3.9 Energy

This section describes energy resources (energy consumption and hydropower generation) that could be affected by implementation of the proposed program. This section is composed of the following subsections:

- Section 3.9.1, "Environmental Setting," describes the physical conditions in the study area as they apply to energy resources.
- Section 3.9.2, "Regulatory Setting," summarizes federal, State, and regional and local laws and regulations pertinent to evaluation of the proposed program's impacts on energy resources.
- Section 3.9.3, "Analysis Methodology and Thresholds of Significance," describes the methods used to assess the environmental effects of the proposed program and lists the thresholds used to determine the significance of those effects.
- Section 3.9.4, "Environmental Impacts and Mitigation Measures for NTMAs," discusses the environmental effects of near-term management activities (NTMAs) and identifies mitigation measures for significant environmental effects.
- Section 3.9.5, "Environmental Impacts, Mitigation Measures, and Mitigation Strategies for LTMAs," discusses the environmental effects of long-term management activities (LTMAs), identifies mitigation measures for significant environmental effects, and addresses conditions in which any impacts would be too speculative for evaluation (CEQA Guidelines, Section 15145).

NTMAs and LTMAs are described in detail in Section 2.4, "Proposed Management Activities."

For discussions of electrical, oil, and natural gas infrastructure, see Section 3.20, "Utilities and Service Systems."

3.9.1 Environmental Setting

Information Sources Consulted

Sources of information used to prepare this section include the following:

- *2009 Integrated Energy Policy Report* (CEC 2009a)
- Global Energy Observatory: Current List of Hydro Powerplants

- The California Energy Commission's (CEC's) Energy Almanac (CEC 2012)

- Map S-1, "Oil, Gas, and Geothermal Fields in California 2001," produced by the California Department of Conservation, Division of Oil, Gas, and Geothermal Resources (DOC 2001)

Geographic Areas Discussed

Energy resources and uses are discussed separately for the following geographic areas within the study area because of differences in the generation and use of energy resources in the areas and the potential effects of the proposed program on energy resource generation and use:

- Extended systemwide planning area (Extended SPA) divided into the Sacramento and San Joaquin Valley and foothills, and the Sacramento–San Joaquin Delta (Delta) and Suisun Marsh

- Sacramento and San Joaquin Valley watersheds

- SoCal/coastal Central Valley Project/State Water Project (CVP/SWP) service areas

Power plants and pumping facilities important to the generation and consumption of power in California are located in various portions of the study area (large hydroelectric projects account for 11 percent of overall energy generation in the state (CEC 2009a)). Generating capacity, and therefore energy supply, is influenced by water supply, environmental requirements, and flood management policies and regulations. However, none of the management activities included in the proposed program would be implemented in the SoCal/coastal CVP/SWP service areas. In addition, implementation of the proposed program would not result in long-term reductions in water or renewable electricity deliveries to the SoCal/coastal CVP/SWP service areas (see Section 2.6, "No Near- or Long-Term Reduction in Water or Renewable Electricity Deliveries"). Given these conditions, little to no effects on energy are expected in the portion of the SoCal/coastal CVP/SWP service areas located outside of the Sacramento and San Joaquin Valley and foothills and the Sacramento and San Joaquin Valley watersheds.

Extended Systemwide Planning Area

Oil, Natural Gas, and Geothermal Production In 2010, California produced approximately 38.1 percent of the crude oil used in California refineries. The state imported 14.2 percent of the crude oil that it used from Alaska and the remaining 47.6 percent from foreign sources (CEC 2012). The locations of oil refineries, which produce gasoline, diesel fuel, motor

oils, and other lubricants, and the pipelines that deliver crude oil to them are shown in Figure 3.20-3, "Major Oil and Natural Gas Infrastructure Located in the Study Area," in Section 3.20, "Utilities and Service Systems."

California produces approximately 13.5 percent of the natural gas that it uses. The largest amount, approximately 43 percent, of the natural gas used in California is used to generate electricity. Industrial facilities use the next largest portion and the residential sector uses the third largest amount, approximately 22 percent, primarily for space and water heating. Demand for natural gas is met by deliveries from the Southwest (40 percent), Canada (23.5 percent), and the Rocky Mountain states (23 percent) (CEC 2012).

In 2007, geothermal energy in California produced 13,000 gigawatt-hours of electricity. When combined with another 440 gigawatt-hours of imported geothermal electricity, these sources produced 4.5 percent of the state's total system power. A total of 42 operating geothermal power plants with an installed capacity of 1,727 megawatts are in California, about two-thirds of the total geothermal generation of the United States (CEC 2012).

Table 3.9-1 lists the counties in California where oil and natural gas is produced, where only natural gas is produced, and where electricity is generated from geothermal energy.

Table 3.9-1. California Counties with Oil, Natural Gas, or Geothermal Production

Oil and Gas Production	Gas Production Only	Electrical Generation from Geothermal Energy
Alameda	Butte	Imperial
Contra Costa	Colusa	Inyo
Fresno	Glenn	Lake
Kern	Humboldt	Lassen
Kings	Madera	Mono
Los Angeles	Merced	Sonoma
Monterey	Sacramento	
Orange	San Joaquin	
San Benito	Solano	
San Bernardino	Stanislaus	
San Luis Obispo	Sutter	
San Mateo	Tehama	
Santa Barbara	Yolo	
Santa Clara		
Tulare		
Ventura		

Source: DOC 2001

Production of Electricity This section describes hydroelectric facilities and associated pumped-storage use of electric resources in the Extended SPA—federally owned CVP facilities, State-owned SWP facilities, and local and privately owned facilities. The Extended SPA has been extensively developed for large and small hydroelectric facilities associated primarily with numerous dams and reservoirs. The electricity load generated by these facilities is marketed and managed by the Western Area Power Administration (Western), DWR, the California Independent System Operator (CAISO), and a variety of local entities. Power-generating facilities in the Extended SPA are shown in Figure 3.9-1.

Central Valley Project The CVP is a multipurpose project that includes dams, reservoirs, power plants, pumping facilities, and approximately 500 miles of major canals, as well as conduits, tunnels, and related facilities. The purposes of the CVP include navigation improvements, flood control, water supply, and energy development. Western, created in 1977 under the U.S. Department of Energy Organization Act, markets and transmits electric power to 15 western states. Western's Sierra Nevada Customer Service Region markets and transmits power generated from the CVP and the Washoe Project. Western follows a formal procedure for allocating

CVP energy to "preference" customers. These customers have 20-year contracts for their share of CVP energy in excess of the water pumping needs of the U.S. Department of the Interior, Bureau of Reclamation (Reclamation) (Reclamation 2010a). CVP power-generating facilities in the Sacramento and San Joaquin Valley and foothills and the Delta and Suisun Marsh are described below.

State Water Project The SWP is also a multipurpose project, providing water supply, flood control, recreation, hydroelectric power, and fish and wildlife benefits. Major SWP facilities consist of pumping plants, hydroelectric power plants, storage facilities, and approximately 700 miles of canals and pipelines. The primary purpose of SWP power-generating facilities is to meet the substantial energy requirements of the SWP pumping plants. When possible, SWP pumping is scheduled during off-peak periods, and energy generation is scheduled during peak periods. When surplus power is available, DWR sells it to minimize the net cost of pumping energy. DWR participates in the CAISO supplemental energy market and ancillary services markets. In case of system emergencies, DWR can drop pump loads to help CAISO maintain reliable electric power for California (DWR 2010).

Figure 3.9-1. Power-Generating Facilities in the Extended Systemwide Planning Area

Sacramento and San Joaquin Valley and Foothills

CVP Facilities This section describes CVP power plants in the Sacramento and San Joaquin Valley and foothills portion of the Extended SPA from north to south. CVP pumping facilities are not discussed because no CVP-owned pumping facilities are located in this portion of the study area. The capacities of CVP power-generating facilities are listed in Table 3.9-2.

Table 3.9-2. Capacities of CVP Power-Generating Facilities in the Sacramento and San Joaquin Valley and Foothills

Power-Generating Facility	Capacity (MW)
Folsom Powerplant	199
Keswick Powerplant	105
New Melones Powerplant	300
Nimbus Powerplant	13.5
Shasta Powerplant	676
Spring Creek Powerplant	180

Source: Reclamation 2010a
Key:
CVP = Central Valley Project
MW = megawatts

- **Shasta Lake and Vicinity—**The Sacramento River watershed supplies water to the Shasta Division of the CVP, which contains Shasta Dam, Lake, and Powerplant, as well as Keswick Dam, Reservoir, and Powerplant (discussed below). The Shasta Powerplant is located just downstream from Shasta Dam. Water from the dam is released through five 15-foot-diameter penstocks leading to the five main generating units and two station service units . Its power is dedicated primarily to meeting the requirements of CVP facilities. The remaining generated power is marketed to various preference customers in Northern California.

- **Upper Sacramento River (Shasta Dam to Red Bluff)**—CVP power plants located downstream from Shasta Dam but upstream from Red Bluff Diversion Dam are the Spring Creek Powerplant of the Trinity River Division and the Keswick Powerplant of the Shasta Division. The Trinity River Division captures headwaters from the Trinity River basin and transports the water to the Sacramento River basin.

  A portion of Whiskeytown Reservoir releases pass through the Spring Creek Power Conduit and Powerplant into Keswick Reservoir in the Shasta Division. The remainder of the releases from Whiskeytown Reservoir enter Clear Creek. Releases from Keswick Reservoir pass through the Keswick Powerplant to the Sacramento River. The Spring

Creek Powerplant, located at the downstream end of the Spring Creek Tunnel, has two generating units. The Keswick Powerplant is located at Keswick Dam. It has three generating units and is a run-of-the-river plant, acting as Shasta Powerplant's afterbay and allowing uniform flows to the Sacramento River.

- **Lower Sacramento River—**Two other CVP power plants, Folsom and Nimbus, are located in the Sacramento and San Joaquin Valley and foothills. Both power plants belong to the Folsom Unit on the American River.

  Folsom Powerplant is a peaking power plant located at the foot of Folsom Dam on the north side of the American River. Water from the dam is released through three 15-foot-diameter penstocks to three generating units. When the U.S. Army Corps of Engineers (USACE) finished constructing Folsom Dam, the dam was transferred to Reclamation for coordinated operation as an integral part of the CVP. The Folsom Powerplant provides a large degree of local voltage control and is increasingly relied on to support local loads during system disturbances.

  Nimbus Dam forms Lake Natoma, which acts as an afterbay for the Folsom Powerplant. Lake Natoma allows dam operators to coordinate power generation and flows in the lower American River channel during normal reservoir operations. The Nimbus Powerplant has two generating units and is a run-of-the-river plant that provides station service backup for the Folsom Powerplant.

- **South-of-Delta Service Areas—**The CVP south-of-Delta service area includes the New Melones Powerplant, which is in the New Melones Unit of the CVP's East Side Division. Construction of New Melones Dam in 1979 subsequently inundated the original Melones Dam, thereby creating New Melones Reservoir on the Stanislaus River. The New Melones Powerplant, located on the north bank immediately downstream from the dam, is a peaking plant with two generating units.

SWP Facilities The following section describes SWP power-generating and pumping facilities in the Sacramento and San Joaquin Valley and foothills.

The pumping facilities discussed in this geographic area are associated with pump-back storage operations in the SWP, where water is pumped back into reservoirs and used for future power generation. Accordingly, these pumping facilities are discussed with the power plants. SWP power-generating facility capacities are listed in Table 3.9-3.

The SWP hydroelectric power plants in the Sacramento and San Joaquin Valley and foothills are the Edward Hyatt Pumping-Generating Plant, Thermalito Diversion Dam and Powerplant, and Ronald B. Robie Thermalito Pumping-Generating Plant (Oroville Facilities), which have a combined capacity of 762.6 megawatts (MW). These power plants are located downstream of Lake Oroville and generate power through Lake Oroville releases and pump-backs. Lake Oroville, the SWP's largest reservoir, stores winter and spring runoff from the Feather River watershed; water is released from this reservoir to meet instream flow, local irrigation, flood control, and SWP needs. DWR schedules hourly releases through these three facilities to maximize power generation when power demands are highest. Because the downstream water supply does not depend on hourly releases, water released for power in excess of local and downstream requirements can be pumped back into Lake Oroville during off-peak times (DWR 2010). The Oroville Facilities operate under Federal Energy Regulatory Commission (FERC) License P-2100.

Table 3.9-3. Capacities of SWP Power-Generating Facilities in the Sacramento and San Joaquin Valley and Foothills

Power-Generating Facility	Capacity (MW)
Edward Hyatt Pumping-Generating Plant	644.1
Thermalito Diversion Dam and Powerplant	3.4
Ronald B. Robie Thermalito Pumping-Generating Plant	115.1

Source: DWR 2010
Key:
MW = megawatts
SWP = State Water Project

Local and Privately Owned Facilities Table 3.9-4 describes the various local and privately owned power-generating facilities in the Sacramento and San Joaquin Valley and foothills. Many local and privately owned pumping plants in this area require only a minor amount of energy, beyond what they generate and use, to operate; those pumping plants are not included in this discussion.

Table 3.9-4. Local and Privately Owned Power Plants in the Sacramento and San Joaquin Valley and Foothills

Power Plant	Capacity (MW)	Owner(s)
Camanche Powerplant	10.8	East Bay Municipal Utility District
Deadwood Creek Powerhouse	1.95	Yuba County Water Agency
Don Pedro Powerplant	170.8	Modesto Irrigation District and Turlock Irrigation District
Exchequer Powerplant	94	Merced Irrigation District

Table 3.9-4. Local and Privately Owned Power Plants in the Sacramento and San Joaquin Valley and Foothills (contd.)

Power Plant	Capacity (MW)	Owner(s)
Forbestown Powerplant	29	Oroville-Wyandotte Irrigation District
Friant-Kern Powerhouse	18.4	Friant Power Authority
Kelly Ridge Powerhouse	10	Oroville-Wyandotte Irrigation District
Madera Powerhouse	9.8	Friant Power Authority
McSwain Powerplant	9	Merced Irrigation District
Narrows I Powerplant	10.2	PG&E
Narrows II Powerplant	46.7	Yuba County Water Agency
New Colgate Powerhouse	315	Yuba County Water Agency
Newcastle Powerplant	12.7	PG&E
New Hogan Powerplant	3	Calaveras County Water District
Orange Cove Powerhouse	1.8	Orange Cove Irrigation District
Pardee Powerplant	23.6	East Bay Municipal Utility District
Pine Flat Powerplant	165	Kings River Conservation District
Poe Powerhouse	142.8	PG&E
River Outlet Powerhouse	2.4	Friant Power Authority

Source: Global Energy Observatory 2010 and Reclamation 2010b
Key:
MW = megawatts
PG&E = Pacific Gas and Electric Company

Delta and Suisun Marsh

CVP Facilities CVP pumping facilities in the Delta and Suisun Marsh are described in this section. CVP power plants are not discussed because no CVP-owned power plants are located in this portion of the study area.

The pumping plants in the Delta and Suisun Marsh used by the CVP to move water to CVP service areas in the Central Valley and elsewhere are the C. W. "Bill" Jones Pumping Plant (formerly known as the Tracy Pumping Plant) and the Harvey O. Banks Pumping Plant. Reclamation constructed and operates the C. W. "Bill" Jones Pumping Plant. The Harvey O. Banks Pumping Plant is an SWP facility; however, Reclamation has certain rights to the SWP's pumping capacity through use of the Joint Point of Diversion, described in State Water Resources Control Board Water Right Decision 1641.

The C. W. "Bill" Jones Pumping Plant is a component of the CVP's Delta Division. Construction of the plant started in 1947 and was completed in 1951. The facility includes an inlet channel, a pumping plant, and discharge pipes, and supplies water to the Delta-Mendota Canal. Each of the six pumps at the plant is powered by a 22,500-horsepower (hp) motor and is

capable of pumping 767 cubic feet per second (cfs). The intake canal includes the Tracy Fish Screen, which was built to intercept migrant fish downstream so they can be returned to the main channel.

SWP Facilities SWP facilities in the Delta and Suisun Marsh are described in this section. SWP power plants are not discussed because no SWP-owned power plants are located in this portion of the study area.

The Harvey O. Banks Pumping Plant is located 2.5 miles southwest of the Clifton Court Forebay adjacent to the California Aqueduct. This pumping plant is the first to direct water into the California Aqueduct system at its origination in the Delta. It provides the head necessary for water in the California Aqueduct to flow for approximately 80 miles south into Bethany Reservoir, where the South Bay Aqueduct begins. The design head is 244 feet, and its installed capacity is 10,670 cfs with a total motor rating of 333,000 hp (DWR 2010).

The Barker Slough Pumping Plant is a SWP facility in the North Delta. Sacramento River water is conveyed through Cache, Lindsey, and Barker sloughs. The plant pumps water into the North Bay Aqueduct, a 27-mile underground pipeline that conveys water supply to the Napa Turnout Reservoir. Barker Slough Pumping Plant provides water to Solano County Water Agency (SCWA) and the Napa County Flood Control and Water Conservation District (Napa County FC&WCD).

General Energy Use A substantial amount of energy is used in the Extended SPA not only for water conveyance–related purposes but for municipal, agricultural, industrial, and transportation-related purposes. In particular, the use of gas and coal is important as a generator of greenhouse gas (GHG) emissions. See Section 3.7, "Climate Change and Greenhouse Gas Emissions," for more detailed discussions of the environmental setting associated with GHG emissions.

Sacramento and San Joaquin Valley Watersheds

This section describes energy resources and uses in the Sacramento and San Joaquin Valley watersheds outside the Extended SPA.

CVP- and SWP-Owned Power Plants and Pumping Facilities This section describes CVP/SWP facilities in the Sacramento and San Joaquin Valley watersheds outside the Extended SPA.

CVP/SWP Power Plants The power plants outside the Extended SPA but within the Sacramento and San Joaquin Valley watersheds are the Judge Francis Carr Powerplant, O'Neill Pumping-Generating Plant, and William R. Gianelli Pumping-Generating Plant.

The Judge Francis Carr Powerplant, a peaking plant at the outlet of Clear Creek Tunnel, is located west of the upper Extended SPA in the Sacramento River watershed. It has two power-generating units and a maximum capacity of 150 MW (after tunnel restriction limits).

The southwest portion of the San Joaquin River watershed includes the San Luis Unit. Reclamation and the State of California constructed and operate this unit jointly. Forty-five percent of the total cost was funded by the federal government, and the remaining 55 percent was funded by the State of California. The joint-use facilities in the unit are O'Neill Dam and Forebay, B. F. Sisk San Luis Dam, San Luis Reservoir, William R. Gianelli Pumping-Generating Plant, Dos Amigos Pumping Plant, Los Banos and Little Panoche reservoirs, and the San Luis Canal from O'Neill Forebay to Kettleman City, together with the necessary switchyard facilities. The federal-only portion of the San Luis Unit includes the O'Neill Pumping-Generating Plant (currently maintained by the Delta-Mendota Water Authority) and Intake Canal, Coalinga Canal, and San Luis Drain.

San Luis Reservoir serves as the key storage reservoir, and O'Neill Forebay acts as an equalizing basin for the upper stage dual-purpose pumping-generating plant. The O'Neill Pumping-Generating Plant takes water from the Delta-Mendota Canal and discharges it into O'Neill Forebay. The William R. Gianelli Pumping-Generating Plant lifts water from O'Neill Forebay and discharges it into San Luis Reservoir. During releases from the reservoir, these plants generate electricity by reversing flow through the turbines. Water for irrigation is released into the San Luis Canal and flows by gravity to Dos Amigos Pumping Plant, where the water is lifted more than 100 feet to permit gravity flow to the canal's terminus at Kettleman City. The SWP's aqueduct system continues to southern coastal and inland areas to supply municipal, industrial, and agricultural uses.

The O'Neill Pumping-Generating Plant consists of an intake channel, leading off the Delta-Mendota Canal, and six pumping-generating units. Normally, these units operate as pumps to lift water 45–53 feet into O'Neill Forebay. Each unit can discharge 700 cfs and has a rating of 6,000 hp. These units are also operated as generators, occasionally releasing water from the forebay into the Delta-Mendota Canal, with a combined capacity of 25.2 MW.

CVP/SWP Pumping Facilities Important CVP and SWP pumping plants outside the Extended SPA but in the Sacramento and San Joaquin Valley watersheds include the William R. Gianelli Pumping-Generating Plant (SWP), Dos Amigos Pumping Plant (CVP/SWP), Ira J. Chrisman Pumping Plant (SWP), and A. D. Edmonston Pumping Plant (SWP).

Local and Privately Owned Power-Generating Facilities Local and privately owned power plants outside the Extended SPA, but in the Sacramento and San Joaquin Valley watersheds include facilities owned by PG&E, Sacramento Municipal Utility District, water agencies, irrigation districts and others. The capacity of these power-generating facilities ranges from less than 1 MW to more than 120 MW.

General Energy Use Energy use in the Sacramento and San Joaquin Valley watersheds but outside the Extended SPA is generally related to residential, agricultural, and transportation uses, including natural gas and crude oil energy sources. This geographic area is not a high consumer of energy compared with other regions of the state and is not a major contributor to GHG emissions. See Section 3.7, "Climate Change and Greenhouse Gas Emissions," for more detailed discussions of the environmental setting related to GHG emissions.

SoCal/Coastal CVP/SWP Service Areas

This section describes energy resources in the SoCal/coastal CVP/SWP service areas but outside the Extended SPA and Sacramento and San Joaquin Valley watersheds. As stated previously, because the proposed program is expected to have little to no effect on energy within the SoCal/coastal CVP/SWP service areas, these resources are not discussed in detail. CVP/SWP pumping plants in the service areas are not discussed here as not changes in pumping are anticipated as a result of an NTMA or LTMA.

CVP/SWP–Owned Power Plants and Pumping Facilities CVP and SWP power plants and pumping facilities in the SoCal/coastal CVP/SWP service areas consist of the Alamo Powerplant (SWP); Mojave Siphon Powerplant (SWP); Devil Canyon Powerplant (SWP); William E. Warne Powerplant (SWP); and the Pleasant Valley Pumping Plant (CVP, operated by Westlands Water District), which does not generate energy. The Alamo Powerplant uses the 133-foot head between the Tehachapi Afterbay and Pool 43 of the California Aqueduct to generate electricity. The Mojave Siphon Powerplant generates electricity with water flowing downhill after its 540-foot lift by the Pearblossom Pumping Plant. The Devil Canyon Powerplant generates electricity by using water from Silverwood Lake with more than 1,300 feet of head, the largest head in the SWP system. The William E. Warne Powerplant uses the 725-foot drop from the Peace Valley Pipeline to generate electricity with its Pelton wheel turbines. The Pleasant Valley Pumping Plant lifts 1,135 cfs of water into the Coalinga Canal and 50 cfs to a distribution lateral serving adjacent lands north of the plant (Reclamation 2010a). The Southern California SWP energy-generating facilities operate under FERC License P-2426, which expires in 2022. CVP- and SWP-owned power-generating facilities include the

Alamo, Devil Canyon, Mojave Siphon, and William E. Warne power plants. The capacity of these power-generating facilities range from 17 MW to 276 MW.

General Energy Use The SoCal/coastal CVP/SWP service areas are geographic areas of high energy use for municipal, agricultural, industrial, and transportation purposes and are a major source of GHG emissions. See Section 3.7, "Climate Change and Greenhouse Gas Emissions," for more detailed discussions of the environmental setting related to GHG emissions.

3.9.2 Regulatory Setting

The following text summarizes federal, State, and regional and local laws and regulations pertinent to evaluation of the proposed program's impacts on energy resources.

Federal

Federal Energy Regulatory Commission FERC regulates the transmission of oil, natural gas, and electricity in interstate commerce. It licenses and inspects both State and local hydroelectric projects and oversees environmental, engineering, recreation, and safety matters related to hydroelectricity, electrical transmission, and large-scale electricity policy initiatives. Energy markets are monitored and investigated by FERC to ensure the reliability of interstate transmission systems (FERC 2009).

FERC Order Nos. 888 and 889 The energy market in California is regulated by FERC Orders No. 888 and 889.

Order No. 888, issued in 1996, requires public utilities that own, control, or operate facilities used for the transmission of electricity in interstate commerce to offer open-access, nondiscriminatory transmission tariffs with minimum terms and conditions of service. It also allows public and transmitting utilities to seek out the recovery of justifiable stranded costs associated with providing open-access transmission services (FERC 2010).

Order No. 889, issued in 1997, requires public utilities that own, control, or operate facilities used for the transmission of electricity in interstate commerce to participate in an Open Access Same-Time Information System. This participation is intended to provide open-access transmission customers and potential open-access transmission customers with information regarding available transmission capacity, prices, and other information on open-access, nondiscriminatory transmission service (FERC 2010).

Federal Power Act The Federal Power Act (16 U.S. Code 4(e)) grants FERC the authority to issue licenses for hydropower projects that fall into any of the following categories:

- Located on navigable waters
- Located on nonnavigable waters that are under the jurisdiction of the U.S. Congress under the Commerce Clause, were constructed after 1935, and affect the interests of interstate or foreign commerce
- Located on public lands or reservations of the United States
- Using surplus water or water power from a federal dam

This authority applies regardless of the project size.

There are 19 hydropower projects in California pending relicense by FERC (FERC 2011). Relicensing efforts are typically subject to increased environmental protection and project enhancement costs necessary for the relicensing, which can increase the costs of power generation. Consequently, many relicensed projects experience decreased generation and operating flexibility. For these reasons, future relicensing efforts could potentially change the number of operating hydroelectric facilities.

Central Valley Project Improvement Act Energy operations in the CVP service areas are subject to Central Valley Project Improvement Act regulations. See Subsection 3.5.2, "Regulatory Setting," in Section 3.5, "Biological Resources—Aquatic."

State

Warren-Alquist Energy Resources Conservation and Delivery Act
The Warren-Alquist Energy Resources Conservation and Delivery Act, passed in 1974, created the California Energy Commission and granted CEC statutory authority over thermal power plants (CEC 2009b).

California Energy Commission CEC was created by the California Legislature in 1974 and is the State's primary energy policy and planning agency. CEC promotes energy efficiency, forecasts future energy needs, licenses thermal power plants (50 MW or larger), supports renewable energy and public-interest energy research, and plans and directs the State's responses to energy emergencies. CEC also regulates the State's thermal energy operations and provides funds for developing and implementing alternative and renewable fuels to reduce California's dependence on petroleum and decrease GHG emissions (CEC 2012).

California Independent System Operator The CAISO was established in 1998 as a not-for-profit public-benefit corporation to act as an independent electrical transmission link between power plants and utilities that provide electricity to customers. By providing nondiscriminatory open access to the grid, it ensures equally accessible power lines and competitive power markets. CAISO also acts as a clearinghouse for close to 30,000 daily market energy transactions and is the custodian of power lines connecting California to neighboring states, Canada, and Mexico. CAISO also manages power-line bottlenecks to prevent overload that could lead to service interruptions (CAISO 2007).

California Public Utilities Commission The California Public Utilities Commission (CPUC) regulates privately owned electric, natural gas, telecommunications, water, railroad, rail transit, and passenger transportation companies, including Pacific Gas and Electric Company (PG&E), Southern California Edison, San Diego Gas and Electric Company, and Southern California Gas Company. CPUC is charged with ensuring that utility service is safe, reliable, and reasonably priced; protecting against fraud; and promoting California's economic health (CPUC 2010).

3.9.3 Analysis Methodology and Thresholds of Significance

This section provides a program-level evaluation of the direct and indirect effects on energy resources (energy consumption and hydropower generation) of implementing management actions included in the proposed program. These proposed management actions are expressed as NTMAs and LTMAs. The methods used to assess how different categories of NTMAs and LTMAs could affect energy resources are summarized in "Analysis Methodology"; thresholds for evaluating the significance of potential impacts are listed in "Thresholds of Significance." Potential effects related to each significance threshold are discussed in Section 3.9.4, "Environmental Impacts and Mitigation Measures for NTMAs," and Section 3.9.5, "Environmental Impacts, Mitigation Measures, and Mitigation Strategies for LTMAs."

Analysis Methodology

Impact evaluations were based on a review of the management actions proposed under the CVFPP, expressed as NTMAs and LTMAs in this PEIR, to determine whether these actions could potentially result in impacts on energy resources. NTMAs and LTMAs are described in more detail in Section 2.4, "Proposed Management Activities." The overall approach to analyzing the impacts of NTMAs and LTMAs and providing mitigation is summarized below and described in detail in Section 3.1,

"Approach to Environmental Analysis." NTMAs can consist of any of the following types of activities:

- Improvement, remediation, repair, reconstruction, and operations and maintenance of existing facilities
- Construction, operation, and maintenance of small setback levees
- Purchase of easements and/or other interests in land
- Operational criteria changes to existing reservoirs that stay within existing storage allocations
- Implementation of the vegetation management strategy included in the CVFPP
- Initiation of conservation elements included in the proposed program
- Implementation of various changes to DWR and Statewide policies that could result in alteration of the physical environment

All other types of CVFPP activities fall within the LTMA category. NTMAs are evaluated using a typical "impact/mitigation" approach. Where impact descriptions and mitigation measures identified for NTMAs also apply to LTMAs, they are also attributed to LTMAs, with modifications or expansions as needed.

Implementation of the proposed program could result in construction-related, operational, and maintenance-related impacts on energy resources (energy consumption and hydropower generation), as evaluated below. However, the proposed program would not affect the production of crude oil, natural gas, or geothermal energy. The geographic extent of proven oil, natural gas, and geothermal fields is quite large, with substantial flexibility in the locations where these resources can be accessed. The presence of new or modified flood protection facilities included in the NTMAs and LTMAs would affect only a small portion of the full geographic extent of proven oil, natural gas, and geothermal fields. They would not preclude ongoing and future exploration and extraction of oil and natural gas resources or the development of future geothermal facilities. Therefore, access to oil, natural gas, and geothermal energy resources is not evaluated further in this section.

The potential for the proposed program to induce development, and therefore increased energy use, by removing flood protection as an

impediment to growth is addressed in Section 6.1, "Growth-Inducing Impacts."

Thresholds of Significance

Appendix F (Energy Conservation) and Appendix G (Environmental Checklist Form) of the CEQA Guidelines do not list potential thresholds of significance for an evaluation of energy-related impacts. For the purposes of this analysis, the following applicable thresholds of significance have been used to determine whether implementing the proposed program would result in a significant impact. An impact related to energy resources is considered significant if implementation of the proposed program would do any of the following when compared against existing conditions:

- Cause a substantially inefficient, wasteful, or unnecessary long-term consumption of energy
- Cause a substantial reduction in the generation of renewable energy

Energy impact evaluations also consider the following requirements and effects associated with the proposed program:

- Energy requirements and energy-use efficiencies for all project stages and activities including construction, operation, maintenance, and/or removal
- Ability to comply with existing energy standards
- Effects on hydroelectric generation
- Projected transportation energy use requirements and overall use of efficient transportation alternatives

3.9.4 Environmental Impacts and Mitigation Measures for NTMAs

This section describes the physical effects of NTMAs on energy resources. For each impact discussion, the environmental effect is determined to be either less than significant, significant, potentially significant, or beneficial compared to existing conditions and relative to the thresholds of significance described above. These significance categories are described in more detail in Section 3.1, "Approach to Environmental Analysis."

Impact ENRG-1 (NTMA): ***Inefficient, Wasteful, or Unnecessary Consumption of Energy during Construction-Related Activities***

Modifying and constructing facilities as proposed under NTMAs would require the direct and indirect use of energy resources. Direct energy use would involve using petroleum products and electricity to operate construction equipment, such as trucks and power tools. Indirect energy use would involve consuming energy to extract raw materials, manufacture items, and transport the goods necessary for construction, operations, and maintenance activities. These activities would cause irreversible and irretrievable commitments of nonrenewable energy resources, such as gasoline and diesel fuel.

Depending on the NTMA, various types of fuel-consuming equipment would be necessary for actions such as excavating, grading, demolishing structures, transporting materials, and transporting construction workers to and from the activity sites. The extent to which these activities would increase energy consumption would be limited because the work would be temporary. No substantial long-term energy use would be required for any of the NTMAs. Also, it is not anticipated that such energy use would be inefficient, wasteful, or unnecessary. Therefore, this impact would be **less than significant**. No mitigation is required.

Impact ENRG-2 (NTMA): ***Inefficient, Wasteful, or Unnecessary Consumption of Energy during Operational and Maintenance-Related Activities***

Operating and maintaining facilities as proposed under NTMAs would require the direct and indirect use of energy resources. Direct energy use would involve using petroleum products and electricity to operate equipment, such as trucks and power tools. Indirect energy use would involve consuming energy to extract raw materials, manufacture items, and transport the goods necessary for operations and maintenance activities. These activities would cause irreversible and irretrievable commitments of nonrenewable energy resources, such as gasoline and diesel fuel.

Depending on the NTMA, various types of fuel-consuming equipment would be necessary for operations and maintenance actions. For some repairs to existing levees (e.g., slurry cutoff walls, slope repairs), maintenance energy usage would continue at the current rate because the existing maintenance regime would continue. For seepage berms and setback levees, there would likely be some new area needing maintenance; however, the expanded area would be relatively minor, and the energy usage would be temporary and intermittent. Also, it is not anticipated that such energy use would be inefficient, wasteful, or unnecessary. The flood control facilities do not use energy on an ongoing basis. Therefore, this impact would be **less than significant**. No mitigation is required.

Impact ENRG-3 (NTMA): ***Reduced Generation of Renewable Energy as a Result of Altered Flow Releases at Hydropower Facilities Caused by Changes in Reservoir Operations***

The proposed program includes forecast-based operations at existing reservoirs. Under forecast-based operations, water may be released from reservoirs in anticipation of higher than normal precipitation, to provide additional room for flood storage. When drier conditions are anticipated, more water may be retained to enhance water supply. In most years, this is anticipated to be beneficial because improving reservoir operations could actually increase the availability of water supply while also improving flood protection and having either no adverse effect or a beneficial effect on hydropower generation. See Section 2.6, "No Near- or Long-Term Reduction in Water or Renewable Electricity Deliveries."

Implementation of the proposed program would not cause a substantial reduction in the generation of renewable energy. Therefore, this impact would be **less than significant**. No mitigation is required.

3.9.5 Environmental Impacts, Mitigation Measures, and Mitigation Strategies for LTMAs

This section describes the physical effects of LTMAs on energy resources. LTMAs include a continuation of activities described as part of NTMAs and all other actions included in the proposed program, and consist of all of the following types of activities:

- Widening floodways (through setback levees and/or purchase of easements)
- Constructing weirs and bypasses
- Constructing new levees
- Changing operation of existing reservoirs
- Achieving protection of urban areas from a flood event with 0.5 percent risk of occurrence
- Changing policies, guidance, standards, and institutional structures
- Implementing additional and ongoing conservation elements

Actions included in LTMAs are described in more detail in Section 2.4, "Proposed Management Activities."

Impacts identified above for NTMAs would also be applicable to many LTMAs and are identified below. The NTMA impact discussions are modified or expanded where appropriate, or new impacts are included if needed, to address conditions unique to LTMAs.

LTMA Impacts

Impact ENRG-1 (LTMA): ***Inefficient, Wasteful, or Unnecessary Consumption of Energy during Construction-Related Activities***

This impact would be similar to Impact ENRG-1 (NTMA) because many construction activities for NTMAs would also be required for LTMAs. Construction activities for LTMAs that are not included in NTMAs would use similar fuel-consuming vehicles and electricity-consuming tools. This impact would be **less than significant**. No mitigation is required.

Impact ENRG-2 (LTMA): ***Inefficient, Wasteful, or Unnecessary Consumption of Energy during Operational and Maintenance-Related Activities***

This impact would be similar to Impact ENRG-2 (NTMA) because many operations and maintenance activities for NTMAs would also be required for LTMAs. Operational and maintenance-related activities for LTMAs that are not included in NTMAs would use similar fuel-consuming vehicles and electricity-consuming tools. This impact would be **less than significant**. No mitigation is required.

Impact ENRG-3 (LTMA): ***Reduced Generation of Renewable Energy as a Result of Altered Flow Releases at Hydropower Facilities Caused by Changes in Reservoir Operations***

This impact would be similar to Impact ENRG-3 (NTMA) because the plans for altering flood flow releases at hydroelectric power facilities included in NTMAs would also be included in LTMAs. This impact would be **less than significant.** No mitigation is required.

LTMA Impact Discussions and Mitigation Strategies

The impacts of the proposed program's NTMAs and LTMAs related to energy are thoroughly described and evaluated above. The general narrative descriptions of additional LTMA impacts and mitigation strategies for those impacts that are included in other sections of this draft PEIR are not required for energy resources.

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