COVER SHEET

FEDERAL ENERGY REGULATORY COMMISSION

DRAFT ENVIRONMENTAL IMPACT STATEMENT
FOR THE BIG CREEK ALP PROJECTS
Docket Nos. P-67, 2175, 2085, and 120

Section 2
Proposed Action and Alternatives
Pages 2-1 to 2-36
DEIS

2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 NO-ACTION ALTERNATIVE

Under the no-action alternative, the Big Creek ALP Projects would continue to operate under the terms and conditions of the existing licenses, and no new environmental protection, mitigation, or enhancement measures would be implemented. We use this alternative to establish baseline environmental conditions for comparison with other alternatives.

2.1.1 Existing Project Facilities

The Big Creek ALP Projects considered in this draft EIS are part of the Big Creek System. The Big Creek System is an integrated operation of nine major powerhouses, six major reservoirs, numerous small diversions, various conveyance facilities, access roads, electrical transmission lines, and appurtenant facilities. The Big Creek System is authorized under seven Commission licenses with coordinated operations to maximize the value of hydropower produced from the available water supply. Table 2-1 shows the average annual generation and dependable capacity of each project. The average annual generation shown in table 2-1 is based on the period from 1991 to 2005. SCE defines dependable operating capacity as "…the capacity that may be available for system use from the individual resources listed under favorable conditions. Where common facilities are shared between units, capacity ratings should be based on the Company's operating experience and exclude capacity associated with auxiliary, house, and fishwater turbine-generators, and emergency engine-generators." SCE's approach to defining dependable capacity is different from that used by the Commission. The Commission defines dependable capacity based on adverse hydrological conditions.

Figure 2-1 presents the locations of the various facilities schematically and table 2-2 describes the project reservoirs. Then, in the following section, we provide detailed descriptions for each of the Big Creek ALP Projects. At the end of the section we describe the existing boundaries for the projects.

Table 2-1. Big Creek ALP System hydroelectric projects.

Project Name (FERC Project No.)	License Expiration Date	Installed Capacity (MW)	Dependable Operating Capacity (MW)	Average Annual Generation (MWh)
Vermilion Valley (No. 2086)	August 31, 2003 (operating under annual license)	0	0	0
Portal (No. 2174)	March 31, 2005 (operating under annual license)	11	10.5	47,400
Mammoth Pool (No. 2085)	November 30, 2007	151	187.0	603,700
Big Creek No. 3 (No. 120)	February 28, 2009	174	181.9	824,080
Big Creek Nos. 1 and 2 (No. 2175)	February 28, 2009	155	150.0	765,480
Big Creek Nos. 2A, 8, and Eastwood (No. 67)	February 28, 2009	385	370.0	1,173,300

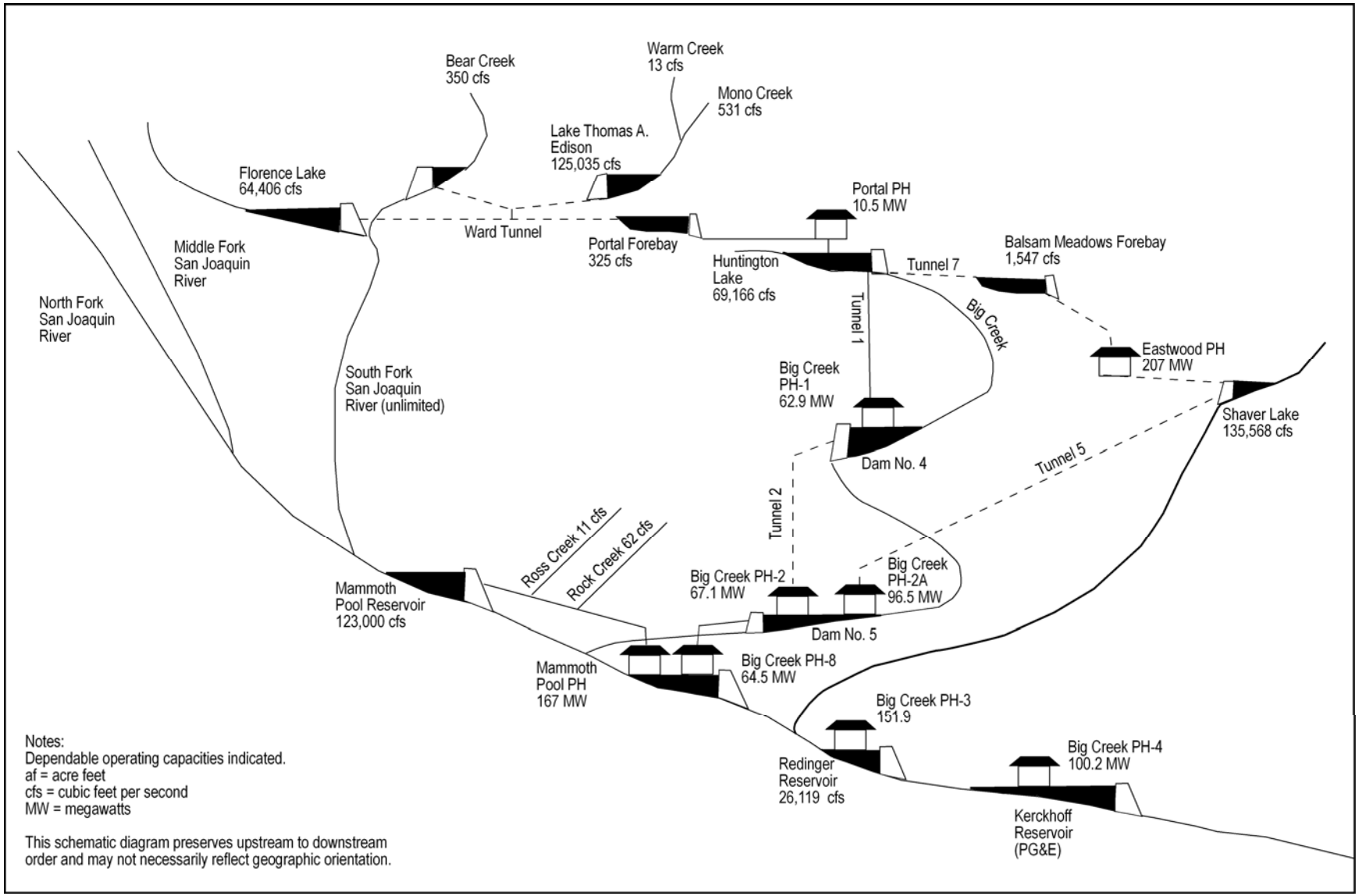

Figure 2-1. Existing facilities in the Big Creek System.

Table 2-2. Reservoir characteristics of the Big Creek ALP Projects.

Reservoir	Project No. (Development)	Maximum Pool Elevation (feet, msl)	Useable Storage at Maximum Pool (acre-feet)	Surface Area at Maximum Pool (acres)
Crater Creek diversion[a]	Project No. 67 (Big Creek 2A)	8,764.6	<1	<1
Tombstone Creek diversion[a]	Project No. 67 (Big Creek 2A)	7,673	<1	<1
Hooper Creek diversion	Project No. 67 (Big Creek 2A)	7,505	<1	<1
North Slide Creek diversion[a]	Project No. 67 (Big Creek 2A)	7,501.5	<1	<1
South Slide Creek diversion[a]	Project No. 67 (Big Creek 2A)	7,501.5	<1	<1
Florence Lake	Project No. 67 (Big Creek 2A)	7,327.5	84,406	962
Chinquapin Creek diversion	Project No. 67 (Big Creek 2A)	7,628	<1	<1
Mono Creek diversion	Project No. 67 (Big Creek 2A)	7,350	47	6.7
Bear Creek diversion	Project No. 67 (Big Creek 2A)	7,350	103	13.25
Camp 62 Creek diversion	Project No. 67 (Big Creek 2A)	7,257	<1	<1

Reservoir	Project No. (Development)	Maximum Pool Elevation (feet, msl)	Useable Storage at Maximum Pool (acre-feet)	Surface Area at Maximum Pool (acres)
Bolsillo Creek diversion	Project No. 67 (Big Creek 2A)	7,532.5	<1	<1
Pitman Creek diversion	Project No. 67 (Big Creek 2A)	6,998	<1	<1
Balsam Meadows	Project No. 67 (Eastwood)	6,670	1,570	60
Shaver Lake	Project No. 67 (Eastwood)	5,370	135,568	2,184
Dam 5	Project No. 67 (Big Creek 8)	2,943	47	3.3
Huntington Lake	Project No. 2175 (Big Creek 1)	6,950	89,166	1,435
Pitman Creek domestic diversion[b]	Project No. 2175 (Big Creek 1)	Approx. 5,210	<1	<1
Snow Slide Creek domestic diversion[b]	Project No. 2175 (Big Creek 1)	Approx. 5,210	<1	<1
Balsam Creek diversion	Project No. 2175 (Big Creek 2)	4,880	<1	<1
Ely Creek diversion	Project No. 2175 (Big Creek 2)	4,844	<1	<1
Adit 8 diversion	Project No. 2175 (Big Creek 2)	4,825	<1	<1

Reservoir	Project No. (Development)	Maximum Pool Elevation (feet, msl)	Useable Storage at Maximum Pool (acre-feet)	Surface Area at Maximum Pool (acres)
Big Creek Dam 4	Project No. 2175 (Big Creek 2)	4,810	56	<1
Mammoth Pool dam	Project No. 2085 (Mammoth)	3,330	119,940	1,435
Rock Creek diversion	Project No. 2085 (Mammoth)	3,336	<1	<1
Ross Creek diversion	Project No. 2085 (Mammoth)	3,359	<1	<1
Powerhouse 3 forebay	Project No. 120 (Big Creek 3)	2,230	993	23.2

[a] SCE proposes to decommission this diversion as part of this proceeding.

[b] This diversion formerly provided domestic water for the community of Big Creek, but it has not been used in 30 years. SCE proposes to decommission this diversion as part of this proceeding.

2.1.1.1 Big Creek Nos. 2A, 8, and Eastwood Hydroelectric Power Project

The Big Creek No. 2A development was constructed between 1920 and 1928, with additional features added between 1944 and 1948. The two units (Units 1 and 2) were placed into service in 1928. The Big Creek No. 8 development was constructed between 1921 and 1929, and the two units (Units 1 and 2) were placed into service in 1921 and 1929, respectively. The Eastwood development was constructed between 1983 and 1987, and the unit was placed into service in 1987. The project is located within the South Fork San Joaquin River, Big Creek, and Stevenson Creek watersheds which flow into the San Joaquin River. The project's reservoirs and diversions are capable of impounding approximately 201,700 acre-feet of water. There are no transmission lines associated with the Big Creek No. 2A and Big Creek No. 8 developments, but there is one 4.7-mile-long, 230 kilovolt (kV) transmission line associated with the Eastwood development. The project features are located on 2,168 acres within the Sierra National Forest (this includes recent mapping corrections). See table 2-2 for reservoir characteristics.

Big Creek No. 2A

The Big Creek No. 2A development consists of two dams, 11 smaller diversion dams, several water conveyances, and a powerhouse. Relevant information about each feature is presented below.

Reservoirs

- Florence Lake dam, a concrete gravity structure that is 3,156 feet long and 149 feet high
- Shaver Lake dam, a concrete gravity structure that is 1,760 feet long and 185 feet high

Diversions

- Tombstone Creek diversion dam, a concrete gravity structure that is 26 feet long and 5 feet high
- Crater Creek diversion dam, a concrete gravity structure that is 21 feet long and 3 feet high
- North Slide Creek diversion dam, a concrete gravity structure that is 19 feet long and 5 feet high
- South Slide Creek diversion dam, a concrete gravity structure that is 22 feet long and 5 feet high
- Hooper Creek diversion dam, a concrete gravity structure that is 158 feet long and 30 feet high
- Chinquapin Creek diversion dam, a concrete gravity structure that is 32 feet long and 8 feet high
- Camp 62 Creek diversion dam, a concrete gravity structure that is 45 feet long and 7 feet high
- Bear Creek diversion dam, a concrete gravity structure that is 293 feet long and 55 feet high
- Mono Creek diversion dam, a concrete gravity structure that is 156 feet long and 64 feet high
- Bolsillo Creek diversion dam, a concrete gravity structure that is 54 feet long and 6 feet high
- Pitman Creek diversion dam, a concrete gravity structure that is 68 feet long and 8 feet high

Conveyances

- Ward Tunnel, a 67,619-foot-long, 15-foot by 15-foot horseshoe-shaped unlined tunnel from Florence Lake to the penstock for the Portal

powerhouse (the Portal Project [FERC No. 2174] is not included in the Big Creek ALP Projects)

- Mono-Bear Conduit (a.k.a. Mono-Bear Siphon), a conveyance that consists of: (a) a 7,596-foot-long unlined tunnel from the Bear Creek diversion dam, (b) a 4,538-foot long flowline from the Mono Creek diversion dam that connects to a 3,933-foot unlined tunnel; and (c) a 13,806-foot-long steel pipe that carries the water from the two tunnels to the Ward Tunnel via a construction adit
- Tunnel 7 (a.k.a. Huntington-Pitman Siphon), which conveys water from Huntington Lake to the Balsam Diversion Tunnel and then to Shaver Lake through the Eastwood powerhouse, and consists of four sections: (a) a 680-foot-long, 21-foot diameter steel pipe; (b) a 2,642-foot-long, 14-foot by 14-foot horseshoe-shaped tunnel; (c) a 2,425-foot-long, steel pipe that varies from 120 inches to 96 inches and back to 120 inches in diameter; and (d) a 22,843-foot-long, 14-foot by 14-foot horseshoe-shaped tunnel through granite
- Tunnel 5, a 13,900-foot-long, 11-foot by 11-foot unlined tunnel conveyance from Shaver Lake to the Powerhouse 2A penstock
- A 6,218-foot-long single steel pipe penstock that ranges from 66- to 108-inches in diameter and then branches into two 48-inch lines outside of the powerhouse

Construction Adits

- Adit 1 and 2 connected to Tunnel 5

Powerhouse

- A powerhouse containing two generating units

Big Creek No. 8

The Big Creek No. 8 development consists of a dam, conveyance, penstocks, and a powerhouse. Relevant information about each feature is listed below.

- Big Creek dam 5, a concrete arch dam that is 224 feet long and 60 feet high and includes 19 ungated spillway bays with flashboards
- A conveyance from Big Creek dam 5 to Powerhouse 8 that consists of: (a) Tunnel 8, which is 5,570 feet long and 20-feet by 20-feet in cross section, and b) a 35-foot-diameter, 90-foot-high steel surge tank
- Two steel pipe penstocks, one 2,668 feet long and 96 to 72 inches in diameter and one 2,698 feet long and 120 to 84 inches in diameter
- A powerhouse containing two generating units

Eastwood Power Station

The Eastwood development consists of a dam, spillway, two water conveyances, a surge chamber, powerhouse, tailrace tunnel, and a transmission line. Relevant information about each feature is presented below.

- Balsam Meadows forebay dam, a compacted rockfill dam that is 1,325 feet long and 123 feet high
- A spillway with a concrete weir that is 280 feet
- Balsam forebay tunnel, a 5,866-foot-long, 16-foot by 16-foot horseshoe-shaped tunnel that intersects Tunnel 7 (the Huntington-Pitman-Shaver Conduit that is part of the Big Creek No. 2A development)
- A conveyance from the Balsam Meadows forebay to the Eastwood powerhouse consisting of three sections: (a) a 2,832-foot-long, 18-foot by 18-foot horseshoe-shaped upper tunnel; (b) a vertical shaft that is a 1,043-foot-long vertical bore connecting the upper and lower tunnels; and (c) a 1,328-foot-long, 12-foot-diameter lower steel-lined tunnel connected to the turbine shutoff valve
- An underground surge chamber consisting of a 30-foot diameter, 275-foot high vertical shaft connected to the conveyance tunnel by a 33-foot-long, 15-foot diameter shaft
- A powerhouse containing one pump/generating unit
- A tailrace tunnel that conveys water from the draft tube to Shaver Lake (and vice-versa during pumping operations), and consists of three sections: (a) a 35-foot-long draft tube transition; (b) a 440-foot-long, 15-foot diameter concrete-lined section; and (c) a 7,068-foot-long, 18-foot by 18-foot horseshoe-shaped section
- A 4.7-mile-long, 230 kV transmission line extending from the project switchyard at the surface to the Big Creek No. 1 switchyard

2.1.1.2 Big Creek Nos. 1 and 2 Hydroelectric Power Project

The Big Creek Nos. 1 and 2 Project was constructed between 1912 and 1917 and was placed into service between 1913 and 1925. The project's two developments are located in Fresno County, California, along Big Creek, a tributary of the San Joaquin River. The project's five reservoirs are capable of impounding more than 89,222 acre-feet of water, all but 56 acre-feet of which is stored for use by the Big Creek No. 1 development in Huntington Lake. There are no transmission lines associated with the project. The project features are all located on 1,996.59 acres within the Sierra National Forest (this includes recent mapping corrections). Reservoir characteristics are shown in table 2-2.

Big Creek No. 1

The Big Creek No. 1 development consists of four dams on Huntington Lake, a water conveyance, penstocks, a construction adit, and powerhouse. Relevant information about each feature is provided below.

Dams

- Huntington Lake dam 1, a concrete gravity structure that is 1,335 feet long and 170 feet high
- Huntington Lake dam 2, a concrete gravity structure that is 1,862 feet long and 120 feet high
- Huntington Lake dam 3, a concrete gravity structure that is 640 feet long and 165 feet high
- Huntington Lake dam 3A, a concrete gravity structure that is 263 feet long and 22.5 feet high

Conveyances

- A conveyance that consists of: (a) a 3,946-foot-long, 12-foot-diameter generally unlined tunnel (Tunnel 1); (b) a 409-foot long, 108-inch diameter riveted steel pipe liner in the lower end of the tunnel that branches into two riveted steel pipe branches; a 6,459-foot-long, 84-inch diameter branch to the Unit 1, 2 and 3 penstocks and a 6,478-foot-long, 60-inch diameter branch to the Unit 4 penstock

Penstocks

- Two 4,311-foot-long welded steel pipe penstocks for Units 1 and 2 which begin as a single 44-inch-diameter pipe that reduces in diameter and splits into branches with a final diameter of 24 inches
- A 4,360-foot-long welded steel pipe penstock for Unit 3 which begins as a single 42-inch-diameter that reduces in diameter and then splits into branches with a final pipe diameter of 24 inches
- A 4,301-foot-long welded steel pipe penstock for Unit 4 which begins as a single 54-inch-diameter that reduces in diameter and then splits into branches with a final pipe diameter of 24 inches

Construction Adit

- A construction adit to Tunnel 1

Powerhouse

- A powerhouse containing four generating units

Big Creek No. 2

The Big Creek No. 2 development consists of a dam, water conveyance penstocks, nine construction adits, three diversion dams with water conveyances, and a powerhouse. Relevant information about each feature is provided below.

Dam

- Big Creek Dam 4, a concrete arch dam that is 287 feet long and 75 feet high and includes 27 ungated spillway bays with flashboards

Conveyances

- A conveyance from Big Creek Dam 4 to the Powerhouse 2 that consists of: (a) Tunnel 2, which is 21,759 feet long and 12 feet in diameter; (b) a 30-foot-diameter, 115-foot-high surge tank; (c) a 255-foot-long, 108-inch-diameter riveted steel pipe from the surge tank to the unit penstocks

Penstocks

- Four steel pipe penstocks that begin as a single 54-inch diameter pipe that reduces in diameter and then splits into branches with a final diameter of 24 inches

Construction Adits

- Nine construction adits for Tunnel 2

Diversions with Conveyances

- Balsam Creek diversion dam, a 72-foot-long, 9-foot-high concrete diversion dam, located across Balsam Creek 2 miles southwest of Big Creek, with a conveyance from the diversion to Tunnel 2 that consists of a 400-foot-long, 12-inch-diameter steel pipe that enters Adit 3
- Ely Creek diversion dam, a 44-foot-long, 7-foot-high concrete diversion dam located approximately 3 miles southwest of Big Creek with a conveyance from the diversion to Tunnel 2 that consists of a 300-foot-long, 12-inch-diameter steel pipe that enters Adit 6
- Adit 8 diversion dam, a 44-foot-long, 30-foot-high concrete diversion dam located on Adit 8 Creek about 3.5 miles southwest of Big Creek, with a vertical borehole into Tunnel 2 at Adit 8

Powerhouse

- A powerhouse containing four generating units

2.1.1.3 Mammoth Pool Project Hydroelectric Power Project

The Mammoth Pool Project was constructed from 1958 to 1960 and placed in service in 1960. The project is located in Fresno County, California, on the San Joaquin

River. The project's reservoir is capable of impounding about 119,940 acre-feet of water. There are two transmission lines associated with the project, which are described in more detail below. The project features are all located on 2,029.68 acres within the Sierra National Forest. Reservoir characteristics are shown in table 2-2.

The Mammoth Pool development consists of a dam, two smaller diversion dams, three water conveyances, a small generating unit in the power tunnel, two construction adits, two transmission lines, and a powerhouse. Relevant information about each feature is provided below.

Dam

- Mammoth Pool dam, a compacted earthfill structure that is 3,361 feet long and 330 feet high

Diversions

- Rock Creek diversion dam, a concrete gravity structure that is 93 feet long and 9 feet high
- Ross Creek diversion dam, a concrete gravity structure that is 53 feet long and 7 feet high

Water Conveyances

- Mammoth power tunnel, a water conveyance from Mammoth Pool dam to the powerhouse (Mammoth power tunnel) consisting of: (a) a 39,350 foot long, 20-foot nominal diameter, horseshoe-shaped tunnel that is partially lined; (b) a 211-foot-long, 13-foot-diameter steel pipe at the Shakeflat Creek crossing; (c) a surge chamber that is 23 feet in diameter and 350 feet high; and (d) a 1,988-foot-long steel pipe penstock that varies from 158 to 129 inches in diameter and bifurcates into two 93-inch-diameter steel pipes just upstream of the powerhouse
- A conveyance from the Rock Creek diversion to the Mammoth Pool power tunnel that consists of a 434-foot-long, 20 to 30-inch-diameter steel pipe to a 20-inch-diameter vertical borehole into the tunnel
- A conveyance from the Ross Creek diversion to the Mammoth Pool power tunnel that consists of a 607-foot-long, 10 to 12-inch-diameter steel pipe to a 10-inch-diameter vertical borehole into the tunnel

Fishwater Generator

- A small generating unit located in the power tunnel

Construction Adits

- Two construction adits to the power tunnel

Transmission Lines

- One 230-kV transmission line that extends from the powerhouse to the non-project Big Creek No. 3 switchyard
- One 0.6-mile-long 12-kV line that connects the fishwater turbine to the non-project Stevenson 12-kV transmission line

Powerhouse

- A powerhouse containing two generating units

2.1.1.4 Big Creek No. 3 Hydroelectric Power Project

The Big Creek No. 3 Project was constructed from 1921 to 1923 and placed in service between 1923 and 1980 (Units 1 and 3 – 1923, Unit 4 – 1948, Unit 5 – 1980). The project is located in Fresno and Madera counties, California, along Big Creek, a tributary of the San Joaquin River. The project's reservoir is capable of impounding about 933 acre-feet of water. There are no transmission lines associated with the project. The project features are all located on 421.33 acres within the Sierra National Forest. Reservoir and powerhouse characteristics are shown in tables 2-2 and 2-3.

The Big Creek No. 3 development consists of a dam, water conveyance penstocks, three construction adits, and a powerhouse. Relevant information about each feature is presented below.

Dam

- Dam 6, a constant-radius concrete arch dam that is 495 feet long and 155 feet high that includes six ungated spillway bays

Conveyances

- A conveyance that consists of: (a) a 28,191-foot-long, 21-foot by 21-foot unlined tunnel (Tunnel 3); (b) a 164-foot-tall underground surge chamber that varies in diameter from 60 inches at the base, 25 inches in the middle and 75 inches at the top ; (c) a 310-foot long, 18-foot-diameter riveted steel pipe that divides through two spherical manifolds into five penstocks

Penstocks

- Four 90-inch to 54-inch-diameter steel penstocks for Units 1, 2, 3, and 4
- One 90-inch to 63-inch diameter steel pipe penstock to Unit 5

Construction Adits

- Three construction adits to Tunnel 3

Powerhouse

- A powerhouse containing five generating units

2.1.1.5 Existing Project Boundaries

The current project boundaries for the Big Creek ALP Projects encompass project facilities including dams and diversions, impoundments, water conveyances and associated structures, access roads and trails, transmission, communication and control lines, powerhouses, gaging stations, and helicopter landing sites for access to project structures. The project boundaries include land adjacent to project features; the width of these zones varies depending on the feature. Table 2-3 describes the lands included in the project boundaries for the Big Creek ALP Projects considered in this draft EIS.

Table 2-3. Lands included in the project boundaries for the Big Creek ALP Projects.

Feature	Associated Lands Included in the Current Project Boundary
Dams and diversion structures	Variable distance of at least 50 feet from the structures
Impoundments	Variable horizontal distance (near zero feet to several hundred feet) from the maximum normal water surface elevation
Water conveyances	Typically the conveyances are located along the center line of a 100-foot-wide right-of-way (ROW)
Water conveyance structures	Typically 50 feet from the structure
Access roads	Typically the roads are located along the center line of a 50- to 100-foot-wide ROW
Access trails	Typically the trails are located within a 10-foot-wide ROW
Transmission lines	Typically the lines are located along the center line of a 100- to 150-foot-wide ROW
Communication and control lines	Typically the lines are located along the center line of a 10-foot-wide ROW
Gaging stations	Typically 50 feet from the structure
Helicopter landing sites	Typically a 70 to 400 foot diameter area around the landing site
Recreational sites	Includes the footprint of the recreational area in most cases (some recreational areas are currently located outside of the project boundary)

The land included within the project boundaries currently overlaps at some locations (i.e., land at specific points is within the project boundary of two different projects). Table 2-4 presents those overlapping areas for the Big Creek ALP Projects (and other adjacent projects).

Table 2-4. Project lands overlapping other project lands for the Big Creek ALP Projects.

Affected Projects	Location of overlapping project lands
Big Creek Nos. 2A, 8, and Eastwood and Big Creek Nos. 1 and 2	Near Powerhouses 1 and 2 At the outlet of Ward Tunnel on Huntington Lake
Big Creek Nos. 2A, 8, and Eastwood and Mammoth Pool	Where the Mammoth Pool transmission lines passes Powerhouse 8
Big Creek Nos. 2A, 8, and Eastwood and Big Creek No. 3	Near the Big Creek Dam 6
Big Creek Nos. 2A, 8, and Eastwood and the Portal Project	Near the Portal forebay and powerhouse
Big Creek Nos. 2A, 8, and Eastwood and Big Creek No. 4	Near Powerhouse 8 at Redinger reservoir
Mammoth Pool and Big Creek No. 3	Around the Big Creek No. 3 forebay and powerhouse Where the Mammoth Pool transmission lines connect to the Big Creek No. 3 switchyard

In addition, there are features included in the Big Creek ALP Projects that also serve other projects. For example, the Ward Tunnel (part of Big Creek Nos. 2A, 8, and Eastwood), feeds water from Florence Lake, and a series of small diversions on the South Fork San Joaquin River (Big Creek Nos. 2A, 8, and Eastwood) into Huntington Lake (Big Creek Nos. 1 and 2). Huntington Lake (Big Creek Nos. 1 and 2), which serves as the impoundment for the Big Creek No. 1 development, is also a source of water for the Big Creek Nos. 2A and Eastwood developments (Big Creek Nos. 2A, 8, and Eastwood) via the Huntington-Pitman-Shaver conduit.

2.1.2 Existing Project Operations

Operations of SCE's seven licensed projects in the Big Creek System are managed from both a watershed-wide perspective and on an individual project-by-project basis. The Big Creek System consists of six major reservoirs (Thomas A. Edison, Florence, Huntington, Shaver, Mammoth Pool, and Redinger), and nine powerhouses (Portal, Eastwood, Mammoth Pool and Big Creek Powerhouses 1, 2, 2A, 3, 4, and 8). Figure 2-1 presents a schematic of the seven projects and associated reservoirs, water conveyance tunnels, and powerhouse in the Big Creek System.

SCE operates the Big Creek ALP Projects within the Big Creek System in accordance with its current license conditions, which include minimum instream flow (MIF) release requirements that are made by SCE from diversions and impoundments. Stream reaches, including bypassed stream reaches, are discussed later in section 3.3.1 and elsewhere.

SCE manages water through the system in a manner that best meets the operational constraints that are imposed either by contractual operating agreements (i.e., licenses, permits) or by physical limitations of the generating equipment. The Big Creek System is subject to several operating constraints, including: (1) available water supply; (2) electrical system requirements; (3) both planned and unplanned maintenance outages; (4) storage limits (including both recreational minimums and year-end carryover maximums); (5) both minimum and maximum release limits (from storage); (6) various provisions contained in water rights agreements,[10] and (7) California Independent System Operator (ISO) requirements.

2.1.2.1 Big Creek System Water Management

This section provides a general overview of how SCE manages the seven projects in the Big Creek System.

In all water year types, water released from project reservoirs and diverted from streams is used to generate power. There are subtle differences, however, in the way the system is operated during different water year. Generally, SCE operates the projects so that the Big Creek System generates around the clock in the spring run-off period, except in dry water years. Operational flexibility is limited during normal run-off because the amount of water run-off available exceeds the combined generation and

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[10]The most prominent water rights agreement is the Mammoth Pool Operating Agreement between SCE and the U.S. Bureau of Reclamation (Reclamation). It pertains to the storage and release of water from SCE's Big Creek reservoirs that are upstream of Reclamation-operated Friant dam (Millerton Lake) and the associated Central Valley Project water distribution system operated by Reclamation on behalf of the downstream irrigators.

storage capacity of the system, resulting in water flowing over spillways or "spill." When the reservoirs stop spilling, SCE is able to use available inflows and generate power to meet the electric supply requirements and provide both base load and peaking energy.

In the upper basin area, water diverted from the Upper South Fork San Joaquin River drainage is stored in Florence Lake and water from Mono Creek drainage is stored in Lake Thomas Edison. Water is diverted from these two lakes and various other small backcountry diversions into Huntington Lake via the Ward Tunnel and the Mono-Bear Siphon. The volumes of water that can pass through Ward Tunnel and the siphons are limited by the physical size and layout of these conduits.

The Big Creek System has three interlinked water chains or pathways through which water may be transported and used to produce power.

- Huntington Water Chain: Portal powerhouse and Powerhouses 1, 2, 8, 3, and 4.
- Shaver Water Chain: Portal powerhouse, Eastwood powerhouse, and Powerhouses 2A, 8, 3, and 4.
- Mammoth Water Chain: Mammoth Pool powerhouse and Powerhouses 3 and 4.

After passing through, or bypassing, the Portal powerhouse, water entering Huntington Lake is directed either to the Huntington or Shaver chain. Water from Powerhouses 1 and 2 in the Huntington Chain joins water from the Shaver Chain, which has already passed through Eastwood powerhouse and Powerhouse 2A. Water from these two chains is then diverted through Powerhouse 8, after which is joins the waters of the San Joaquin River coming from the Mammoth Chain. Water from all three chains then continues through Big Creek powerhouses 3 and 4.

Water from the Middle Fork and North Fork San Joaquin River drainages and the South Fork San Joaquin River that is not diverted at Florence Lake, Lake Thomas A. Edison, Bear Creek forebay, and the small backcountry diversions, is collected in Mammoth Pool reservoir and becomes part of the Mammoth Chain. Mammoth Pool powerhouse is usually run at maximum during the high flow or run-off period to prevent or delay spill at Mammoth Pool reservoir.

For the most part, Portal, Eastwood, and Big Creek No. 4 operate independently of the other powerhouses in the Big Creek System. Portal powerhouse opportunistically uses water passing through the Ward Tunnel for power generation, but only operates efficiently at moderate flows through Ward Tunnel. Ward Tunnel flows outside of the efficient flow range of Portal powerhouse bypass the powerhouse through a valve into Huntington Lake. Eastwood powerhouse generation normally occurs during the peak demand period of the day, unless water is being moved continuously from Huntington Lake to Shaver Lake for use during peak periods.

During the night, water is typically pumped from Shaver Lake through Eastwood Power Station into Balsam Meadows reservoir. During the day, the water then passes back through Eastwood Power Station in generate mode to Shaver Lake during peak demand hours. Maintaining water surface levels for recreational purposes at Huntington Lake and above pump-back minimum water surface elevations in Shaver Lake are important considerations when planning operations at Eastwood. Powerhouse 4 is the last power generation opportunity in the Big Creek System and therefore adjustments in the operation of that powerhouse will not affect the other upstream powerhouses.

Besides inflow, market constraints and pricing, transmission constraints, and weather will affect generation and operations at the Big Creek ALP Projects.

2.1.2.2 Water Management for the Big Creek ALP Projects

Here we describe how SCE operates the reservoirs and powerhouses that are part of the Big Creek ALP Project.

Big Creek Project Reservoirs

Lake Thomas A. Edison

Lake Thomas A. Edison, a component of SCE's Vermilion Project, is the highest elevation reservoir in the Big Creek System. The lake is located on, and stores water from, Mono Creek and its tributaries. Water released from storage at the lake is diverted about 1 mile downstream at Mono Creek diversion (part of the Big Creek Nos. 2A, 8, and Eastwood Project) into the Mono-Bear Siphon. Water can also be diverted from the Bear Creek diversion into the Mono-Bear Siphon. Water from the Mono-Bear Siphon flows into Ward Tunnel. Lake Thomas A. Edison has a relatively large storage capacity compared to its drainage area. Thus, during the spring run-off period in non-spill years, the majority of inflow is stored and not released until late summer. In spill years, however, the inflow to the lake is stored until threat of spill at Florence Lake and Bear Creek diversion has passed, then releases from the lake begin to avoid using the emergency spillway at the lake. Peak storage normally occurs sometime during July and August.

Florence Lake

Florence Lake, a component of the Big Creek Nos. 2A, 8, and Eastwood Project, is a high elevation reservoir that stores water from the South Fork San Joaquin River and other small tributaries. Water at Florence Lake is diverted into Ward Tunnel, as is water from Bolsillo, Chinquapin, Camp 62, and Camp 61 creeks. Priority is given to water being diverted from Florence Lake if spill is imminent at that location. Water being diverted from Lake Thomas A. Edison is given last priority because it is the least likely to spill due to its large storage capacity. Water diverted into Ward Tunnel passes under and is hydrologically connected to Portal forebay. The water eventually exits

Ward Tunnel through Portal powerhouse or the bypass valve, and is stored in Huntington Lake.

Florence Lake storage is kept near it minimum level (1,000 acre-feet) during the winter months to avoid damage due to freezing water on the dam face. Storage usually begins to increase in late April. After the peak storage level is reached in late spring/early summer, the reservoir elevation gradually declines until it again reaches its minimum storage level in late fall.

Huntington Lake

Huntington Lake, a component of the Big Creek Nos. 1 and 2 Project, is also a relatively high elevation reservoir that stores water from the backcountry lakes and diversions via the Ward Tunnel. Water from Huntington Lake may be sent to either Powerhouse 1 or Shaver Lake via Balsam forebay or North Fork Stevenson Creek. A good faith effort is made by SCE to keep Huntington Lake as full as practicable with minimum fluctuation from Memorial Day through Labor Day weekend, for recreational uses. However, during wet years, it becomes necessary to keep storage lower until after local uncontrolled peak inflows have passed. Spill could occur if local uncontrolled inflows exceed Huntington Lake water diversion capacities. Due to downstream safety issues and domestic water issues for the town of Big Creek, spill is avoided at Huntington Lake, if possible.

Shaver Lake

Shaver Lake, a component of the Big Creek Nos. 2A, 8, and Eastwood Project, is a moderate elevation reservoir that stores water from Huntington Lake via Eastwood or Tunnel 7 (through Gate 2) and local inflows from North Fork Stevenson Creek and other small tributaries. Water storage at Shaver Lake is not noticeably altered on a daily basis by pump-back operations at Eastwood powerhouse, which usually occur during the late-night/early-morning hours from spring through fall, depending on water availability. During this period, the reservoir is generally kept at a high surface elevation to enable the use of pump-back capability. In pump-back mode, the Eastwood powerhouse pumps water from Shaver Lake and returns it to Balsam forebay. This water is used again the following day, for generation through Eastwood powerhouse, and then returned to Shaver Lake. For pump-back generation to occur, Shaver Lake has to be above a minimum elevation of 5,342 feet, or 78,426 acre-feet of storage. During wet water years, Shaver Lake storage will be drawn down below this pump-back minimum elevation in the spring/early summer to create storage space for the upcoming run-off and to minimize the potential for spilling at Shaver dam. Water from Shaver Lake is diverted to Powerhouse 2A through Tunnel 2, and is also released to Stevenson Creek, which is a tributary to the San Joaquin River downstream of Dam 6.

Mammoth Pool

Mammoth Pool reservoir, a component of the Mammoth Pool Project, is a moderate elevation reservoir that stores water from the San Joaquin River and other small tributaries. The drainage area of Mammoth Pool reservoir is by far the largest of all of the system reservoirs, relative to the reservoir size. As a result, Mammoth Pool reservoir spills more often than the other system reservoirs. In most cases, spill at Mammoth Pool dam will also result in spill downstream of Dam 6 and Redinger reservoir. Ideally, minimum storage at Mammoth Pool reservoir will occur just prior to the beginning of spring run-off to maximize storage space availability. After the threat of spill has passed, storage at Mammoth Pool reservoir declines at a rate necessary to ensure compliance with the September 30th storage requirements of the Mammoth Pool Operating Agreement. Consideration is given to flood control issues when determining the optimal storage level at Mammoth Pool reservoir during the winter months.

Big Creek Project Powerhouses

Big Creek Nos. 2A, 8, and Eastwood Project

The Eastwood powerhouse receives water from Balsam Meadow forebay, which is filled via the Huntington-Pitman-Shaver Conduit from Huntington Lake or through water pumped back from Shaver Lake, and discharges to Shaver Lake. Eastwood may operate as a pumped storage project in all water year types after the run-off period has ended and SCE gains control of reservoir inflows in the Big Creek System. Powerhouse 2A receives water from Shaver Lake and discharges to the Dam 5 impoundment on Big Creek. Powerhouse 8 uses water from the Dam 5 impoundment and discharges to the Dam 6 impoundment on the San Joaquin River.

Big Creek Nos. 1 and 2 Project

Big Creek No. 1 uses water from Huntington Lake and discharges into the Dam 4 impoundment on Big Creek. No. 2 receives water from the Dam 4 impoundment and discharges to the Dam 5 impoundment on Big Creek.

Mammoth Pool Project

Mammoth Pool reservoir receives flow from a large watershed that includes: Chiquito, Jackass, Dalton, and Granite creeks, and the North, Middle and South forks of the San Joaquin River. Under existing operations, water from the Mammoth Pool Project is diverted at the Mammoth Pool reservoir on the San Joaquin River and from Rock and Ross creeks (tributaries to the San Joaquin River downstream of Mammoth Pool reservoir). Water passing through the powerhouse enters the San Joaquin River just upstream of the Dam 6 impoundment, also known as Big Creek No. 3 forebay.

Big Creek No. 3 Project

Big Creek No. 3 receives water from the Dam 6 impoundment, and the powerhouse discharges into Redinger reservoir (Big Creek No. 4 Project, FERC No. 2017).

2.2 APPLICANT'S PROPOSAL

2.2.1 Proposed Project Facilities

SCE proposes the following modifications to project facilities. These modifications are discussed in more detail under specific resource sections.

Big Creek Nos. 2A, 8, and Eastwood Project

- Install new minimum flow devices and gaging equipment at Dam 5 and Mono Creek diversion.
- Decommission diversions at Crater Creek, Tombstone Creek, North Slide Creek, South Slide Creek, Pitman Creek domestic diversion, and Snow Slide Creek domestic diversion.
- Rehabilitate all existing recreational facilities over the life of the license.
- Construct a new accessible fishing platform at Jackass Meadows campground.
- Construct a new accessible boat landing platform at Florence Lake.
- Install interpretive signage at Florence Lake Store, Jackass Meadows Campground, Mono Campground, and Whitebark Vista.
- Enhance visual aesthetics by painting the Mono-Bear siphon pipeline.

Big Creek Nos. 1 and 2 Project

- Install new minimum flow devices and gaging equipment at Ely Creek diversion, Balsam Creek diversion and Dam 4.
- Rehabilitate all existing recreational facilities over the life of the license.
- Construct a new Dam 3 day-use area at Huntington Lake.
- Construct a new accessible fishing platform at Huntington Lake.
- Install interpretive signage at Bear Cove day-use picnic area, Dam 3 parking area, Dowville day-use picnic area, and Eastwood Visitor Center.
- Enhance visual aesthetics by painting the Big Creek No. 1 penstock and other structures and providing vegetative screening at the switchyard.

Mammoth Pool Project

- Install new minimum flow devices and gaging equipment at Mammoth Pool dam, Rock Creek diversion and Ross Creek diversion.
- Upgrading the fishwater generator.
- Rehabilitate all existing recreational facilities over the life of the license.
- Install interpretive signage in the Mammoth Pool vicinity and Redinger reservoir overlook.
- Enhance visual aesthetics by painting the Mammoth Pool penstock.

Big Creek No. 3 Project

- Install new minimum flow devices and gaging equipment at Dam 6.
- Rehabilitate all existing recreational facilities over the life of the license.
- Enhance visual aesthetics by painting the Big Creek No. 3 penstock.

2.2.2 Project Safety

The Big Creek Nos. 2A, 8, and Eastwood; Big Creek Nos. 1 and 2; Mammoth Pool; and Big Creek No 3 projects have been operating for 29, 48, 50, and 30 years, respectively under the existing licenses. During this time, Commission staff have conducted operational inspections focusing on the continued safety of the structures, identification of unauthorized modifications, efficiency and safety of operations, compliance with the terms of the license, and proper maintenance. In addition, the Big Creek ALP Projects have been inspected and evaluated every 5 years by an independent consultant, and a consultant's safety report has been filed for Commission review. As part of the relicensing process, the Commission staff would evaluate the adequacy of all proposed project facilities under a new license. Special articles would be included in any licenses issued, as appropriate. Commission staff would continue to inspect the project during the new license terms to assure continued adherence to Commission-approved plans relating to operation and maintenance, and accepted engineering practices and procedures.

In addition to the environmental measures proposed by SCE, it also proposes to move the Howell-Bunger valve and fishwater generator located in the Mammoth Pool diversion tunnel to an exterior location at the downstream end of the tunnel for more efficient and safer access, maintenance, and operation. The fishwater generator is used to provide minimum instream flows downstream of Mammoth Pool dam. The Howell-Bunger valve is used to provide releases from the reservoir other than through the powerhouse. The generator and Howell-Bunger valve also would be automated to enable operation from the Big Creek dispatch control center at the Big Creek No. 3 powerhouse for better control, compliance, and operator safety. These modifications would improve overall project safety.

2.2.3 Proposed Project Operations

SCE proposes to provide or modify minimum flow releases from several dams and diversions, provide channel riparian maintenance flows from some diversions, provide pre-spill whitewater flow releases from some diversions, and to eliminate some flow diversions through diversion decommissioning. These modifications to project operations are summarized in the following section and discussed in more detail under specific resource sections.

2.2.4 Proposed Environmental Measures under the Settlement Agreement

SCE proposes a comprehensive set of measures covering the full range of resources in the Upper San Joaquin River Basin. Table 2-5 summarizes those proposed measures under the Settlement Agreement.[11] The Settlement Agreement envisions that all measures listed in appendix A of the agreement would be included in new licenses for the Big Creek ALP Projects, whereas measures listed in appendix B of the agreement would be implemented by SCE, but not included as a condition of new licenses. We only list those measures from appendix A of the agreement with the exception of one measure included in appendix B of the agreement that has a nexus to project purposes.

Table 2-5. Proposed environmental measures for the Big Creek ALP Projects under the Settlement Agreement. (Source: SCE, 2007b)

Article	Measure	Elements
1.1.1	**Streamflow Requirements**	As set forth in measures 1.1.1.1 through 1.1.1.22, maintain flows downstream of Project diversion dams. Measure instream flow releases as the 24-hour average of the flow and as an instantaneous flow. Instream flows would be the flow set forth below or the natural inflow into the point of diversion, whichever is less. Should the 24-hour average flow as measured, be less than the required 24-hour average flow, but more than the instantaneous flow (instantaneous floor); begin releasing the equivalent

[11]The precise wording of the measure summaries in this table differs from the specific language of the Settlement Agreement. Individual measures (Proposed Articles in the Settlement Agreement) include programmatic elements for scheduling and developing plans, monitoring, evaluation, and reporting that are not listed in this table. Characterizations of these measures are primarily the result of our attempt to provide a concise summary of the measures for this draft EIS and are not intended to modify any of the terms of the Settlement Agreement.

Article	Measure	Elements
		under-released volume of water within 7 days of discovery (based on SCE review of flow records) of the under-release. Water year types would be based on the April 1 forecast from the CDWR Bulletin No. 120, San Joaquin Valley Water Year Index, or its successor index that is most representative of the Big Creek Watershed. Inform the Forest Service, Water Board, FWS, and the Commission which category of instream flows would be implemented based on the April 1 forecast.
	1.1.1.1 through 1.1.1.20 and 1.1.1.22	**Big Creek Nos. 2A, 8 and Eastwood Project** • Modify minimum flow releases at Stevenson Creek, Upper Balsam Creek (forebay to diversion), Lower Big Creek (Dam 5 to San Joaquin River), North Fork Stevenson Creek, Pitman Creek, Mono Creek (downstream of diversion), Bolsillo Creek, Chinquapin Creek, and Hooper Creek. **Big Creek Nos. 1 and 2 Project** • Provide minimum flows to Lower Balsam Creek (diversion to Big Creek), Middle Big Creek (Dam 4 to Dam 5), and Ely Creek and modify minimum flow releases to Upper Big Creek (Huntington Lake to Dam 4). **Mammoth Pool Project** • Provide minimum flows to Rock Creek and Ross Creek and modify minimum flows to the San Joaquin River (Mammoth Pool dam to Dam 6). **Big Creek No. 3 Project** • Modify minimum flows to the San Joaquin River (Dam 6 to Redinger reservoir).

Article	Measure	Elements
	1.1.1.21 Crater Creek /1.1.1.23 North Slide Creek/ 1.1.1.24 South Slide Creek/1.1.1.25 Tombstone Creek and 1.6 Small Diversions Decommissioning Plan	Remove from Service. The Licensee would implement the Small Diversions Decommissioning Plan (Crater Creek diversion, Tombstone Creek diversion, South Slide Creek diversion, North Slide Creek diversion, Pitman Creek domestic diversion, and Snow Slide Creek domestic diversion), included as appendix G in the Settlement Agreement.
	1.1.2/1.12 Flow Monitoring and Reservoir Water Level Measurement Plan	Measure and document all instream flow releases in publicly available and readily accessible formats. For the purposes of measuring and documenting compliance with the required instream flows in Project bypassed reaches, the Licensee would implement the Flow Monitoring and Reservoir Water Level Measurement Plan included as appendix L in the Settlement Agreement.
1.2	**Channel Riparian Maintenance Flows**	By March 15 of each year, use March 1 preliminary water year forecast to inform the Forest Service, Water Board, FWS, Cal Fish & Game, and the Commission which category of instream flows would be implemented on April 1, with the option to adjust flows based on the April 1 and May 1 DWR Water Year forecast updates, if those updates are revised.
	1.2.1 Bear Creek	Starting between May 15 and June 30 in Wet Years, do not divert water at the Bear Creek diversion for 10 consecutive days.
	1.2.2 Bolsillo Creek	Between April 1 and June 30 in Wet Years, do not divert water at the Bolsillo Creek diversion.
	1.2.3 Camp 62 Creek	Between April 1 and June 30 in Wet Years, do not divert water at the Camp 62 Creek diversion.

Article	Measure	Elements
	1.2.4 Chinquapin Creek	Between April 1 and June 30 in Wet Years, do not divert water at the Chinquapin Creek diversion.
1.3	**Mono Creek Channel Riparian Maintenance Flow Plan**	Implement the Mono Creek Channel Riparian Maintenance Flow Plan, included as appendix D in the Settlement Agreement.
1.4	**Camp 61 Creek Channel Riparian Maintenance Flow Plan**	Implement the Camp 61 Creek Channel Riparian Maintenance Flow Plan, included as Settlement Agreement, appendix E. The objective of this Camp 61 Creek Channel Riparian Maintenance Flow Plan is to determine an appropriate channel riparian maintenance flow regime to maintain reduced accumulations of fine sediment in Camp 61 Creek downstream of Portal forebay to the confluence with the South Fork San Joaquin River.
1.5	**Channel and Riparian Maintenance Flows for the South Fork San Joaquin River Downstream of Florence Reservoir**	Implement the channel and riparian maintenance flows for the South Fork San Joaquin River downstream of Florence reservoir, included as appendix F in the Settlement Agreement.
1.7	**Large Woody Debris Management**	Return large wood to Bear Creek by allowing large woody debris to pass over the Bear Creek diversion dam spillway during spill.
1.8	**Temperature Monitoring and Management Plan**	Implement the Temperature Monitoring and Management Plan, included as appendix H in the Settlement Agreement.
1.9	**Fish Monitoring Plan**	Implement the Fish Monitoring Plan, included as appendix I in the Settlement Agreement.

Article	Measure	Elements
1.10	**Sediment Management Prescriptions**	Implement the Sediment Management Prescriptions, included as Settlement Agreement, appendix J. SCE proposes to conduct sediment prescriptions at Dam 6 forebay at least every 5 years beginning the year following implementation of sediment prescriptions at Dam 4 and Dam 5. Initiate sediment prescriptions at Dam 6 forebay between January 1 and March 31.
1.11	**Riparian Monitoring Plan** **(Camp 61 Creek, Mono Creek, and South Fork San Joaquin River)**	Implement the Riparian Monitoring Plan, included as appendix K in the Settlement Agreement.
2.1	**Historic Properties Management Plan**	Complete the draft Historic Properties Management Plan (HPMP) filed with the Commission on November 29, 2005, pursuant to section 106 of the National Historic Preservation Act. To the extent required by the Commission or applicable law, consult with the Commission, interested governmental agencies, the Settlement Parties, and the Tribal Community for the completion of the draft HPMP. The final HPMP shall include: • Coordination with the Vegetation Management Plan, Recreation Management Plan, Riparian Monitoring Plan, and any other plan referenced in the HPMP. • A Forest Service representative on the Big Creek Heritage Advisory Committee. Consult with the Advisory Committee on the development of management and monitoring plans for cultural resources, review and evaluation of cultural resource data, the development of cultural resource protection measures, implementation of protection measures, or other recommendations as required by any Programmatic Agreement

Article	Measure	Elements
		developed for the HPMP. The Advisory Committee will address specific issues or concerns that arise during the implementation of the licenses. • Continued management of NRHP ineligible sites as important sites, as per the draft HPMP. Provide geographic information system (GIS) compatible electronic data through "Arc GIS coverage/shapefiles" whereby archaeological survey coverage and site locations can be entered into the Forest Service database. Implement the HPMP upon execution of a Programmatic Agreement.
3.1	**Visual Resources Plan**	Implement the Visual Resources Plan, included as appendix M in the Settlement Agreement.
3.2	**Transportation System Management Plan**	Implement the Transportation System Management Plan, included appendix N in the Settlement Agreement.
4.1	**Recreation Management Plan**	Implement the Recreation Management Plan, included as appendix O in the Settlement Agreement.
5.1	**Special-Status Bat Species Protection**	Prior to conducting any non-routine maintenance activities that result in harm to special status bat species or their habitat, in structures that are known to support maternal or roosting bat species (including but not limited to, reconstruction and painting) (Settlement Agreement, table 5.1-1), consult with the Forest Service, Cal Fish & Game, and FWS. Based on the consultation, implement appropriate avoidance and protection measures if necessary to minimize disturbance of special status bat species or habitat.
5.2	**Mule Deer**	To protect deer crossing Mammoth Pool reservoir during spring migration, maintain (i) the fences

Article	Measure	Elements
	Protection **1. Mammoth Pool Reservoir**	around the Mammoth Pool dam spillway; (ii) the Daulton Creek bridge; and (iii) a device to discourage deer from crossing the reservoir near the spillway. During the peak migration period (May 1 through June 15), ensure sand is present on the dam road to encourage deer to use the dam road to cross, and close the road during the peak migration period to reduce any adverse effects from recreation. Additionally, to ensure that the presence of debris that may impede deer migration across Mammoth Pool reservoir is monitored and that any build up of debris is removed in a timely manner, provide annual photo documentation to the Forest Service, Cal Fish & Game, and FWS of the area at the floating boom above the spillway (i.e., area of concern) along with an estimate of the extent of any debris present. This is especially important in years when Mammoth Pool reservoir spills. If agencies determine—based on review of the photograph and the estimate of the aerial extent of debris buildup—that the debris would impede deer migration, remove sufficient levels of debris to allow deer to migrate without impediment.
	2. Eastwood (Balsam Meadows)	Implement road closures within Big Creek Nos. 2A, 8, and Eastwood Project to prevent the disturbance of mule deer and other wildlife. Specific roads and road closure requirements are provided in appendix A in the Settlement Agreement, table 5.2-1.
5.3	**Special-Status Species Protection**	Prior to construction of new project features on National Forest Service land that may affect Forest Service special-status species and their habitat (i.e., Forest Service sensitive and/or management indicator species), prepare a Biological Evaluation (BE) to describe the potential effect of the action on the species or its habitat. For state or federally listed species, federal candidate species, California species of special concern, and California fully protected species, prepare a Biological Assessment (BA) or other required document and obtain any necessary

Article	Measure	Elements
		permits or approvals.
5.4	**Bald Eagle Management Plan**	Implement the Bald Eagle Management Plan, included as appendix P in the Settlement Agreement.
5.5	**Valley Elderberry Longhorn Beetle Management Plan**	Implement the VELB Management Plan, included as appendix Q in the Settlement Agreement.
5.6	**Vegetation And Integrated Pest Management Plan**	Implement the Vegetation and Integrated Pest Management Plan, included as appendix R in the Settlement Agreement.
5.7	**Bear/Human Interaction License Article**	Install and maintain bear-proof dumpsters at the Big Creek No. 1 administrative offices and company housing, and other project facilities where food waste may be disposed of or stored. The Forest Service, Cal Fish & Game, and FWS would review and approve dumpster design prior to installation. Implement a program to educate SCE personnel about proper food storage and garbage disposal to reduce bear/human incidents. The education program would consist of written materials (educational pamphlet) and employee training.
	Appendix B - (Non-FERC Settlement Agreement Provisions) – 1.2.2 Gravel Augmentation Feasibility Assessment	During reconstruction and modification of the flow release structures for the Mammoth Pool dam, in consultation with agencies named above, assess the feasibility of adding gravel into or immediately below the spillway channel. Provide a written explanation of its determination to the Forest Service, FWS, Cal Fish & Game, and the Water Board. Schedule a meeting with these agencies, and any other interested government agencies to discuss the determination. The assessment would determine whether gravel augmentation in or below the spillway channel would: 1. impair the Mammoth Pool dam spillway function;

Article	Measure	Elements
		2. result in erosion and undermining of the access road to Mammoth dam; or 3. result in dam instability, impair operation of the release structures or hinder inspections to the dam and the release structures.

2.2.5 Proposed Project Boundary

2.2.5.1 Big Creek Nos. 2A, 8, and Eastwood

SCE proposes to add some lands to the area within the project boundary and to remove other lands from the project area. The exhibit G drawings have been revised to show these changes. Project boundary changes are summarized below.

SCE proposes to expand the area within the project boundary to include the following lands:

- The trail to the stream gage on Big Creek below Dam 5 from FS Road No. 8S05;
- The segment of access road FS Road No. 8S08A, leading to the upper penstock valves for Tunnel 5 from Railroad Grade Road (FS Road No. 8S08);
- The helicopter landing sites at: the summit at Shaver Hill near the junction of FS Road Nos. 2710 and 9S32; Tiffany Pines at Camp Edison; Mount Givens telecom site near the terminus of FS Road No. 7S32, near the Bear Creek diversion used to access the Bear Creek diversion and stream gage; Mono Creek diversion near FS No. 5S80Z, used to access the Mono Creek diversion and forebay; Mono Creek below Lake Thomas A. Edison, used to access the stream gage SCE gage no. 119; and the South Fork San Joaquin River below Hooper Creek, used to access SCE stream No. 129 at the South Fork San Joaquin River at Florence Spill Station that provides access to SCE stream gage No. 128S, and to access the Florence Lake dam;
- The access road FS Road No. 9S58 to the North Fork Stevenson Creek gage from State Highway 168;
- The access road from FS Road No. 9S58 to the Eagle Point boat-in day-use area;

- The access road FS Road No. 9S17 to the Eastwood-Big Creek 1 Transmission Line tower M0-T3 from State Highway 168;
- The access road FS Road No. 9S312 to the Eastwood powerhouse from State Highway 168;
- The access road FS Road No. 9S58K from FS Road No. 9S58 to the Eastwood powerhouse entrance tunnel;
- The access roads FS Road Nos. 8S02 and 8S02B from State Highway 168 to the Huntington-Pitman-Shaver Tunnel Adit;
- The segment of FS Road No. 8S83 that accesses the Huntington-Pitman-Shaver Siphon from the junction of FS Road No. 8S83A;
- The Pitman Creek diversion access road (FS No. 8S94) from State Highway 168;
- The Bolsillo Creek diversion and Stream Gage Trail from FS Road No. 5S80H to the Bolsillo Creek diversion;
- The Chinquapin Creek diversion and Stream Gage Trail from FS Road No. 7S01 (Florence Lake Road) to the Chinquapin Creek diversion;
- The Bear Creek Stream Gage Trail from the Bear Creek diversion pool to the instream gage located upstream on Bear Creek;
- The land associated with the gaging station on Hooper Creek below Hooper Creek diversion (SCE gage no. 114) and the Hooper Creek diversion helicopter landing site;
- The land surrounding the gaging station on the South Fork San Joaquin River below the Hooper Creek confluence (SCE gage No. 129), increasing the existing diameter of project lands around the stream gage from 20 feet to 100 feet;
- The gaging station and ancillary equipment (cable way and housing structure) on the South Fork San Joaquin River above Hooper Creek confluence (SCE gage no. 128S;
- The access road FS Road No. 9S32C and associated spur roads to the Eastwood-Big Creek No. 1 Transmission Line towers M1-T2, M1-T3, M1-T4, M1-T5, M1-T6, M2-T1 and M2-T2; and
- The access road FS Road No. 8S47 from the gate to the Eastwood-Big Creek No. 1 Transmission Line towers M3-T1 and M2-T5.

SCE proposes to reduce the project area by removing:

- Excess land located southwest of Powerhouses 2 and 2A;

- A segment of FS Road No. 9S311 from the State Highway 168 to the Eastwood Switchyard;
- Excess land located along the southern side of Rancheria Creek from approximately 500 feet upstream of Portal powerhouse downstream to Huntington Lake;
- The Eastwood Overflow Campground located east of the Portal powerhouse;
- The Eastwood Overlook located along Rancheria Creek upstream of the confluence with Huntington Lake;
- The access road FS Road No. 5580H to the Bolsillo Creek diversion from FS Road No. 5S80;
- The Chinquapin diversion piping near Camp 62 along a co-aligned segment of FS Road No. 7S01;
- The Florence Lake day-use area.

The net change in area would be a reduction of 24.79 acres, revising the total federal land acreage to 2,143.21 acres.

2.2.5.2 Big Creek Nos. 1 and 2

SCE proposes to add some lands to the area within the project boundary and to remove other lands from the project area. Specifically, SCE proposes to expand the area within the project boundary to include the following lands:

- The Eastwood Overflow Campground located east of Portal powerhouse;
- The Eastwood Overlook along Rancheria Creek upstream of the confluence with Huntington Lake;
- The access road beginning from the gate located at the terminus of Fresno County Road 3380 (Huntington Lodge Road) to the west end of Dam 2 (FS Road No. 8S66);
- The segment of FS Road No. 8S83 from the junction with FS Road No. 8S83A to the current project boundary.

SCE proposes to reduce the project area by removing:

- The area surrounding Rancheria Creek from Portal powerhouse to the high water line of Huntington Lake (Portal Tailrace);
- A portion of the right-of-way along the access road to the gaging station located on Big Creek below Huntington Lake (FS Road Nos. 8S66 and 8S66A), narrowing it from 100 feet to 50 feet (25 feet from the centerline along both sides of the road);

- The former company housing area near Powerhouses 2 and 2A;
- The segment of FS Road No. 8S13 between the gate near the top of the penstocks for Powerhouses 2 and 2A and FS Road No. 8S08 (Railroad Grade Road);
- Excess land located southwest of Powerhouses 2 and 2A; and
- The communication line ROW from the dispatcher's office near Powerhouse 3 to Powerhouse 2 and the Northern Hydro offices near Powerhouse 1.

The net change in project area would be a reduction of 118.63 acres, revising the total federal land acreage to 1,877.96 acres.

2.2.5.3 Mammoth Pool

SCE proposes to expand the existing project boundary to include 0.7 acres of federal lands associated with Shakeflat Trail to provide access to the San Joaquin River gaging station upstream of Shakeflat Creek and to include 2.90 acres of federal land for the helicopter landing site adjacent to the San Joaquin River above Shakeflat Creek. The revised total federal land acreage would be 2,033.28 acres.

2.2.5.4 Big Creek No. 3

SCE proposes to remove 44.17 acres of federal land above the high water line around the Dam 6 forebay that are not needed for access to the forebay or for the operation and maintenance of the project or other specified project purposes. The revised total federal land acreage would be 377.16 acres.

2.2.6 Proposed Action with Modifications

Section 4(e) Federal Land Management Conditions

Section 4(e) of the FPA states that the Commission may issue a license for a project on a federal reservation only if it finds that the license will not interfere or be inconsistent with the purpose for which the reservation was created or acquired. Such a reservation includes, without limitation, Forest Service-administered land. Section 4(e) of the FPA requires that a Commission license for a project located on a reservation include the conditions that the Secretary of the department under whose supervision the reservation falls deems necessary for the adequate protection and use of such reservation.

The Forest Service filed preliminary 4(e) conditions on February 5, 2007, for the Mammoth Pool Project and final conditions on February 27, 2008, for the remaining three projects. The measures proposed in the Settlement Agreement are consistent with the 4(e) conditions with the exception of minor variations in wording in the 4(e) conditions and the inclusion of standard general conditions by the Forest Service.

Because the preliminary and final conditions filed by the Forest Service are consistent with the provisions of the Settlement Agreement, we discuss these terms and conditions in the context of our discussions of the Settlement Agreement measures throughout this draft EIS.

2.3 STAFF ALTERNATIVE

Under the staff alternative, the Big Creek ALP Projects would include SCE's proposal, including the Settlement Agreement and the terms and conditions filed pursuant to sections 4(e) and 10(j) of the FPA. Additional measures that we recommend for inclusion in any licenses that may be issued for the Big Creek ALP Projects are detailed below:

Aquatic Resources

Spawning Gravel Embeddedness Assessment Following Release of Flushing Flows – Qualitatively assess gravel embeddedness in association with pool depth assessments following flushing flow releases from Dams 4, 5, and 6.

Sediment Management – Include the gravel augmentation feasibility assessment specified in section B.1.2.2 of the Settlement Agreement (measures not to be included in a new license) as a condition of a new license because this assessment pertains to Mammoth Pool dam spillway functions and maintenance of a project access road.

Terrestrial Resources

Bald Eagles – Specify in SCE's Avian Protection Plan that as follow-up to any documented bald eagle mortality at project transmission lines, the most recent APLIC guidelines would be used to assess appropriate corrective actions (the most recent guidance was issued in 2006 and it is likely to be updated during the life of the project).

Recreation

Funding Rehabilitation of Campgrounds – SCE would not be required to fund rehabilitation of five campgrounds that are located outside the existing and proposed project boundaries.

Report on Recreational Resources – SCE would provide reservoir elevation, boat ramp accessibility information, and parking and campsite capacity as a component of the Form 80 Recreation Report.

Land Use

Fire Management Plan – Include a Fire Management Plan in the Land Resource Plans that are approved by the Forest Service.

Sign Plan – Include a Sign Plan in the Land Resource Plans that are approved by the Forest Service.

Spill Prevention and Countermeasure Plan– Include a Spill Prevention and Countermeasure Plan in the Land Resource Plans approved by the Forest Service.

2.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER ANALYSIS

2.4.1 Issuing a Non-Power License

A non-power license is a temporary license that the Commission terminates when it determines that another governmental agency will assume regulatory authority and supervision over the lands and facilities covered by the license. At this point, no agency has suggested a willingness or ability to do so. No party has sought non-power licenses, and we have no basis for concluding that the Big Creek ALP Projects should no longer be used to produce power. Thus, we do not consider a non-power license a realistic alternative to relicensing in this circumstance.

2.4.2 Federal Government Takeover of the Projects

We do not consider federal takeover to be a reasonable alternative. Federal takeover and operation of the Big Creek ALP Projects would require Congressional approval. Although that fact alone would not preclude further consideration of this alternative, there is no evidence to indicate that federal takeover should be recommended to Congress. No party has suggested federal takeover would be appropriate, and no federal agency has expressed an interest in operating the projects.

2.4.3 Project Retirement

Retiring the Big Creek ALP Projects would require denying SCE's license applications and require the surrender and termination of the existing licenses with any necessary conditions. The projects would no longer be authorized to generate power. Retiring the projects would involve significant cost and would foreclose any opportunity to add environmental enhancements to the existing Big Creek ALP Projects. For these reasons, we do not consider project retirement to be a reasonable alternative.