM11, would alter the course of a stream or river by enlarging channels (e.g., remove barriers to fish passage) or constricting channels (e.g., adding large woody debris). Although these activities are expected to increase available habitat for covered fish spices and thus provide an overall benefit to these species, if not implemented properly, they could adversely affect downstream flow velocities and natural geomorphological processes. If not implemented properly, fish passage barrier would enlarge channels and may result in upstream channel incision (i.e., the overall lowering of a streambed over time). The channel typically deepens due to a change in the proportionality between the amount and size of sediment, water volume and flows, and the stream slope. If not designed properly, the addition of large woody debris across the width of the channel has the potential to retain sediment and alter the channel profile. When the debris obstructs only a portion of the channel, it can redirect flow, which alter patterns of scour and deposition (Curran 2010), and ultimately can affect the natural channel meandering processes.

Adherence to applicable, federal, state, and local regulations regarding erosion surface runoff and drainage control, as well as implementation of BRCP AMMs would reduce the effects to existing drainage patterns in the Plan Area and control the rate or amount of surface runoff. The AMMs would require that covered activities comply with applicable NPDES permits, including preparation and implementation of SWPPPs that include construction-related erosion-control BMPs. Further, implementation of the AMMs intended to protect natural communities and covered species habitat would also help minimize site erosion, increased runoff, and impact on storm drainage areas. The

following AMMs would be implemented during the design and construction phases of covered permanent development projects inside and outside of the UPA, and for all covered roadway construction and maintenance actions. These AMMs are presented in detail Chapter 5 of the BRCP.

- AMM8: Implement Standard Urban Stormwater Management Plans
- AMM12: Confine and Delineate Work Area
- AMM16: Install Erosion Control Barriers
- AMM19: Implement Wet Weather Erosion Control Plan
- AMM21: Implement Additional Avoidance and Minimization Measures and Best Management Practices.
- AMM26: Implement Caltrans Construction BMPs to Maintain Water Quality

In addition the BMPs identified in Appendix D would be implemented for all roadway construction activities, which would also reduce effects to existing drainage patterns and control the rate or amount of surface water runoff.

NEPA Determination: Under Alternative 2, implementing covered activities within the UPAs, outside the UPAs, and within the water and irrigation district, as well as implementing certain BRCP conservations measures could adversely and substantially alter the existing drainage pattern of multiple sites or areas within the Plan Area and potentially substantially increase the rate or amount of surface runoff such that there may be substantial erosion, siltation, or flooding onsite or offsite. However, adherence to the Butte County Stormwater Management Program, the Butte County Stormwater Management and Discharge Control Ordinance, and other applicable, federal, state, and local regulations regarding erosion, surface runoff, and drainage control, and implementation of applicable BRCP AMMs and Caltrans BMPs cited in Appendix D, would ensure that this impact would not be adverse. Furthermore, the CMs are expected to increase and encourage naturally functioning hydrologic systems that would reduce substantial site runoff, erosion, and/or inadvertent flooding over the long term. Impacts would be less than significant. No mitigation is required.

CEQA Determination: Under Alternative 2, implementation of the BRCP would have potentially significant impacts on the drainage pattern of sites or areas, and/or substantially cause erosion, siltation, or flooding through site clearing and grading, excavation, increasing land imperviousness, and altering channel geomorphology. However, adherence to the Butte County Stormwater Management Program, the Butte County Stormwater Management and Discharge Control Ordinance, and other applicable, federal, state and local regulations regarding erosion, surface runoff, and drainage control, and implementation of applicable BRCP AMMs and Caltrans BMPs cited in Appendix D, would ensure that this impact would be less than significant. Furthermore, the CMs are expected to increase and encourage naturally functioning hydrologic systems that would reduce substantial site runoff, erosion, and/or inadvertent flooding over the long term. Impacts would be less than significant. No mitigation is required.

Impact WQ-4: Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff (NEPA: less than significant; CEQA: less than significant)

Under Alternative 2, impacts of implementing covered activities within the UPAs as they relate to drainage and surface runoff and water quality would be the same under Alternative 1.

As previously described for Under Alternative 1, Impact WQ-3, paving, compaction of soil and other short-term and long-term activities that would increase land imperviousness outside the UPAs, within the water and irrigation districts, and within areas where certain conservation measures would be implemented (particularly if there would be new infrastructure) would result in decreases in precipitation infiltration into the soil. This would result in increasing drainage runoff flows into receiving drainages. These activities could result in adverse effects if the runoff volume exceeds the capacities of local drainages. Additionally, an increase in permanent urban development could result in an increase in the type and quantity of pollutants in stormwater runoff, such as oil and sloughed brake material from vehicles, pesticides, metals, and nutrients (e.g., nitrogen and phosphorus in fertilizers). As runoff flows over areas altered by development, such as roads, parking lots and other impervious surfaces or disturbed soil areas, it picks up sediment and chemicals that often become suspended in runoff and are carried to receiving waters, such as lakes, ponds, and streams.

Activities to improve urban stormwater water quality (see BRCP Section 5.4.4), which would support the Cities of Chico, Oroville, Gridley, and Biggs in obtaining funding to implement programs to improve urban stormwater quality would also potentially fund actions that would slow runoff velocities and support onsite drainage, as well as pollutant retention through construction of stormwater retention irrigation holding ponds, vegetated buffer strips, bioretention systems, and pervious pavement to substitute for asphalt and concrete, when practicable. These measures could be implemented at drainage areas near Big Chico Creek, Lindo Channel, Little Chico Creek, Sycamore/Mud Creek, Butte Creek, and the Feather River, and would help avoid impacts on drainage systems and water quality. Additionally, Permit Applicants would adhere to the Butte County Stormwater Management Program, Butte County Stormwater Management and Discharge Control Ordinance, as well as to other applicable, federal, state, and local regulations that pertain to controlling pollutant runoff and ensuring that projects are designed and implemented such that they do not exceed existing drainage capacities. Further, BRCP AMMs 8, 12, 16, 19, 21, and 26 would help reduce potential impacts that would slow, contain and/or filter stormwater runoff.

NEPA Determination: Under Alternative 2, implementation of the BRCP, particularly of covered activities that result in increases in impervious surfaces would increase stormwater runoff relative to existing conditions. Increased stormwater runoff, both during and after development, at project sites could exceed existing storm drainage systems and contribute additional pollutants, such as sediment, oil, and pesticides, to the drainage system. This would be a potentially adverse effect. Adherence to the Butte County Stormwater Management Program, the Butte County Stormwater Management and Discharge Control Ordinance, and other applicable, federal, state, and local regulations regarding erosion, surface runoff, and drainage control, and implementation of applicable BRCP AMMs, and Caltrans BMPs cited in Appendix D, would ensure that this effect would not be adverse. Impacts would be less than significant. No mitigation is required.

***CEQA Determination*:** Under Alternative 2, implementation of the BRCP, particularly of covered activities that result in increases in impervious surfaces, would increase stormwater runoff relative to existing conditions. Increased stormwater runoff, both during and after development, at project sites could exceed existing storm drainage systems and contribute additional pollutants, such as sediment, oil, and pesticides, to the drainage system. This would be a potentially significant impact. Adherence to the Butte County Stormwater Management Program, the Butte County Stormwater Management and Discharge Control Ordinance, and other applicable, federal, state, and local regulations regarding erosion, surface runoff, and drainage control, and implementation of applicable BRCP AMMs, would ensure that this impact would be less than significant. No mitigation is required.

Impact WQ-5: Place housing within a 100-year flood hazard area or place structures that would impede or redirect flood flows within a 100-year flood hazard area (NEPA: less than significant; CEQA: less than significant)

Under Alternative 2, covered activities within or outside the UPAs or within the water and irrigation districts would place people and structures within a 100-year flood hazard area. The largest impacts may be experienced within UPAs where development is most dense and more structures and people would be affected. In addition, if not designed properly, construction of new bridges for transportation projects would affect channel capacities in streams and increase flood risks. However, as part of covered activities that include flood control projects within the UPAs including: construction of new channels, levees/dikes, flood walls, and retention/detention basins would ultimately reduce potential flooding impacts within the Plan Area. Construction of covered activities outside UPAs and within water and irrigation districts, including wastewater management facilities, transportation facilities, and agriculture-related service facilities would not have a large overall effect on flooding risk because the facility footprint would be small compared to the overall surrounding pervious areas that already provide for flood control.

Most of the conservation measures do not involve placing structures within a 100-year floodplain and therefore would not have the potential to impede or redirect flood flows. The addition of large woody debris as part of CM9–CM11 in stream channels may reduce channel capacity during high rain events. However the woody debris is not expected to be placed within high flood risk areas or within an area large enough to increase flood risk. Furthermore, using woody debris rather than armoring the channels provides a hydrologic benefit to the channels because it slows river velocities and provides beneficial habitat to covered fish species.

NEPA Determination: Under Alternative 2, implementation of covered activities within and outside the UPAs, within the water and irrigation districts, and for BRCP conservation measures would result in some limited new development within the 100-year flood hazard zones that could potentially adversely affect flood flows. Implementation of Local Agency policies and actions designed to prevent flooding of occupied developments and restrict new development within the 100-year flood zone, in combination with the Butte County Flood Hazard Prevention Ordinance, Butte County Flood Mitigation Plan, and other applicable state and federal regulations regarding flooding would ensure that this effect would not be adverse. Impacts would be less than significant. No mitigation is required.

CEQA Determination: Under Alternative 2, implementation of covered activities for permanent development projects within and outside the UPAs, within the water and irrigation districts, and for BRCP conservation measures would result in some limited new development within the 100-year flood hazard zones that could potentially adversely affect flood flows. Implementation of Local Agency policies and actions designed to prevent flooding of occupied developments and restrict new development within the 100-year flood zone, in combination with the Butte County Flood Hazard Prevention Ordinance, Butte County Flood Mitigation Plan, and other applicable state and federal regulations related to flooding would ensure that impacts would be less than significant. No mitigation is required.

Impact WQ-6: Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam (NEPA: significant and unavoidable; CEQA: significant and unavoidable)

Under Alternative 2, covered activities within or outside the UPAs or within the water and irrigation districts would place people and structures within a dam or levee inundation area and impacts would be the same as under Alternative 1 for WQ-6. Although the general plan policies and actions of the Local Agencies are intended to reduce flood hazard damage and exposure risks associated with dam and levee failure within the county, and thus the Plan Area, they do not entirely eliminate risks to people and property from potential floods. In addition, recently-adopted policies by FEMA would de-certify a number of levees in the county, which indicates that larger areas of the county are subject to levee inundation than realized under previous policies. It is not within Butte County's authority to require or complete maintenance and improvements to levees in the county owned and maintained by private individuals and other public agencies, as discussed under Alternative 1, Impact WQ-6; however, covered activities implemented by Local Agencies within and outside the UPAs would still expose people or structures to significant risk of loss, injury, or death involving flooding.

The BRCP conservation strategy and conservation measures are designed to protect, enhance, and restore natural communities. None of the measures would result in the exposure of people or structures to increased risks associated with levee or dam failure.

NEPA Determination: Under Alternative 2, implementation of the covered activities would expose people and structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of levee or dam failure in the Plan Area. The conservation measures would not result in an increased exposure to risks of levee or dam failures. Although implementation of the policies and actions in the Local Agencies' general plans would reduce risks associated with levee failure, they would not eliminate risks to people and property. Therefore, this would be an adverse effect. Impacts would be significant and unavoidable.

CEQA Determination: Under Alternative 2, implementation of the covered activities would expose people and structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of levee or dam failure in the Plan Area. The conservation measures would not result in an increased exposure to risks of levee or dam failures. Although implementation of the policies and actions in the Local Agencies' general plans would reduce risks associated with levee failure, they would not eliminate risks to people and property. Therefore, this impact would be significant and unavoidable.

Alternative 3—Reduced Development/Reduced Fill

Alternative 3 is similar to Alternative 2 except that it uses the various general plan EIR reduced development alternatives as described in Chapter 2, *Proposed Action and Alternatives*, to create a single reduced development footprint. Covered activities under this alternative would be similar to those described Alternative 2 but would be limited to the reduced development footprint and reduce the permit term to 30 years. The reduced footprint and reduced land conservation would result in fewer built structures and less ground disturbance.

It is anticipated that under Alternative 3, fewer acres of natural communities would be conserved because reduced development would provide reduced funding for the conservation strategy. However, it is anticipated that the conservation measures would be the same because the reduction

of fill would be achieved through the reduced development footprint of the Local Agencies' general plans rather than through modification of the conservation measures. Since the conservation strategy would be similar, applicable AMMs (as described under Alternative 2) would be incorporated to reduce impacts to water quality and reduce sedimentation, erosion, flooding, including those listed below.

- AMM8: Implement Standard Urban Stormwater Management Plans
- AMM12: Confine and Delineate Work Area
- AMM16: Install Erosion Control Barriers
- AMM19: Implement Wet Weather Erosion Control Plan
- AMM21: Implement Additional Avoidance and Minimization Measures and Best Management Practices.
- AMM26: Implement Caltrans Construction BMPs to Maintain Water Quality

Consequently, the impacts related to implementation of the conservation strategy and conservation measures would be the same as under Alternative 2.

Impact WQ-1: Violate any water quality standards or waste discharge requirements, or otherwise substantially degrade water quality (NEPA: less than significant; CEQA: less than significant)

Covered activities within the UPAs under Alternative 3 would be more concentrated in existing urbanized areas. Therefore, implementation of Alternative 3 would result in similar but less substantial impacts related to water quality as those determined by the Local Agencies for implementation of their general plans under Alterative 2 (City of Oroville 2009a; City of Gridley 2009; Butte County 2010; City of Chico 2011a; City of Biggs 2013). Further, because there would be less fill related to the construction of residential, commercial, and industrial development under this alternative compared with Alternative 2, water quality impacts within the UPAs would be also be reduced. Under Alternative 3, in areas outside UPAs and within water and irrigation districts and conservation lands, less undeveloped land would be disturbed and less impermeable surface area would be created than under Alternative 2, thereby reducing the extent of impacts related to increased stormwater runoff and contamination. Impacts on water quality as a result of construction and maintenance activities carried out as part of implementing conservation measures, covered activities outside the UPAs, and covered activities within the water and irrigation districts would be as described under Alternative 2, Impact WQ-1. The conservation measures, and any activities undertaken by the water districts or irrigation districts, would be the same as Under Alternative 2, although there would be an overall reduced amount and extent of conserved lands.

NEPA Determination: Under Alternative 3, surface and groundwater quality effects resulting from covered activities within and outside the UPAs, within the water and irrigation districts, and for CM4–CM12, CM14, and Activities to Improve Urban Stormwater Water Quality would be similar to those described for Alternative 2, Impact WQ-1. However, the extent of these potentially adverse effects would likely be smaller because less undeveloped land would be disturbed and less impermeable surface area would be created. Adherence to applicable federal, state, and local regulations, including Butte County's Stormwater Management Program, Stormwater Management and Discharge Control Ordinance, and implementation of applicable AMMs, as well as BMPs cited in

Appendix D, would ensure that effects would not be adverse. Impacts would be less than significant. No mitigation is required.

CEQA Determination: Under Alternative 3, surface and groundwater quality impacts resulting from covered activities within and outside the UPAs, within the water and irrigation districts, and for CM4–CM12, CM14, and Activities to Improve Urban Stormwater Water Quality would be similar to those described for Alternative 2, Impact WQ-1. However, the extent of these potentially significant impacts would likely be smaller because less undeveloped land would be disturbed and less impermeable surface area would be created. Adherence to applicable federal, state, and local regulations, including Butte County's Stormwater Management Program, Stormwater Management and Discharge Control Ordinance, and implementation of applicable AMMs, would ensure that impacts would be less than significant. No mitigation is required.

Impact WQ-2: Substantially deplete groundwater supplies or interfere substantially with groundwater recharge (NEPA: less than significant; CEQA: less than significant)

This impact under Alternative 3 would be the nearly the same as Impact WQ-2 under Alternative 2. Potential effects on groundwater supplies could be greater within the UPAs than under Alternative 2 because, in some cities, Alternative 3 would include higher densities in and around the existing urban area. However, under Alternative 3, there would be an overall less impervious surface area within the Plan Area than under Alternative 2 because less undeveloped land would be disturbed. Therefore, the impacts related to reduced groundwater recharge under this alternative would be less substantial relative to Alternative 2. It is not likely that implementation of covered activities outside UPAs, within water and irrigation districts, or implementation of the conservation measures would have any direct or indirect impacts on groundwater resources.

NEPA Determination: Implementation of Alternative 3 would result in similar effects on groundwater (i.e., increased groundwater pumping) as under Alternative 2, particularly for covered activities within the UPAs, and could reduce groundwater recharge by increasing impervious surface areas. However, because there would likely be less impervious surface area under this alternative relative to Alternative 2, the effect on groundwater supplies in the Plan Area would not be as substantial because there would potentially be greater recharge. It is not likely that implementation of covered activities outside UPAs, within water and irrigation districts, or implementation of the conservation measures would have any direct or indirect impacts on groundwater resources. General plan policies, goals, actions, and/or implementation strategies of the Local Agencies were designed to minimize the impact of groundwater pumping, reduced groundwater recharge, and groundwater pollution, and therefore would help reduce the severity of this effect. Adherence to general plan policies, the Butte County Groundwater Management Plan and Groundwater Ordinances, and other applicable local, state, and federal regulations would ensure that this effect would be not be adverse. Impacts would be less than significant. No mitigation is required.

CEQA Determination: Implementation of Alternative 3 would result in similar impacts on groundwater (i.e., increased groundwater pumping) as under Alternative 2, particularly for covered activities within the UPAs, and could reduce groundwater recharge by increasing impervious surface areas. However, because there would likely be less impervious surface under this alternative relative to Alternative 2, the impact on groundwater supplies in the Plan Area would not be as substantial. It is not likely that implementation of covered activities outside UPAs, within water and irrigation districts, or implementation of the conservation measures would have any direct or

indirect impacts on groundwater resources. General plan policies, goals, actions, and/or implementation strategies of the Local Agencies were designed to minimize the impact of groundwater pumping, reduced groundwater recharge, and groundwater pollution, and therefore would help reduce the severity of this impact. Adherence to general plan policies, the Butte County Groundwater Management Plan and Groundwater Ordinances, and other applicable local, state, and federal regulations would ensure that this impact would be less than significant. No mitigation is required.

Impact WQ-3: Substantially alter the existing drainage pattern of the site or area or substantially increase the rate or amount of surface runoff in a manner that would result in substantial erosion, siltation, or flooding onsite or offsite (NEPA: less than significant; CEQA: less than significant)

Permanent new development within the UPAs under Alternative 3 would be directed to existing urbanized areas. The Local Agencies determined that implementation of Alternative 3 would result in similar but less substantial impacts related to altering drainage patterns and surface runoff than under Alternative 2. Less undeveloped land would be disturbed and less impervious surface area created, thereby reducing the potential for impacts related to drainage patterns and surface runoff, including erosion, siltation and flooding through site clearing and grading, excavation, increasing land imperviousness, and altering channel geomorphology in the Plan Area (City of Gridley 2009; City of Oroville 2009a; Butte County 2010; City of Chico 2011a; City of Biggs 2013). Impacts on surface drainage and the rate or volume of surface runoff as a result of construction and maintenance activities carried out as part of implementing covered activities outside the UPAs, within the water and irrigation districts, and for the conservation measures would be the same as described under Alternative 2, Impact WQ-3.

NEPA Determination: Implementation of Alternative 3 could have adverse effects on the existing drainage pattern of sites or areas, and/or substantially cause erosion, siltation, or flooding through site clearing and grading, excavation, increasing land imperviousness, and altering channel geomorphology. Although the extent of these potential effects under this alternative would be smaller relative to under Alternative 2 due to reduced development and fill, this effect could still be adverse. Adherence to the Butte County Stormwater Management Program, the Butte County Stormwater Management and Discharge Control Ordinance, and other applicable federal, state, and local regulations regarding erosion, surface runoff, and drainage control, as well as implementation of applicable AMMs, as well as the Caltrans BMPs cited in Appendix D, would ensure that this effect would not be adverse. Furthermore, the CMs are expected to increase and encourage naturally functioning hydrologic systems that would reduce substantial site runoff, erosion, and/or inadvertent flooding over the long term. Impacts would be less than significant. No mitigation is required.

CEQA Determination: Implementation of Alternative 3 could have significant impacts on the drainage pattern of sites or areas, and/or substantially cause erosion, siltation, or flooding through site clearing and grading, excavation, increasing land imperviousness, and altering channel geomorphology. Although the extent of these potential impacts under this alternative would be smaller relative to under Alternative 2 due to reduced development and fill, this impact could still be significant. Adherence to the Butte County Stormwater Management Program, the Butte County Stormwater Management and Discharge Control Ordinance, and other applicable federal, state, and local regulations regarding erosion, surface runoff, and drainage control, as well as implementation of applicable AMMs, as well as Caltrans BMPs cited in Appendix D, would ensure that this impact

would be less than significant. Furthermore, the CMs are expected to increase and encourage naturally functioning hydrologic systems that would reduce substantial site runoff, erosion, and/or inadvertent flooding over the long term. Impacts would be less than significant. No mitigation is required.

Impact WQ-4: Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff (NEPA: less than significant; CEQA: less than significant)

Covered activities within the UPAs under Alternative 3 would result in similar but less substantial impacts related to surface runoff, stormwater drainage, and polluted stormwater runoff than those determined by the Local Agencies for implementation of their general plans under Alternative 2 (City of Gridley 2009; City of Oroville 2009a; Butte County 2010; City of Chico 2011a; City of Biggs 2013). This would be true for covered activities outside the UPAs and water and irrigation districts as well as for conservation measures that, once implemented, would result in an increase in impervious surface areas. Under this alternative, less undeveloped land would be disturbed and less impervious surface area would be created. Consequently, there would be reduced potential for impacts related to the rate and amount of surface runoff and contaminants typically contained in urban runoff, particularly from impervious surfaces such roads and parking lots.

NEPA Determination: Implementation of Alternative 3, particularly of covered activities that result in increases in impervious surfaces would increase stormwater runoff relative to existing conditions. Increased stormwater runoff, both during and after development, at project sites could exceed existing storm drainage systems and contribute additional pollutants, such as sediment, oil, pesticides to the drainage system. Although the extent and/or severity of these impacts under this alternative would be reduced relative to Alternative 2 because there would be less development and less impervious services, this would still be a potentially adverse effect. Adherence to the Butte County Stormwater Management Program, the Butte County Stormwater Management and Discharge Control Ordinance, and other applicable, federal, state, and local regulations regarding erosion, surface runoff, and drainage control, and implementation of applicable AMMs, and Caltrans BMPs cited in Appendix D, would ensure that this would not be an adverse effect. Impacts would be less than significant. No mitigation is required.

CEQA Determination: Implementation of Alternative 3, particularly of covered activities that result in increases in impervious surfaces would increase stormwater runoff relative to existing conditions. Increased stormwater runoff, both during and after development, at project sites could exceed existing storm drainage systems and contribute additional pollutants, such as sediment, oil, pesticides, to the drainage system. Although the extent and/or severity of these impacts under this alternative would be reduced relative to Alternative 2 because there would be less development and less impervious services, this would still be a potentially significant impact. Adherence to the Butte County Stormwater Management Program, the Butte County Stormwater Management and Discharge Control Ordinance, as well as to other applicable, federal, state and local regulations, regarding erosion, surface runoff, and drainage control, and implementation of applicable AMMs, and Caltrans BMPs cited in Appendix D, would ensure that this impact would be less than significant. No mitigation is required.

Impact WQ-5: Place housing within a 100-year flood hazard area or place structures that would impede or redirect flood flows within a 100-year flood hazard area (NEPA: less than significant; CEQA: less than significant)

This impact under Alternative 3 would be similar to Impact WQ-5 under Alternative 2. Potential effects on flood risk would be greatest within the UPAs because there would be higher density development in and around the existing urban areas. However, under Alternative 3, there would be less overall development within the Plan Area than under Alternative 2; consequently, there would be less housing and fewer structures placed within 100-year flood-hazard areas.

NEPA Determination: Although implementation of the Local Agencies' general plans would allow limited new development within the 100-year flood hazard zones, implementation of Local Agency policies and actions designed to prevent flooding of occupied developments and restrict new development within the 100-year flood zone, in combination with the Butte County Flood Hazard Prevention Ordinance, Butte County Flood Mitigation Plan, and other local, state, and federal regulations regarding flooding, would ensure that this effect is not adverse. Impacts would be less than significant. No mitigation is required.

CEQA Determination: Although implementation of the Local Agencies' general plans would allow limited new development within the 100-year flood hazard zones, implementation of Local Agency policies and actions designed to prevent flooding of occupied developments and restrict new development within the 100-year flood zone, in combination with the Butte County Flood Hazard Prevention Ordinance, Butte County Flood Mitigation Plan, and other local, state, and federal regulations regarding flooding, would ensure that impacts would be less than significant. No mitigation is required.

Impact WQ-6: Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam (NEPA: significant and unavoidable; CEQA: significant and unavoidable)

This impact under Alternative 3 would be the same as Impact WQ-6 under Alternative 2. Alternative 3 would place people and structures in areas with risk of levee or dam inundation. Although the Local Agencies' general plan policies and actions are intended to reduce flood hazard damage and exposure risks associated with dam and levee failure within the county, they do not entirely eliminate risks to people and property from potential floods. In addition, recently adopted policies by FEMA would de-certify a number of levees in the county, which indicates that larger areas of the county are subject to levee inundation than realized under previous policies. As stated in the County general plan EIR, it is not within Butte County's authority to require or complete maintenance and improvements to levees in the county owned and maintained by private individuals and other public agencies, as discussed under Alternative 1, Impact WQ-6.

Because Alternative 3 focuses development in targeted locations within the city, the dam inundation areas within the cities of Biggs, Gridley, and Oroville would be most affected (the majority of Chico does not fall within a dam inundation area) as well as urban areas surrounded by levees. Development associated with covered activities within or outside the UPAs or within the water and irrigation districts would be less affected by the potential for exposure to flood risk from a levee or dam failure. Under Alternative 3, there would be less overall development within the Plan Area than under Alternative 2; consequently, people and structures would have less exposure to flood risks associated with dam or levee failure.

The conservation measures would not involve activities that would place people or structures within areas prone to risk of levee or dam failure.

NEPA Determination: Implementation of the activities under Alternative 3 would expose people and structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of levee or dam failure in the Plan Area. However, this effect would be less than that under Alternative 2 because there would be overall less development within the Plan Area. The conservation measures would not result in an increased exposure to risks of levee or dam failures. Although implementation of the policies and actions in the Local Agencies' general plans would reduce risks associated with levee failure, they would not eliminate risks to people and property. This would be an adverse effect. Therefore, impacts would be significant and unavoidable.

CEQA Determination: Implementation of the activities under Alternative 3 would expose people and structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of levee or dam failure in the Plan Area. However, this impact would be less than that under Alternative 2 because there would be overall less development within the Plan Area. The conservation measures would not result in an increased exposure to risks of levee or dam failures. Although implementation of the policies and actions in the Local Agencies' general plans would reduce risks associated with levee failure, they would not eliminate risks to people and property. As a result, this impact would be significant and unavoidable.

Alternative 4—Greater Conservation

Alternative 4 would be similar to Alternative 2 except that under Alternative 4, the conservation strategy would include the conservation of an additional 9,850 acres of grassland and 35,310 acres of riceland. Alternative 4 would include the same conservation measures and AMMs as described in the BRCP under Alternative 2, and all other acreage protection targets for natural communities/land types would be the same as described under Alternative 2.

The impacts of the covered activities within local jurisdictions of the Local Agencies would be the same under Alternative 4 as under Alternative 2, as would the water district and irrigation district covered activities.

Impact WQ-1: Violate any water quality standards or waste discharge requirements, or otherwise substantially degrade water quality (NEPA: less than significant; CEQA: less than significant)

This impact under Alternative 4 would be similar to Impact WQ-1 under Alternative 2. An increase in agricultural acreage devoted to rice farming would potentially result in an increase in existing pesticide-laden runoff to agricultural drainages and potentially to surface waters. However, the application of pesticides, herbicides, fungicides, and fertilizers would continue to be in compliance with DPR use requirements (Section 9.1.1, *Regulatory Setting*) as well as other regulations and programs to minimize water quality impacts.

NEPA Determination: Under Alternative 4, surface and groundwater quality effects resulting from the covered activities within and outside the UPAs, within the water and irrigation districts, and for CM4–CM12, CM14 and Activities to Improve Urban Stormwater Water Quality would be similar to those described for Impact WQ-1 under Alternative 2. However, because there would be additional land devoted to rice farming, there would be an increased potential for pollutant discharge (e.g., pesticides) to agricultural drainages and surface waters. These effects could be adverse. Adherence

to applicable federal, state, and local regulations, including Butte County's Stormwater Management Program, Stormwater Management and Discharge Control Ordinance, as well as implementation of applicable AMMs, would ensure that the effect would not be adverse. Impacts would be less than significant. No mitigation is required.

CEQA Determination: Under Alternative 4, surface and groundwater quality impacts resulting from the implementation covered activities within and outside the UPAs, within the water and irrigation districts, and for CM4–CM12, CM14, and Activities to Improve Urban Stormwater Water Quality would be similar to those described for Impact WQ-1 under Alternative 2. However, because there would be additional land devoted to rice farming, there would be an increased potential for pollutant discharge (e.g., pesticides) to agricultural drainages and surface waters. This impact would be potentially significant. Adherence to applicable federal, state, and local regulations, including Butte County's Stormwater Management Program, Stormwater Management and Discharge Control Ordinance, as well as implementation of applicable AMMs, would ensure that impacts would be less than significant. No mitigation is required.

Impact WQ-2: Substantially deplete groundwater supplies or interfere substantially with groundwater recharge (NEPA: less than significant; CEQA: less than significant)

This impact under Alternative 4 would be nearly the same as Impact WQ-2 under Alternative 2. However, under Alternative 4, there would be additional conservation of grassland and rice land. Although the maintenance of existing rice lands still may require the use of groundwater supplies, there would be more land perviousness and, consequently, greater groundwater recharge relative to Alternative 2. Therefore, the impacts related to reduced groundwater recharge under this alternative would be less substantial relative to Alternative 2.

NEPA Determination: Implementation of Alternative 4 would result in similar effects on groundwater (i.e., increased groundwater pumping) as under Alternative 2, particularly for projects implemented within the UPAs, and could reduce groundwater recharge by increasing impervious surface areas. However, because there would likely be less impervious surface under this alternative relative to Alternative 2, the effect on groundwater supplies in the Plan Area would not be as substantial because there would potentially be greater recharge. It is not likely that implementation of covered activities outside UPAs, within water and irrigation districts, or implementation of the conservation measures would have any direct or indirect change in impacts on groundwater resources. General plan policies, goals, actions, and/or implementation strategies of the Local Agencies were designed to minimize the impact of groundwater pumping, reduced groundwater recharge, and groundwater pollution, and therefore would help reduce the severity of this effect. Adherence to general plan policies, the Butte County Groundwater Management Plan and Groundwater Ordinances, and other applicable local, state, and federal regulations would ensure that this effect would not be adverse. Impacts would be less than significant. No mitigation is required.

CEQA Determination: Implementation of Alternative 4 would result in similar impacts on groundwater (i.e., increased groundwater pumping) as under Alternative 2, particularly for projects implemented within the UPAs, and could reduce groundwater recharge by increasing impervious surface areas. However, because there would likely be less impervious surface under this alternative relative to Alternative 2, the impact on groundwater supplies in the Plan Area would not be as substantial because there would potentially be greater recharge. Nonetheless, this impact could still be significant. It is not likely that implementation of covered activities outside UPAs, within water

and irrigation districts, or implementation of the conservation measures would have any direct or indirect change in impacts on groundwater resources. General plan policies, goals, actions, and/or implementation strategies of the Local Agencies were designed to minimize the impact of groundwater pumping, reduced groundwater recharge, and groundwater pollution, and therefore would help reduce the severity of this effect. Adherence to general plan policies, the Butte County Groundwater Management Plan and Groundwater Ordinances, and other applicable local, state, and federal regulations would ensure that this impact would be less than significant. No mitigation is required.

Impact WQ-3: Substantially alter the existing drainage pattern of the site or area or substantially increase the rate or amount of surface runoff in a manner that would result in substantial erosion, siltation, or flooding onsite or offsite (NEPA: less than significant; CEQA: less than significant)

This impact under Alternative 4 would be similar to Impact WQ-3 under Alternative 2. Covered activities would alter drainage patterns in areas where development would take place; alter channel geomorphology through aquatic habitat improvements as part of conservation measures; increase surface runoff by increased land imperviousness through new development; cause erosion and/or siltation through actions such as site clearing, grading, and excavation during construction; and potentially result in ponding or other flooding effects due to construction activities and new development. However, Alternative 4 would allow for greater preservation of existing pervious area for rice and grassland than would Alternative 2, thereby reducing potential for the creation of new impervious area. This would also result in greater volumes of existing surface runoff to agricultural drainages during certain times of the year. Therefore, while Alternative 4 would impact existing drainage patterns, it would also lessen the potential for the alteration of existing drainage patterns in conserved lands relative to Alternative 2.

NEPA Determination: Implementation of Alternative 4 would potentially have adverse effects on the existing drainage pattern of sites or areas and/or substantially increase the rate or amount of surface runoff in a manner that would result in substantial erosion, siltation, or flooding onsite or offsite. Adherence to the Butte County Stormwater Management Program, the Butte County Stormwater Management and Discharge Control Ordinance, and applicable federal, state, and local regulations regarding erosion, surface runoff, and drainage control, and implementation of applicable AMMs would ensure that this impact would not be adverse. Furthermore, the CMs are expected to increase and encourage naturally functioning hydrologic systems that would reduce substantial site runoff, erosion, and/or inadvertent flooding over the long term. Impacts would be less than significant. No mitigation is required.

CEQA Determination: Implementation of Alternative 4 would substantially alter the existing drainage pattern of sites or areas and/or substantially increase the rate or amount of surface runoff in a manner that would result in substantial erosion, siltation, or flooding onsite or offsite. The extent of these impacts would potentially be less than under Alternative 2 because of the reduced amount of development and fill in the Plan Area under Alternative 4. Adherence to the Butte County Stormwater Management Program, the Butte County Stormwater Management and Discharge Control Ordinance, and applicable federal, state, and local regulations regarding erosion, surface runoff, and drainage control, and implementation of applicable AMMs would ensure that this impact would be less than significant. Furthermore, the CMs are expected to increase and encourage naturally functioning hydrologic systems that would reduce substantial site runoff, erosion, and/or

inadvertent flooding over the long term. Impacts would be less than significant. No mitigation is required.

Impact WQ-4: Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff (NEPA: less than significant; CEQA: less than significant)

This impact under Alternative 4 would be similar to Impact WQ-4 under Alternative 2. However, this alternative would allow for the greater preservation of existing pervious land for rice and grassland, thereby reducing potential for the creation of new impervious area. This would also result in greater volumes of existing surface runoff to agricultural drainages during certain times of the year. An increase in agricultural acreage devoted to rice farming would potentially result in an increase in existing pesticide-laden runoff to agricultural drainages and, potentially, to surface waters. However, the application of pesticides, herbicides, fungicides, and fertilizers would continue to be in compliance with DPR use requirements (Section 9.1.1, *Regulatory Setting*) as well as other regulations and programs to minimize water quality impacts.

NEPA Determination: Implementation of Alternative 4, particularly of covered activities that result in increases in impervious surfaces would increase stormwater runoff relative to existing conditions. Increased stormwater runoff, both during and after development, at project sites could exceed existing storm drainage systems and contribute additional pollutants, such as sediment, oil, and pesticides to the drainage system. The extent and/or severity of these impacts under this alternative would be similar to Alternative 2 except the increase in agricultural acreage devoted to rice farming would potentially result in an increase in existing pesticide-laden runoff to agricultural drainages and, potentially, to surface waters. This could be an adverse effect. Adherence to the Butte County Stormwater Management Program, the Butte County Stormwater Management and Discharge Control Ordinance, as well as to other applicable federal, state, and local regulations regarding erosion, surface runoff, and drainage control, and implementation of applicable AMMs and Caltrans BMPs cited in Appendix D would ensure that this would not be an adverse effect. Impacts would be less than significant. No mitigation is required.

CEQA Determination: Implementation of Alternative 4, particularly of covered activities that result in increases in impervious surfaces would result in increased stormwater runoff relative to existing conditions. Increased stormwater runoff, both during and after development, at project sites could exceed existing storm drainage systems and contribute additional pollutants, such as sediment, oil, and pesticides to the drainage system. The extent and/or severity of these impacts under this alternative would be similar to Alternative 2 except the increase in agricultural acreage devoted to rice farming would potentially result in an increase in existing pesticide-laden runoff to agricultural drainages and, potentially, to surface waters. This impact would be potentially significant. Adherence to the Butte County Stormwater Management Program, the Butte County Stormwater Management and Discharge Control Ordinance, as well as to other applicable federal, state, and local regulations regarding erosion, surface runoff, and drainage control, and implementation of applicable AMMs and Caltrans BMPs cited in Appendix D would ensure that this impact would be less than significant. No mitigation is required.

Impact WQ-5: Place housing within a 100-year flood hazard area or place structures that would impede or redirect flood flows within a 100-year flood hazard area (NEPA: less than significant; CEQA: less than significant)

This impact under Alternative 4 would be similar to Impact WQ-5 under Alternative 2 because the same covered activities would be implemented. Alternative 4 would place new structures within a 100-year flood hazard area. However, increased acreages for rice and grassland would provide increased flood control in flood risk areas by allowing the flooding of fields and open space. Increased conserved lands would also reduce the area for potential future placement of structures within 100-year flood hazard areas.

NEPA Determination: Implementation of the Local Agencies' general plans would allow limited new development within the 100-year flood hazard zones. However, this impact would be less than that of Alternative 2 because there would be overall more open area for flood control and less area for potential future development. Local Agency policies and actions designed to prevent flooding of occupied developments and restrict new development within the 100-year flood zone, in combination with the Butte County Flood Hazard Prevention Ordinance, Butte County Flood Mitigation Plan, and other local, state, and federal regulations related to flooding, would ensure that this effect is not adverse. Impacts would be less than significant. No mitigation is required.

CEQA Determination: Implementation of the Local Agencies' general plans would allow limited new development within the 100-year flood hazard zones. However, this impact would be less than that of Alternative 2 because there would be overall more open area for flood control and less area for potential future development. Local Agency policies and actions designed to prevent flooding of occupied developments and restrict new development within the 100-year flood zone, in combination with the Butte County Flood Hazard Prevention Ordinance, Butte County Flood Mitigation Plan, and other local, state, and federal regulations related to flooding, would ensure that this impact would be less than significant. No mitigation is required.

Impact WQ-6: Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam (NEPA: significant and unavoidable; CEQA: significant and unavoidable)

This impact under Alternative 4 would be the same as Impact WQ-6 under Alternative 2. Alternative 4 would place people and structures in areas with risk of levee or dam inundation. Although the general plan policies and actions of the Local Agencies are intended to reduce flood hazard damage and exposure risks associated with dam and levee failure within the county, they do not entirely eliminate risks to people and property from potential floods. In addition, recently adopted policies by FEMA would de-certify a number of levees in the county, which indicates that larger areas of the county are subject to levee inundation than realized under previous policies. Increased acreages for rice and grassland would provide increased flood control during a levee or dam failure by allowing the flooding of fields and open space. Increased conserved lands would also reduce the area available for potential future placement of structures within levee and dam inundation areas, thereby reducing the potential exposure of people or structures to flooding impacts associated with levee or dam failure.

NEPA Determination: Implementation of Alternative 4 would expose people and structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of levee or dam failure in the Plan Area. However, this impact would be less than that of Alternative 2 because there would be overall more open area for flood control during a levee or dam failure and less area

for potential future exposure of people or structures to associated flooding impacts. Although implementation of the policies and actions in the Local Agencies' general plans would reduce risks associated with levee failure, they would not eliminate risks to people and property. This would be an adverse effect. Therefore, impacts would be significant and unavoidable.

CEQA Determination: Implementation of Alternative 4 would expose people and structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of levee or dam failure in the Plan Area. However, this impact would be less than that of Alternative 2 because there would be overall more open area for flood control during a levee or dam failure and less area for potential future exposure of people or structures to associated flooding impacts. Although implementation of the policies and actions in the Local Agencies' general plans would reduce risks associated with levee failure, they would not eliminate risks to people and property. As a result, this impact is considered significant and unavoidable.

9.2.4 Cumulative Analysis

Methods and Approach

The cumulative analysis for hydrology, water resources, and water quality is a qualitative evaluation using the past, present, and reasonably foreseeable future projects listed in Chapter 3, Section 3.3.2, under *Cumulative Impacts*. This analysis considered agricultural and urban development projects, including roadway projects, and water supply development projects; the Local Agency general plan EIR impact determinations for cumulative impacts, where applicable; and the impact determinations identified above for the various alternatives.

This analysis determines whether the covered activities not analyzed in previous environmental documents would result in a cumulatively considerable incremental contribution that, when combined with the past, present, and reasonably foreseeable future projects, would result in a cumulatively significant impact.

Cumulative Impacts

Past projects have resulted in various effects on hydrology, water resources, and water quality in the Plan Area. As disclosed in Chapter 3, Section 3.3.2, under *Cumulative Impacts*, the Plan Area contains numerous surface water bodies and groundwater resources that have been negatively affected by development and use but have also benefitted from restoration projects. In addition, past and present flood control projects provide increased flood control in the Plan Area.

The conversion of natural lands to farmland, the subsequent urbanization of farmland to urban and rural residential uses, and the direct conversion of natural lands to urban and rural residential uses in the county have reduced water quality as a result of construction activities and increased polluted runoff. Increased development has also increased the use of surface water and groundwater supplies (see Chapter 12, *Public Services and Public Utilities*, for more information on cumulative impacts on water supply and development). As a result, groundwater pumping has increased in the county, and approximately 75% of the county's residential water supply currently is extracted from groundwater (Butte County 2010).

While urbanization and other activities have contributed to reduced water quality in the Plan Area, several restoration programs have been implemented to restore natural processes related to hydrology, stream channels, sediment, floodplains, and ecosystem water quality and to develop

habitat management and restoration actions, including restoration of river corridors, reconstruction of channel floodplain interaction, and restoration of aquatic habitat. In addition, a substantial amount of land preservation, including wetlands, has occurred along with the urbanization of the Plan Area.

Extensive work has been undertaken to improve flood protection for urban areas. Past and present flood control projects within the Plan Area include the CVFPP, Sacramento River Flood Control System Evaluation, Sacramento–San Joaquin Rivers Comprehensive Study, Sacramento River Bank Protection Project, and the Sutter Basin Project. These projects are aimed at improving the structural integrity of urban levees and other flood control facilities. While these projects generally have degraded instream and nearby wetland and riparian communities in the Plan Area, efforts have been underway to upgrade flood control systems while restoring natural stream channels to the extent possible along the Sacramento and Feather Rivers.

Alternative 1—No Action (No Plan Implementation)

The County of Butte determined that implementation of the County general plan would result in cumulatively considerable and significant impacts associated with flooding. In addition, implementation of the County General Plan 2030 2030 would contribute to development in levee and dam inundation areas, resulting in a significant cumulative impact (Butte County 2010). The City of Chico determined that implementation of its general plan would result in less than cumulatively considerable impacts related to flooding but could increase impervious surfaces and alter drainage conditions and rates in the Plan Area, which could contribute to cumulative flood conditions downstream (City of Chico 2011a). Accordingly, past, present, and reasonably foreseeable future projects would result in cumulatively considerable and significant impacts.

The City of Chico determined that implementation of its general plan would result in less than cumulatively considerable impacts related to water quality. (City of Chico 2011a). Butte County and the Cities of Biggs, Gridley, and Oroville determined that implementation of the general plans for the county and for those cities would not result in any cumulative impacts for hydrology, water resources, and water quality. Accordingly, past, present, and reasonably foreseeable future projects would not result in cumulatively considerable and significant impacts in this area.

Alternative 2—Proposed Action

The County determined that implementation of the County general plan would result in cumulatively considerable and significant impacts associated with flooding due to the increase in impervious surfaces and altered drainage conditions and rates in the Plan Area. Accordingly, past, present, and reasonably foreseeable future projects would result in cumulatively considerable and significant impacts. Implementation of covered activities under Alternative 2 would result in limited new development within the 100-year flood hazard zones. However, Local Agency policies and actions designed to prevent flooding of occupied developments and restrict new development within the 100-year flood zone, in combination with the Butte County Flood Hazard Prevention Ordinance, Butte County Flood Mitigation Plan, and other local, state, and federal regulations related to flooding would reduce flooding impacts. Therefore, implementation of the BRCP would not result in an additional incremental contribution to cumulative impacts, and cumulative impacts would be the same as under Alternative 1, cumulatively considerable and significant.

The County determined that implementation of the County general plan would result in cumulatively considerable and significant impacts associated with flooding due to development in

levee and dam inundation areas (Butte County 2010). Accordingly, past, present, and reasonably foreseeable future projects would result in cumulatively considerable and significant impacts. Implementation of the covered activities under Alternative 2 would expose people and structures to a significant risk of loss, injury, or death involving flooding, including as a result of levee or dam failure in the Plan Area. Although implementation of the policies and actions in the Local Agencies' general plans would reduce risks associated with levee failure, they would not entirely eliminate risks to people and property. This is because the majority of levees and dams in the county are owned or maintained by private individuals or other public agencies, and it is not feasible for the Permit Applicants to completely address maintenance and improvements to all levees to the extent necessary to eliminate risks from levee failure. In addition, FEMA adopted a new policy that would de-certify a number of levees in the County and would not consider these levees when developing FIRMs. This policy has led to significantly larger areas being designated as flood zones. Consequently, Alternative 2 would result in a cumulatively considerable contribution to cumulative impacts on exposure of people and structures to flood risks as a result of levee or dam failure in the Plan Area.

The City of Chico determined that implementation of its general plan would result in less than cumulatively considerable impacts related to water quality. (City of Chico 2011a). The County and the Cities of Biggs, Gridley, and Oroville determined that implementation of the general plans for the county and for those cities would not result in any cumulative impacts for hydrology, water resources, and water quality. Accordingly, past, present, and reasonably foreseeable future projects would not result in cumulatively considerable and significant impacts in this area. Implementation of covered activities and BRCP conservation measures could result in significant impacts on water quality in the Plan Area. However, adherence to applicable federal, state, and local regulations, including Butte County's Stormwater Management Program, Stormwater Management and Discharge Control Ordinance, as well as implementation of applicable AMMs and Caltrans BMPs cited in Appendix D would reduce impacts on water quality. Furthermore, it is anticipated that the BRCP would regionally benefit hydrology and water quality because the restored habitat required by the conservation strategy would encourage naturally functioning hydrologic systems that would ultimately reduce large quantities of site runoff, erosion, flooding, and decreased water quality. Therefore, Alternative 2 would not result in an incremental contribution to cumulative impacts, and cumulative impacts would be less than significant.

Alternative 3—Reduced Development/Reduced Fill and Alternative 4—Greater Conservation

The effects on hydrology, water resources, and water quality under Alternatives 3 and 4 would be the same as under Alternative 2. These alternatives would not result in an incremental contribution to cumulative impacts associated with flooding due to the increase in impervious surfaces, altered drainage conditions and rates in the Plan Area, or impacts on water quality due to substantial grading, site preparation, or increase in urbanized development. However, neither Alternative 3 nor Alternative 4 would result in a cumulatively considerable contribution to cumulative impacts on exposure of people and structures to flood risks as a result of levee or dam failure in the Plan Area because, although implementation of the policies and actions in the Local Agencies' general plans would reduce risks associated with levee failure, they would not entirely eliminate risks to people and property.

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