DEVIL CANYON PROJECT RELICENSING
FERC PROJECT NUMBER 14797

FINAL LICENSE APPLICATION
VOLUME I OF IV

November 2019

State of California
California Natural Resources Agency
DEPARTMENT OF WATER RESOURCES
Hydropower License Planning and Compliance Office

GAVIN NEWSOM	**WADE CROWFOOT**	**KARLA A. NEMETH**
Governor	Secretary for	Director
State of California	California Natural Resources	Department of Water Resources

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Final License Application
Initial Statement

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State of California
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BEFORE THE FEDERAL REGULATORY COMMISSION

Application for New License for Major Project – Existing Dam

1.0 INITIAL STATEMENT

1.1 INTRODUCTION

The California Department of Water Resources (DWR) applies to the Federal Energy Regulatory Commission (FERC) for a new license for the Devil Canyon Project Relicensing, FERC Project Number (No.) 14797 (Project), a water power project, as described in the attached exhibits. The Project is currently part of FERC Project No. 2426. Lands within the Project's existing boundary include National Forest System lands managed by the U.S. Department of Agriculture, Forest Service as part of the San Bernardino National Forest.

This Application for a New License Major Project – Existing Dam (Application for New License) is filed under the Traditional Licensing Process, as described in Title 18 of the Code of Federal Regulations (CFR), Part 4, Subparts D-H and, as applicable, Part 16.

This Initial Statement conforms to the regulations in 18 CFR Section (§) 4.51(a), which pertain to the contents of an Initial Statement, and § 4.32, which describes information to be made available to the public in an application.

1.2 LOCATION OF THE PROJECT

The location of the Project is:

State:	California
Township or nearby town:	Cities of San Bernardino and Hesperia
County:	San Bernardino
Stream or other body of water:	State Water Project

The Project is located in whole or in part within the following irrigation districts, drainage districts, or similar special purpose political subdivisions.

Crestline-Lake
Arrowhead Water Agency
General Manager
24116 Crest Forest Drive
Crestline, California 92325-3880

Inland Empire
Resource Conservation District
Director
25864-K Business Center Drive
Redlands, California 92374

Local Agency Formation Commission
of San Bernardino County
Commission Clerk
215 North D Street, Suite 204
San Bernardino, California 92415-0490

San Bernardino Valley
Municipal Water District
General Manager
380 East Vanderbilt Way
San Bernardino, California 92408-3593

Crestline Sanitation District
General Manager
24516 Lake Drive
Crestline, California 92325

Crestline Village Water District
General Manager
777 Cottonwood Drive
Crestline, California 92325-3347

Mojave Desert Resource Conservation
District
General Manager
15415 W. Sand St #103
Victorville, California 92392

1.3 DWR'S NAME, BUSINESS ADDRESS, AND TELEPHONE NUMBER

DWR's physical address, mailing address, and telephone number are:

Physical Address & Telephone Number:
California Department of Water
Resources
2033 Howe Avenue, Suite 220
Sacramento, California 95825
Tel: (916) 557-4554

Mailing Address:
California Department of Water
Resources
P.O. Box 942836
Sacramento, California 94236-0001

The exact name, business address, and telephone number of the person authorized to act for DWR as an agent for this Application for New license are:

Physical Address:
Gwen Knittweis, Chief
Hydropower License Planning and
Compliance Office
Executive Division
California Department of Water
Resources
2033 Howe Avenue, Suite 220
Sacramento, California 95825
Tel: (916) 557-4554
Gwen.Knittweis@water.ca.gov

Mailing Address:
Gwen Knittweis, Chief
Hydropower License Planning and
Compliance Office
Executive Division
California Department of Water
Resources
P.O. Box 942836
Sacramento, California 94236-0001

1.4 DWR'S ORGANIZATIONAL STATUS

DWR is an agency of the State of California, organized and existing pursuant to the laws of the State of California. It is a municipality within the meaning of Section 796(7) of the Federal Power Act.

1.5 PERTINENT STATUTORY AND REGULATORY REQUIREMENTS OF THE STATE OF CALIFORNIA

The statutory or regulatory requirements of California, the State in which the Project is located, that may affect the Project with respect to: (1) bed and banks; (2) appropriation, diversion, and use of water for power purposes; (3) right to engage in the business of developing, transmitting, and distributing power; and (4) any other business necessary to accomplish the purposes of the license under the Federal Power Act, are:

- California Water Code Section 13160 – Designates the California State Water Resources Control Board (SWRCB) as the State water pollution control agency for the Federal Water Pollution Control Act and any other federal act. Title 23, California Code of Regulations, Sections 3855-3861 specify requirements and procedures for applications for water quality certificates required under federal law.

- California Water Code Sections 6075-6157 – Specifies powers of the California Division of Safety of Dams (DSOD) and requirements and procedures for the inspection and maintenance of dams.

- California Water Code Section 11295 authorizes DWR to construct and operate plants and works for the generation, transmission, sale and use of electric power.

- California Water Code Section 11130 authorizes DWR to use any State real property including the land lying beneath any navigable waters of the State for the purpose of the State Water Project.

- California Water Code Section 1375 et seq. authorizes the State Water Resources Control Board to issue water rights permits.

The steps which DWR has taken or plans to take to comply with each of the laws and regulations cited above are described below:

- DWR already has the water rights necessary to operate the Project.

- DWR will file an application for water quality certification, if applicable, with the SWRCB within 60 days after FERC issues a notice that DWR's Application for New License is ready for environmental analysis.

- DWR cooperates, and will continue to cooperate, with DSOD on annual inspections of Project dams.

1.6 OWNERSHIP OF EXISTING PROJECT FACILITIES

DWR owns all existing Project facilities.

1.7 PROPERTY RIGHTS NECESSARY TO CONSTRUCT, OPERATE, AND MAINTAIN THE PROJECT

DWR has all necessary proprietary rights, title, and interest in lands and waters to operate and maintain the Project.

1.8 COUNTIES, CITIES, AND OTHER POLITICAL SUBDIVISIONS AND INDIAN TRIBES AFFECTED BY THE PROJECT

The name and mailing address of the county in which the Project is located is:

County of San Bernardino
Board of Supervisors
County Government Center
385 North Arrowhead Avenue, 5th Floor
San Bernardino, California 92415

The name and mailing address of the city in which a portion of the Project is located is:

City of San Bernardino
City Manager
300 North D Street, 6th Floor
San Bernardino, California 92418

The Project is located within 15 miles of the following city(s) and town(s) that have a population of 5,000 or more:

Town of Apple Valley
Town Manager
14955 Dale Evans Parkway
Apple Valley, California 92307

City of Colton
City Manager
650 North La Cadena Drive
Colton, California 92324

City of Crestline
General Manager
24385 Lake Drive
Crestline, California 92325-3880

City of Fontana
City Manager
8353 Sierra Avenue
Fontana, California 92335-3528

City of Hesperia
City Manager
9700 Seventh Avenue
Hesperia, California 92345

City of Highland
City Manager
27215 Base Line
Highland, California 92346

Unincorporated Community of
Lake Arrowhead
General Manager
P.O. Box 3880
Crestline, California 92325-3880

City of Rancho Cucamonga
City of Manager
10500 Civic Center Drive
Rancho Cucamonga, California 91730

City of Rialto
City Administrator
150 South Palm Avenue
Rialto, California 92376

City of Victorville
City Manager
14343 Civic Drive
Victorville, California 92392

DWR has reason to believe the following cities, counties, irrigation districts, water districts, and local agencies would likely be interested in, or affected by, this new license:

City of Adelanto
City Manager
11600 Air Expressway
Adelanto, California 92301

Coachella Valley Water District
General Manager – Chief Engineer
51501 Tyler Street
Coachella, California 92236-1058

Desert Water Agency
General Manager
1200 S. Gene Autry Trail
Palm Springs, California 92264

City of Grand Terrace
City Manager
22795 Barton Road
Grand Terrace, California 92313

City of Jurupa Valley
City Manager
8930 Limonite Avenue
Jurupa Valley, California 92509

City of Loma Linda
City Manager
25541 Barton Road
Loma Linda, California 92354-3125

The Metropolitan Water District of
Southern California
General Manager
700 North Alameda Street
Los Angeles, California 90012-2944

City of Moreno Valley
City Manager
14177 Frederick Street
Moreno Valley, California 92552

Mojave Water Agency
General Manager
13846 Conference Center Drive
Apple Valley, California 92307-4377

City of Ontario
City Manager
303 East B Street
Ontario, California 91764

City of Redlands
City Manager
35 Cajon Street, Suite 200
Redlands, California 92373

City of Riverside, Public Utilities
Department
Planning Director
3900 Main Street
Riverside, California 92522-0001

County of Riverside
Planning Director
4080 Lemon Street, 14th Floor
P.O. Box 1605
Riverside, California 92502-1605

San Gabriel Valley Municipal Water District
General Manager
1402 N. Vosburg Drive
Azusa, California 91702

San Gorgonio Pass Water Agency
General Manager and Chief Engineer
1210 Beaumont Avenue
Beaumont, California 92223-1506

Native American individuals and organizations that are federally recognized Indian tribes that may be affected by the Project are listed below. By including this list here, DWR does not imply that any tribe listed below will be interested in the Devil Canyon Project relicensing, or that tribes not included in this list would not be interested in the relicensing.

Morongo Band of Mission Indians
Robert Martin, Chairperson
12700 Pumarra Road
Banning, California 92220

Morongo Band of Mission Indians
Travis Armstrong
Tribal Historic Preservation Officer
12700 Pumarra Road
Banning, California 92220

San Manuel Band of Mission Indians
Lynn Valbuena, Chairwoman
26569 Community Center SR
Highland, California 92346

San Manuel Band of Mission Indians
Lee Clauss, Director of CRM
26569 Community Center SR
Highland, California 92346

Native American individuals and organizations that may be affected by the Project are listed below. By including this list here, DWR does not imply that any tribe listed below will be interested in the Devil Canyon Project relicensing, or that tribes not included in this list would not be interested in the relicensing.

Gabrieleño Band of Mission Indians - Kizh Nation
Andrew Salas, Chairperson
P.O. Box 393
Covina, California 91723

Gabrielino/Tongva Nation
Sam Dunlap, Cultural Resources Director
P.O. Box 86908
Los Angeles, California 90086

Gabrielino/Tongva Nation
Sandonne Goad, Chairperson
106 1/2 Judge John Aiso Street, #231
Los Angeles, California 90012

Gabrieleño/Tongva San Gabriel Band of Mission Indians
Anthony Morales, Chairperson
P.O. Box 693
San Gabriel, California 91778

Serrano Nation of Mission Indians
Mark Cochrane, Co-Chairperson
P.O. Box 343
Patton, California 92369

Serrano Nation of Mission Indians
Wayne Walker, Co-Chairperson
P.O. Box 343
Patton, California 92369

San Fernando Band of Mission Indians
Donna Yocum, Chairperson
P.O. Box 221838
Newhall, California 91322

Chemehuevi Indian Reservation
Charles Wood, Chairperson
P.O. Box 1976
Havasu Lake, California 92363

1.9 EXHIBITS

The exhibits that are filed as part of this Application for New License are:

- Exhibit A – Project Description
- Exhibit B – Project Operations and Resource Utilization
- Exhibit C – Construction History and Proposed Construction Schedule for the Project
- Exhibit D – Statement of Costs and Financing
- Exhibit E – Environmental Report
- Exhibit F – General Design Drawings
- Exhibit G – Project Maps
- Exhibit H – Plans and Ability of Applicant to Operate Efficiently

The foregoing Initial Statement and attached exhibits are hereby made part of DWR's Application for New License for the Devil Canyon Project.

SUBSCRIPTION AND VERIFICATION

This application for new license is executed in the State of California, City of Sacramento, and County of Sacramento by Karla A. Nemeth, Director of the California Department of Water Resources, being first duly sworn, deposes and states that the contents of this application for new license are true to the best of her knowledge or belief, and signs the application this 12 day of November, 2019.

CALIFORNIA DEPARTMENT OF WATER RESOURCES

By: _____

Karla A. Nemeth, Director

Subscribed and sworn to (or affirmed) before me on this 12 date of November, 2019 by Karla A. Nemeth proved to me on the basis of satisfactory evidence to be the person(s) who appeared before me.

_____

NATHAN MYHRE
Notary Public - California
Sacramento County
Commission # 2262822
My Comm. Expires Oct 15, 2022

DEVIL CANYON PROJECT RELICENSING
FERC PROJECT NUMBER 14797

Final License Application
Exhibit A – Project Description

November 2019

State of California
California Natural Resources Agency
DEPARTMENT OF WATER RESOURCES
Hydropower License Planning and Compliance Office

GAVIN NEWSOM	**WADE CROWFOOT**	**KARLA A. NEMETH**
Governor	Secretary for	Director
State of California	California Natural Resources	Department of Water Resources

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COMMONLY USED TERMS, ACRONYMS & ABBREVIATIONS

§	Section
%	percent
AF	acre-feet
Application for New License	Application for a New License Major Project – Existing Dam for the Devil Canyon Project Relicensing, Federal Energy Regulatory Commission Project Number 14797
CA	California
CFR	Code of Federal Regulations
cfs	cubic feet per second
DPR	California Department of Parks and Recreation
DWR	California Department of Water Resources
FERC	Federal Energy Regulatory Commission
hp	horsepower
kW	kilowatt
MWh/yr	megawatt-hours per year
NMWSE	Normal Maximum Water Surface Elevation
No.	Number
O&M	operation and maintenance
Project	Devil Canyon Project Relicensing, Federal Energy Regulatory Commission Project Number 14797
Project vicinity	This is the area within the existing Project boundary and the area surrounding the Project on the order of a USGS 1:24,000 quadrangle
RA	Resource Adequacy
rpm	revolutions per minute
SRA	State Recreation Area
SWP	State Water Project
U.S.	United States
U.S.C.	United States Code
USFS	U.S. Department of Agriculture, Forest Service
USGS	U.S. Geological Survey

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1.0 INTRODUCTION

The California Department of Water Resources (DWR) has prepared this Exhibit A, Project Description, as part of its Application for a New License Major Project – Existing Dam (Application for New License) from the Federal Energy Regulatory Commission (FERC) for the Devil Canyon Project Relicensing, FERC Project Number 14797 (Project). This exhibit has been prepared to conform with Title 18 of the Code of Federal Regulations (CFR), Subchapter B (Regulation under the Federal Power Act), Part 4, Subpart F (Application for License for Major Project – Existing Dam) (Traditional Licensing Process). In particular, this exhibit complies with the regulations in 18 CFR Section (§) 4.51(b). For reference, 18 CFR § 4.51(b) states:

> Exhibit A is a description of the project. This exhibit need not include information on project works maintained and operated by the U.S. Army Corps of Engineers, the Bureau of Reclamation, or any other department or agency of the United States, except for any project works that are proposed to be altered or modified. If the project includes more than one dam with associated facilities, each dam and the associated component parts must be described together as a discrete development. The description for each development must contain:
>
> (1) The physical composition, dimensions, and general configuration of any dams, spillways, penstocks, powerhouses, tailraces, or other structures, whether existing or proposed, to be included as part of the project;
>
> (2) The normal maximum surface area and normal maximum surface elevation (mean sea level), gross storage capacity, and usable storage capacity of any impoundments to be included as part of the project;
>
> (3) The number, type, and rated capacity of any turbines or generators, whether existing or proposed, to be included as part of the project;
>
> (4) The number, length, voltage, and interconnections of any primary transmission lines, whether existing or proposed, to be included as part of the project (see 16 U.S.C. 796[11]);
>
> (5) The specifications of any additional mechanical, electrical, and transmission equipment appurtenant to the project; and
>
> (6) All lands of the United States that are enclosed within the project boundary described under paragraph (h) of this section (Exhibit G), identified and tabulated by legal subdivisions of a public land survey of the affected area or, in the absence of a public land survey, by the best available legal description. The tabulation must show the total acreage of the lands of the United States within the project boundary.

Excluding this introductory material, this exhibit includes six sections. The Project's location is described in Section 2.0. Section 3.0 provides details of the existing Project facilities, including dimensions, physical features, and other pertinent information. Section 4.0 describes the area within the existing Project boundary, including the legal description and total acreage for all parcels owned by the United States (U.S.). Section 5.0 describes DWR's proposed changes to existing Project facilities. Section 6.0 discusses DWR's proposed changes to the existing Project boundary, including changes to total acreage of land within the existing Project boundary owned by the United States. Section 7.0 includes a list of references cited in this exhibit.

Refer to Exhibit B for a description of Project operations, Exhibit C for a description of construction history and proposed construction schedule, Exhibit D for costs and financing information, and Exhibit E for a discussion of potential environmental effects and DWR's proposed resource management measures. Project design drawings are included in Exhibit F, and Project maps are included in Exhibit G. Exhibit H includes a detailed description of the need for the power generated by the Project, and other important miscellaneous information.

All elevation data in this exhibit are in U.S. Department of Commerce, National Oceanic and Atmospheric Association, National Geodetic Survey Vertical Datum of 1929, unless otherwise stated.

2.0 PROJECT LOCATION

The existing Project is part of a larger water storage and delivery system, the State Water Project (SWP), which is the largest state-owned and operated water supply project of its kind in the United States. The SWP provides southern California with many benefits, including an affordable water supply, reliable regional clean energy, opportunities to integrate green energy, accessible public recreation opportunities, and environmental benefits.

The Project is located in San Bernardino County on the East Branch of the SWP. Figure 2.0-1 shows the Project vicinity. Figure 2.0-2 shows Project facilities; the existing and proposed Project boundaries are shown for reference purposes.

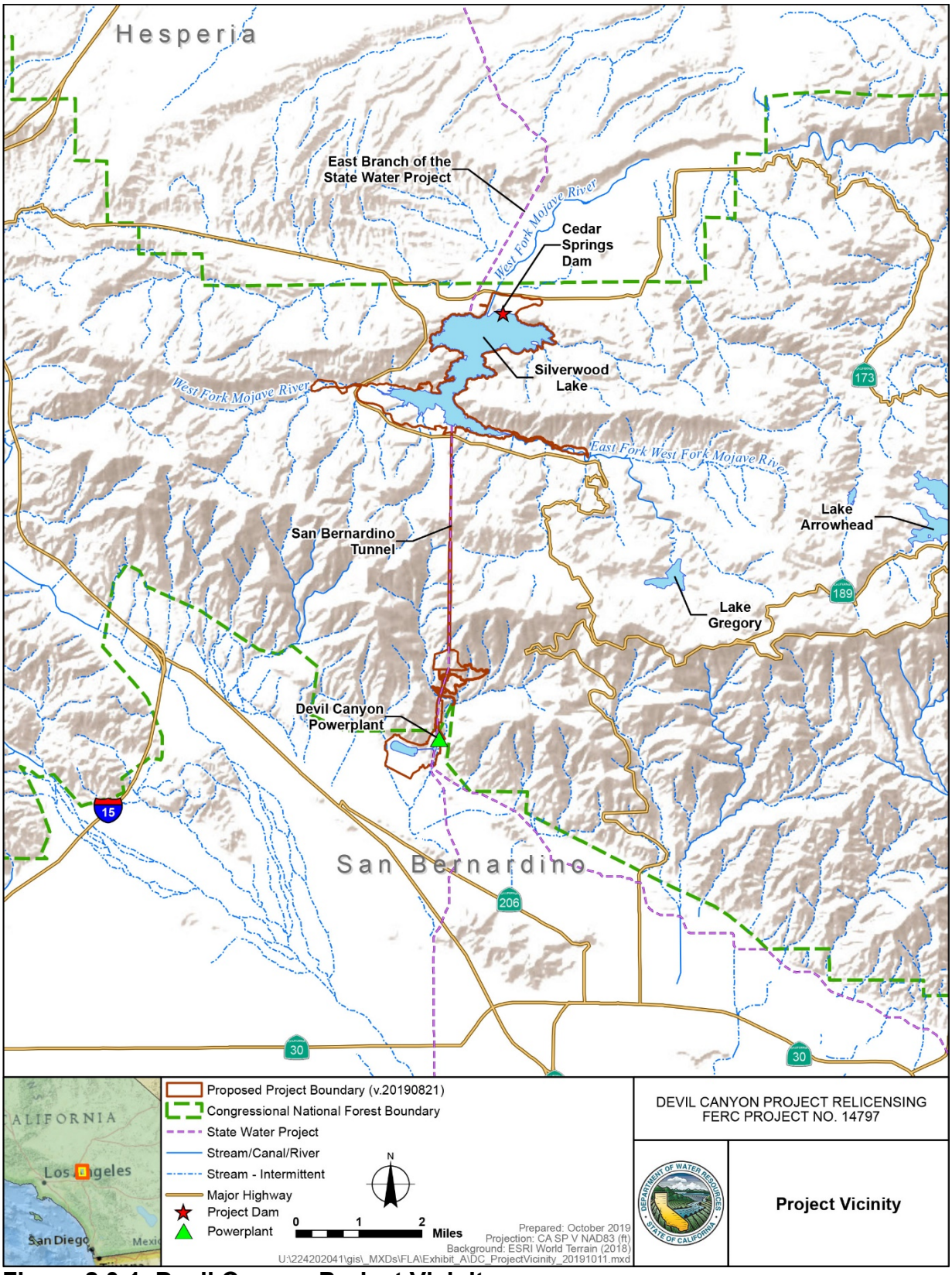

Figure 2.0-1. Devil Canyon Project Vicinity

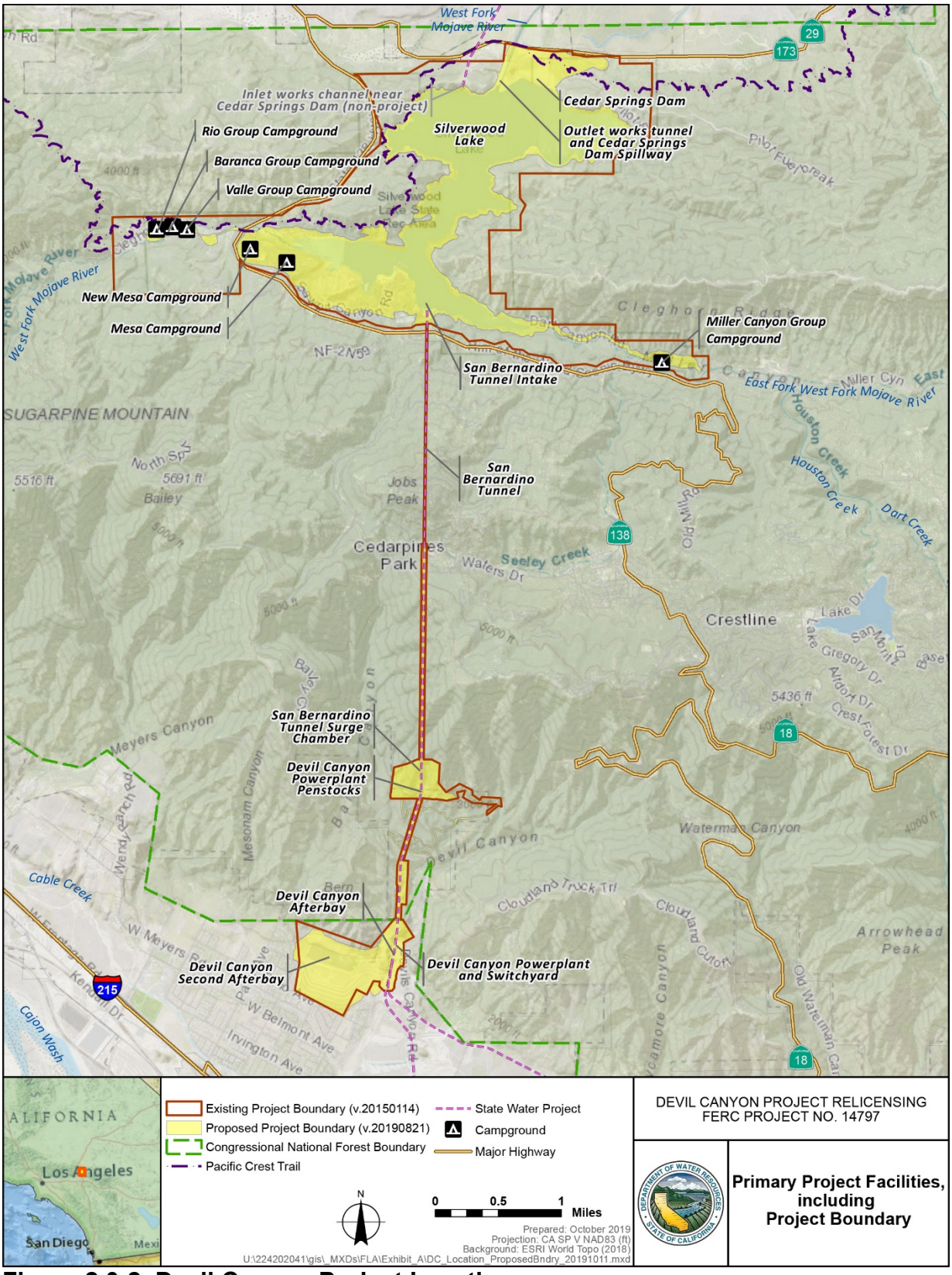

Figure 2.0-2. Devil Canyon Project Location

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3.0 EXISTING PROJECT FACILITIES AND FEATURES

The existing Project can store approximately 76,051 acre-feet (AF) of SWP water, and generates an average of 836,000 megawatt-hours of energy annually. The existing Project's FERC licensed authorized installed capacity is 272,796 kilowatts (kW) and the Project's calculated dependable capacity is 250,100 kW. Table 3.0-1 and Table 3.0-2 summarize key information for Project powerplants and for reservoirs and impoundments, respectively.

The Project includes one development: Devil Canyon. The Project does not include the following features located within the proposed Project boundary or its vicinity:

- Any open water conduits, excluding the Cross Channel described in Section 3.5, transmission lines or spoil piles
- Inlet Works at Silverwood Lake, including the transition structure, chute, energy dissipation structure, and associated riprap, which is part of the conveyance from the Mojave Siphon on the SWP outside of the existing Project boundary
- Fenced-in laydown and storage yard, which is used by DWR for multiple projects, at the base of Cedar Springs Dam
- The water intake, treatment facilities, and distribution facilities of the Crestline-Lake Arrowhead Water Agency
- The Cleghorn Wastewater Treatment Plant, collection system, water storage tank, and outflow pipeline of the Crestline Sanitary District on the west side of State Highway 138, near the California Department of Parks and Recreation (DPR) administration building
- The Administrative Building and other administrative and maintenance facilities of DPR
- The Pacific Crest National Scenic Trail
- A small section of State Highway 138
- General public multiple use access roads
- The Southern California Edison transmission system
- The San Bernardino Valley Municipal Water District's San Bernardino Pipeline, the SWP's Santa Ana Pipeline, the San Gabriel Valley Municipal Water District's Azusa Pipeline, and the Metropolitan Water District of Southern California's Rialto Pipeline from the Devil Canyon Afterbay, including their valves, turnouts, meters and connections
- The Santa Ana Pipeline, Rialto Pipeline, and the Inland Feeder Pipeline from the Devil Canyon Second Afterbay, including their valves, turnouts, meters, and connections

Table 3.0-1. Devil Canyon Project Powerplant – Key Information

Powerhouse	Unit	Turbine Type	Rated Head (feet)	Rated Hydraulic Capacity (cfs)		Generation Capacity (kW)		Average Annual Energy (MWh/yr)[2]
				Minimum	Maximum	Installed	Dependable[1]	
Devil Canyon	1	Pelton	1,357	50	670	59,850	--	--
	2	Pelton	1,357	50	670	59,850	--	--
	3	Pelton	1,250	50	800	76,548	--	--
	4	Pelton	1,250	50	800	76,548	--	--
Total	**4**	**--**	**--**	**200**	**2,940**	**272,796**	**250,100**	**836,000**

Sources: ACES the CAISO NERC Registry, Mapper Reservoir Storage Software, Operation Control Office
Notes:
[1]DWR calculated dependable capacity by multiplying the Devil Canyon Powerplant's average monthly Resource Adequacy (RA) data for 2013 through 2017 by the yearly RA capacity.
[2]DWR calculated average annual energy by multiplying the Project's installed capacity by the reported Devil Canon Powerplant operating availability average of 89.31 percent for the 2010 through 2017 period.
The maximum capacity of the San Bernardino Tunnel and penstocks is 2,811 cfs.
Key:
cfs = cubic feet per second
kW = kilowatt
MWh/yr = megawatt-hours per year

Table 3.0-2. Devil Canyon Project Reservoirs and Impoundments – Key Information

Project Reservoir	NMWSE (feet)[1]	Gross Storage (AF)[1]	Usable Storage[1,2] (AF)	Surface Area[1,3] (acres)	Maximum Depth[1] (feet)	Shoreline Length[1]	Drainage Area[1,3] (square miles)
Silverwood Lake	3,355	75,000	33,820	995	236	13 miles[1]	144.8
Devil Canyon Afterbay	1,932.6	49	43	4	15	1,940 feet	None
Devil Canyon Second Afterbay	1,930.5	1,002	620	36	40	5,500 feet	None
Total	**--**	**76,051**	**34,483**	**1,035**	**--**	**--**	**--**

Notes:
[1]All values are based on the normal maximum operating levels.
[2]Storage between operating maximum 3,353 feet and operating minimum pool 3,312 feet.
[3]At the dam, drainage areas are not additive.
The following data corresponds to the operating maximum elevation of the facility:
Silverwood: NMWSE – 3,353 feet, gross capacity – 73,032 AF, surface area – 962 acres
Devil Canyon First Afterbay: NMWSE – 1,932 feet, gross capacity – 49 AF, surface area – 4 acres
Devil Canyon Second Afterbay: NMWSE – 1,930 feet, gross capacity – 960 AF, surface area – 36 acres
Key:
AF = acre-feet
NMWSE = Normal Maximum Water Surface Elevation

3.1 CEDAR SPRINGS DAM AND SILVERWOOD LAKE

Cedar Springs Dam and Silverwood Lake (Figure 3.1-1), located on the West Fork Mojave River, are about 90 miles southeast of the bifurcation of the east and west branches of the SWP and 25 miles north of the City of San Bernardino. Completed in 1971, Cedar Springs Dam is a 249-foot-tall, zoned earth and rockfill dam, with a dam crest that is 42 feet wide and 2,230 feet long, at an elevation of 3,378 feet. It contains approximately 7.6 million cubic yards of embankment. At the Normal Maximum Water Surface Elevation (NMWSE) of 3,355 feet, Silverwood Lake has a storage capacity of 75,000 AF, a usable storage capacity of 33,820 AF, normal maximum surface area of 995 acres, and a shoreline length of about 13 miles.

Figure 3.1-1. Downstream Face of Cedar Springs Dam and Silverwood Lake from the Right Abutment

The Cedar Springs Dam Spillway is located on the left abutment of the dam and consists of a 120-foot long, un-gated crest with a rectangular lined concrete channel. The Cedar Springs Dam low-level outlet works is located in the left abutment of the dam directly below the spillway. The low-level outlet works consists of an un-gated intake tower, a pressure tunnel connecting the intake tower to a gate chamber, a free-flow tunnel downstream from the gate chamber that discharges into the spillway chute just

upstream from the stilling basin, and an air intake that also serves as an emergency exit. The maximum capacity of the low-level outlet works is 5,000 cubic feet per second (cfs).

3.2 SAN BERNARDINO TUNNEL AND SURGE CHAMBER

The San Bernardino Tunnel intake is a vertical reinforced concrete tower on the south end of Silverwood Lake that draws water from the reservoir and conveys it into the San Bernardino Tunnel.

The San Bernardino Tunnel is a pressure conduit, which conveys water from Silverwood Lake to the Devil Canyon Penstocks. The 3.81-mile-long, concrete-lined tunnel has a design capacity of 2,811 cfs at Silverwood Lake NMWSE and is primarily 13 feet in diameter up to the lower 425 feet, which is 12.75 feet in diameter and both steel- and concrete-lined.

The San Bernardino Tunnel Surge Chamber is 120 feet in diameter and 383 feet in height, of which 225 feet is underground. The underground portion is concrete and is steel-lined throughout. A steel tank forms the aboveground, 158-foot portion of the surge chamber. The external portion of the tank is sealed with coal tar epoxy and has an off-white color. A 108-foot-long juncture structure connects the surge chamber to the tunnel through a 28-foot diameter riser.

3.3 DEVIL CANYON POWERPLANT PENSTOCKS

Water enters the Devil Canyon Powerplant via two surface penstocks. One of the penstocks, which is constructed of steel, is 1.3 miles long, with a diameter varying from 9.5 feet at the south portal (i.e., where the tunnel transitions to a penstock) to 8 feet at the plant. The other penstock, constructed of steel, is also 1.3 miles long, and has a diameter varying from 12.5 feet at the south portal to 8 feet at the plant. The external portions of the penstocks are sealed with inorganic zinc sulfate and have a grey color. Both penstocks are supported by a set of ring girders resting on a single concrete pier. The above-ground penstocks run parallel, generally following the ground slope from the south portal to the Devil Canyon Powerplant. The maximum capacities of the two penstocks at Silverwood Lake NMWSE are approximately 1,200 cfs and 1,600 cfs, respectively.

3.4 DEVIL CANYON POWERPLANT

The Devil Canyon Powerplant (Figure 3.4-1) is located at the base of the San Bernardino Mountains in the City of San Bernardino and is designed to recover power in electrical form from the waters of the SWP as it drops from the high desert through the Devil Canyon Powerplant turbines.

The elevation drop from Silverwood Lake provides the Devil Canyon Powerplant with a normal static head of 1,406 feet at the NMWSE of Silverwood Lake.

The Devil Canyon Powerplant has four generation units. These include one Baldwin-Lima-Hamilton Pelton-type turbine and one Sulzer Escher Wyss Pelton-type turbine, each with 1,357 feet rated head, 277 revolutions per minute (rpm) runner speed, 81,000 horsepower (hp) rated output, 670 cfs approximate rated discharge, and a licensed capacity of 59,850 kW. The other two are Voith Pelton-type turbines, each with 1,250 feet rated head, 277 rpm runner speed, 102,064 hp rated output, 800 cfs approximate rated discharge, and a licensed capacity of 76,548 kW.

Figure 3.4-1. Devil Canyon Powerplant and Devil Canyon Afterbay from the Road Leading to the Second Afterbay

3.5 DEVIL CANYON SWITCHYARD

The Devil Canyon Switchyard includes four step-up transformers. There are multiple current transformers and potential transformers in the switchyard. The main function of the transformers is metering and protection. The ratings of the current transformers and potential transformers, which are part of the interconnected transmission system, are CEII and are provided separately (Single-Line Diagram of the Devil Canyon Powerplant in Exhibit F). The Project does not include a primary transmission line but connects to the Southern California Edison interconnected system at the switchyard.

3.6 DEVIL CANYON AFTERBAY DAM AND AFTERBAY

Water from the Devil Canyon Powerplant flows to the off-channel Devil Canyon Afterbay, which has a surface area of four acres at a NMWSE of 1,932.6 feet, a capacity of 49 AF, and an embankment crest elevation of 1,940 feet. Completed in 1974, the afterbay provides a minimal amount of regulatory capacity for matching the powerplant's inflows and outflows to different pipelines for SWP water deliveries outside of the existing Project boundary.

SWP water supply in Devil Canyon Afterbay is either conveyed to the Devil Canyon Second Afterbay for future delivery or via four pipelines to meet downstream water supply demands. SWP water is delivered to the Devil Canyon Second Afterbay via the 1,100-foot-long, 40-foot-wide, 27-foot-deep concrete-lined Cross Channel with an approximately 13-foot-high uncontrolled weir structure at the inlet to the Cross Channel. SWP water scheduled to meet downstream water supply demands is delivered through the following four pipelines: the Rialto Pipeline; Azusa Pipeline; Santa Ana Pipeline; or the San Bernardino Pipeline.

The Devil Canyon Afterbay includes a spillway structure designed for emergency purposes but the spillway has never been used, and is obsolete due to the construction of the Second Afterbay. This spillway and the four pipelines connected to the Devil Canyon Afterbay, including their valves, turnouts, meters, and connections, are not part of the Project facilities. There are no other releases from the Devil Canyon Afterbay.

3.7 DEVIL CANYON SECOND AFTERBAY DAM AND AFTERBAY

Completed in 1995, the Devil Canyon Second Afterbay (Figure 3.7-1) was added to the Project to increase the operational flexibility and capacity of the Devil Canyon Powerplant. The Devil Canyon Second Afterbay NMWSE is 1,930.5 feet, has a gross storage capacity of 960 AF, and a surface area of approximately 36 acres. Devil Canyon Second Afterbay is an off-channel, below-original-ground-level water holding structure.

All operational releases from the Devil Canyon Second Afterbay occur through the outlet structure. SWP water can be delivered through the outlet structure via one of three pipelines: the Rialto, Santa Ana, and Inland Feeder. The Devil Canyon Second Afterbay also has an emergency overflow spillway discharge outlet, as well as a low-level emergency outlet release. The Rialto Pipeline, Santa Ana Pipeline, and Inland Feeder, including their valves, turnouts, meters, and connections within the existing Project boundary, are non-Project facilities.

Figure 3.7-1. Devil Canyon Second Afterbay from the West Side of the Afterbay Looking East

3.8 PROJECT GAGES

The existing license does not identify any streamflow or reservoir stage gages for the purpose of complying with streamflow or reservoir elevation requirements.

3.9 PROJECT RECREATION FACILITIES

Table 3.9-1 lists Project recreational facilities, all of which are located at Silverwood Lake. Public access to the Devil Canyon Afterbay and Second Afterbay is not permitted due to safety concerns.

Table 3.9-1. Project Recreation Facilities

Silverwood Lake SRA Recreational Facility	Description
Rio Group Camp	Group camping facility with 100 person capacity
Barranca Group Camp	Group camping facility with 100 person capacity
Valle Group Camp	Group camping facility with 100 person capacity
Cleghorn Day Use Area	Day use shoreline facility with swim beach and picnicking sites
Cleghorn Boat Launch	Day use facility with boat launch and courtesy dock, restrooms
Garces Overlook	Developed overlook view point
New Mesa Campground	Campground with 42 full hook up individual camping units
Entrance Station	Kiosk entry station for recreationists
Nature Center	2,700-square foot facility for interpretive programs
Mesa Campground	Campground facility with 107 individual camping units
Campfire Center	Outdoor amphitheater for interpretive programs
Sawpit Canyon Picnic Area 3	Day use facility with 57 picnicking units
Sawpit Canyon Picnic Area 2	Day use facility with 45 picnicking units
Sawpit Canyon Picnic Area 1	Day use facility with 10 picnicking units
Sawpit Canyon Day Use Area	Day use shoreline facility with swim beach with multiple picnicking facilities and concessionaire store
Black Oak Picnic Area	Day use facility with 84 picnicking units
Sawpit Canyon Marina	Marina facilities with moorage facilities for 61 boats and concessionaire boat rentals
Sawpit Canyon Boat Launch	7-lane boat launch and courtesy docks
Jamajab Point Overlook	Developed overlook view point
Serrano Landing Day Use Area	Boat-in/hike-in shoreline day use site with picnicking facilities
Miller Canyon Picnic Area	Bike-in/hike-in day use site with 12 picnicking units
Lynx Point Overlook	Developed overlook view point
Devil’s Pit Overlook	Developed overlook view point with wooden viewing platform

Table 3.9-1. Project Recreation Facilities (continued)

Silverwood Lake SRA Recreational Facility	Description
Miller Canyon Group Camp	Group camping area with 3 sites holding up to 40 persons each
Miller Canyon Trailhead	Developed trail head for accessing all Miller Canyon facilities and shorelines
Sycamore Landing Day Use Area	Boat-in day use site with 13 picnicking units
Live Oak Landing Day Use Area	Boat-in/hike-in day use site with 8 picnicking units
Chamise Day Use Area	Boat-in day use site with 7 picnicking units
Garces Trail	0.4-mile-long trail linking Cleghorn Day Use area to Garces Overlook
Miller Canyon Trail	1.6-mile-long asphalt surfaced trail linking Miller Canyon Group Camps to the Silverwood Bike Path
East Fork Trail	0.3-mile long asphalt surfaced trail
Silverwood Bike Path	5.6-mile-long paved bike path connecting Serrano Landing Day Use Area in Miller Canyon to Cleghorn Day Use Area on the West end of Silverwood Lake SRA

Source: DWR 2016
Key:

SRA = State Recreation Area

3.10 ROADS AND TRAILS

The existing license does not identify any Primary Project Roads. A Primary Project Road or Trail includes any road or any trail that is identified in the license as a Project facility, is used almost exclusively to access the Project, is within the existing Project boundary, and is operated and maintained exclusively by DWR as a Project feature. Roads and trails associated with Project recreation facilities are considered part of the Project recreation facilities and are not discussed in this section.

4.0 EXISTING PROJECT BOUNDARY

The existing Project boundary comprises 3,744.0 acres of land (Figure 2.1-2). Within the total acreage, 221.0 acres are federal lands managed by the U.S. Department of Agriculture, Forest Service as part of the San Bernardino National Forest (Table 4.0-1). Most of these federal lands are located along the west side of Silverwood Lake, San Bernardino Tunnel and Surge Chamber, and Devil Canyon Powerplant Penstocks areas.

Table 4.0-1. Summary of Land Ownership Within the Existing Project Boundary

Development	USFS (acres)	State of California (acres)	Private (acres)	Total	
				Area (acres)	Percent of Total
Devil Canyon	221.0	3,501.3	21.7	3,744.0	--
Percent	5.9%	93.5%	0.6%	--	100.0%

Source: Compiled by the California Department of Water Resources – Geodetic Branch – Property Management and Land Records section from Department land records and County Assessor Data.
Key:
% = percent
State of California = Lands owned by DWR and the California Department of Parks and Recreation
USFS = U.S. Department of Agriculture, Forest Service

4.1 LANDS OF THE U.S. WITHIN THE EXISTING PROJECT BOUNDARY

Table 4.1-1 identifies each section, or portion thereof, within the existing Project boundary that is federal land, per the Public Land Survey System.

Table 4.1-1. Federal Lands Within the Existing Project Boundary

Administered by	Township	Range	Section	Acres
USFS	10N	04W	6	0.0
	20N		4	6.9
			5	1.6
			6	0.3
			7	4.6
			8	0.1
			9	0.0
			10	0.0
			18	0.0
			19	24.2
			29	57.4
			30	52.6
			32	1.8
		05W	1	0.0
			2	71.5
			11	0.0
			12	0.0
	03N	04W	31	0.0
			33	0.0
Total				221.0

Source: Compiled by the California Department of Water Resources – Geodetic Branch – Property Management and Land Records section from Department land records and County Assessor Data
Key:
USFS = U.S. Department of Agriculture, Forest Service

5.0 PROPOSED CHANGES TO PROJECT FACILITIES AND FEATURES

5.1 GENERATING FACILITIES

DWR does not propose to add to the Project any previously constructed, unlicensed water power structures or facilities, or new generating facilities, or to modify any existing Project generating facility.

5.2 RECREATION FACILITIES

DWR does not propose to add to the Project any additional recreation facilities, including recreation-related roads and trails.

5.3 GAGES

Table 5.3-1 describes one existing reservoir gage that DWR proposes to add to the Project for the purpose of documenting compliance with conditions in the new license. DWR does not propose to add to the Project any streamflow gages, since DWR does not propose any measures related to streamflow.

Table 5.3-1. List of Existing Gages DWR Proposes to Add to the Project for the Purpose of Compliance with License Conditions

USGS Gage No.	Gage Name	Purpose of Gage as Related to the Project
10260790	Silverwood Lake, Near Hesperia, CA	Record Silverwood Lake stage

Key:
CA = California
No. = Number
USGS = U.S. Geological Survey

5.4 ROADS AND TRAILS

Table 5.4-1, below, describes 10 existing road segments that DWR proposes to add to the Project as Primary Project Roads. DWR does not propose to add to the Project any trails as Primary Project Trails. Each of the road segments is within DWR's proposed Project boundary. Refer to DWR's Proposed Condition LU1, Transportation System Management Plan, in Appendix E of Exhibit E to DWR's Application for New License for a detailed map of each road segment listed in Table 5.4-1.

Table 5.4-1. List of Primary Project Roads DWR Proposes to Add to the Project

Designation	Begins	Ends	Land Ownership	Distance (miles)	Purpose
Tunnel Outlet Access Road	Locked Gate on Devils Canyon Road	San Bernardino Tunnel Outlet	City of San Bernardino, State of California, and USFS	2.4	Access to San Bernardino Tunnel Outlet
Surge Chamber Access Road	Tunnel Outlet Access Road	San Bernardino Tunnel Surge Chamber	USFS	0.5	Access to San Bernardino Tunnel Surge Chamber
Upper Penstocks (West) Access Road	San Bernardino Tunnel Outlet	San Bernardino Penstocks	City of San Bernardino, State of California, and USFS	1.1	Access to west side of Upper Portion of Devil Canyon Penstocks
Upper Penstocks (Upper East) Access Road	Tunnel Outlet Access Road	San Bernardino Penstocks	City of San Bernardino and State of California	0.7	Access to east side of Upper Portion of Devil Canyon Penstocks
Upper Penstocks (Lower East) Access Road	Tunnel Outlet Access Road	San Bernardino Penstocks	City of San Bernardino and State of California	0.1	Access to east side of Upper Portion of Devil Canyon Penstocks
Lower Penstocks Access Road	Devil Canyon Powerplant Complex	San Bernardino Penstocks	City of San Bernardino and State of California	0.8	Access to Lower Portion of Devil Canyon Penstocks
Dam and Spillway Access Road	Locked gate	Silverwood Lake	State of California	1.0	Access to Cedar Springs Dam and east side of Cedar Springs Dam Spillway
Dam Downstream Face Access Road	Locked gate	Downstream Face of Cedar Springs Dam	State of California	0.4	Access to downstream face of Cedar Springs Dam
Spillway Access Road	Mojave Power/Pumping Plant Road	Silverwood Lake	State of California	0.3	Access to west side of Cedar Springs Dam Spillway
Intake Access Road	Locked gate	San Bernardino Tunnel Intake	State of California	<0.1	Access to San Bernardino Tunnel Intake

Key:
USFS = U.S. Department of Agriculture, Forest Service

6.0 PROPOSED CHANGES TO THE PROJECT BOUNDARY

DWR proposes several changes to the existing Project boundary to more accurately define lands necessary for the safe operation and maintenance (O&M) of the Project and other purposes, such as recreation, shoreline control, and protection of environmental resources. There are two categories of proposed Project boundary changes:

- Proposed addition of lands to the existing Project boundary that are currently utilized with a preponderance of use related to the Project O&M (e.g., the drainage area west of the Devil Canyon Second Afterbay), and proposed removal of lands from the existing Project boundary that do not have Project facilities and are not used or necessary for Project O&M (e.g., certain areas between Silverwood Lake and State Highway 138). These proposed changes are essentially corrections to the existing Project boundary.

- Proposed changes to the existing Project boundary around the Project reservoir and impoundments from surveyed coordinates to a contour located above the NMWSE. These changes reflect the preferred method of defining a project's boundary, as outlined in the FERC Drawing Guide (FERC 2014), and more accurately represents lands required for Project O&M around the Project reservoir.

The net effect of modifying the existing Project boundary is the reduction of area within the boundary from 3,744.0 acres to 2,079.2 acres. This change would reduce the 221.0 acres of federal land (approximately 6 percent of the total area within the existing Project boundary) to 125.7 acres of federal land (approximately 6 percent of the total area within the proposed Project boundary). Table 6.0-1 shows DWR's proposed changes to the existing Project boundary. An area by area assessment of the proposed changes to the existing Project boundary is included in Appendix A of this Exhibit A.

Table 6.0-1. Summary of Proposed Changes to Land Ownership Within the Existing Project Boundary

Development	USFS (acres)	State of California (acres)	Private (acres)	County (acres)	Total (acres)
Existing Project Boundary	221.0	3,501.3	21.7	0.0	3,744.0
Proposed Project Boundary	125.7	1,923.3	7.2	23.0	2,079.2
Change to Project Boundary	-95.3	-1,578.0	-14.5	+23.0	-1,664.8

Source: Compiled by the California Department of Water Resources – Geodetic Branch – Property Management and Land Records section from Department land records and County Assessor Data.
Key:
USFS = *U.S. Department of Agriculture, Forest Service*

The proposed changes are consistent with FERC regulations, and are based on DWR's current and historic use of land for the Project; DWR's comprehensive review of facilities, operations, and land information to date; and additional new information and data available for facilitating a more refined boundary delineation. All Project recreation facilities, including trails and Primary Project Roads, are fully within the proposed Project boundary. Multiple use roads (i.e., roads used by multiple parties, not just used to access the Project) may be within the boundary, but they are not Project facilities in the license. The Project boundary is an administrative marker to clearly delineate those lands necessary for O&M of the Project and for other Project purposes.

The most significant change in the delineation is the use of a 100-foot buffer from Silverwood Lake's NMWSE to define the proposed Project boundary around portions of the lake, which reduces the land area considerably on the eastern, western, and southern side of Silverwood Lake.

Table 6.0-2 identifies each section, or portion thereof, within the proposed Project boundary that is federal land, per the Public Land Survey System.

Table 6.0-2. Differences Between Federal Lands in the Existing and Proposed Project Boundaries

Administered by	Township	Range	Section	Acres
PROPOSED PROJECT BOUNDARY				
USFS	20N	04W	7	4.6
			8	0.1
			18	0.0
			19	24.1
			29	38.7
			30	57.2
			31	0.1
			32	0.8
Total				125.7
DIFFERENCES BETWEEN EXISTING (TABLE 4.0-1) AND PROPOSED PROJECT BOUNDARIES				
USFS	10N	04W	6	0.0
	20N		4	0.0
			5	0.0
			6	0.0
			7	0.0

Table 6.0-2. Differences Between Federal Lands in the Existing and Proposed Project Boundaries (continued)

Administered by	Township	Range	Section	Acres
USFS	20N	04W	8	0.0
			9	0.0
			10	0.0
			18	0.0
			19	0.1 Less
			29	18.7 Less
			30	4.6 More
			32	1.0 Less
		05W	1	0.0
			2	0.0
			11	0.0
			12	0.0
	03N	04W	31	0.0
			33	0.0
Difference				95.3 Less

Source:
Compiled by the California Department of Water Resources – Geodetic Branch – Property Management and Land Records section from Department land records and County Assessor Data
Key:
USFS = U.S. Department of Agriculture, Forest Service

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7.0 REFERENCES CITED

California Department of Water Resources (DWR). 2016. Updated Recreation Plan. South SWP Hydropower, FERC Project No. 2426. May 2016.

Federal Energy Regulatory Commission. 2014. Managing Hydropower Project Exhibits, Guidance Document. August.

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Appendix A

Area by Area Assessment of Existing and Proposed Project Boundary

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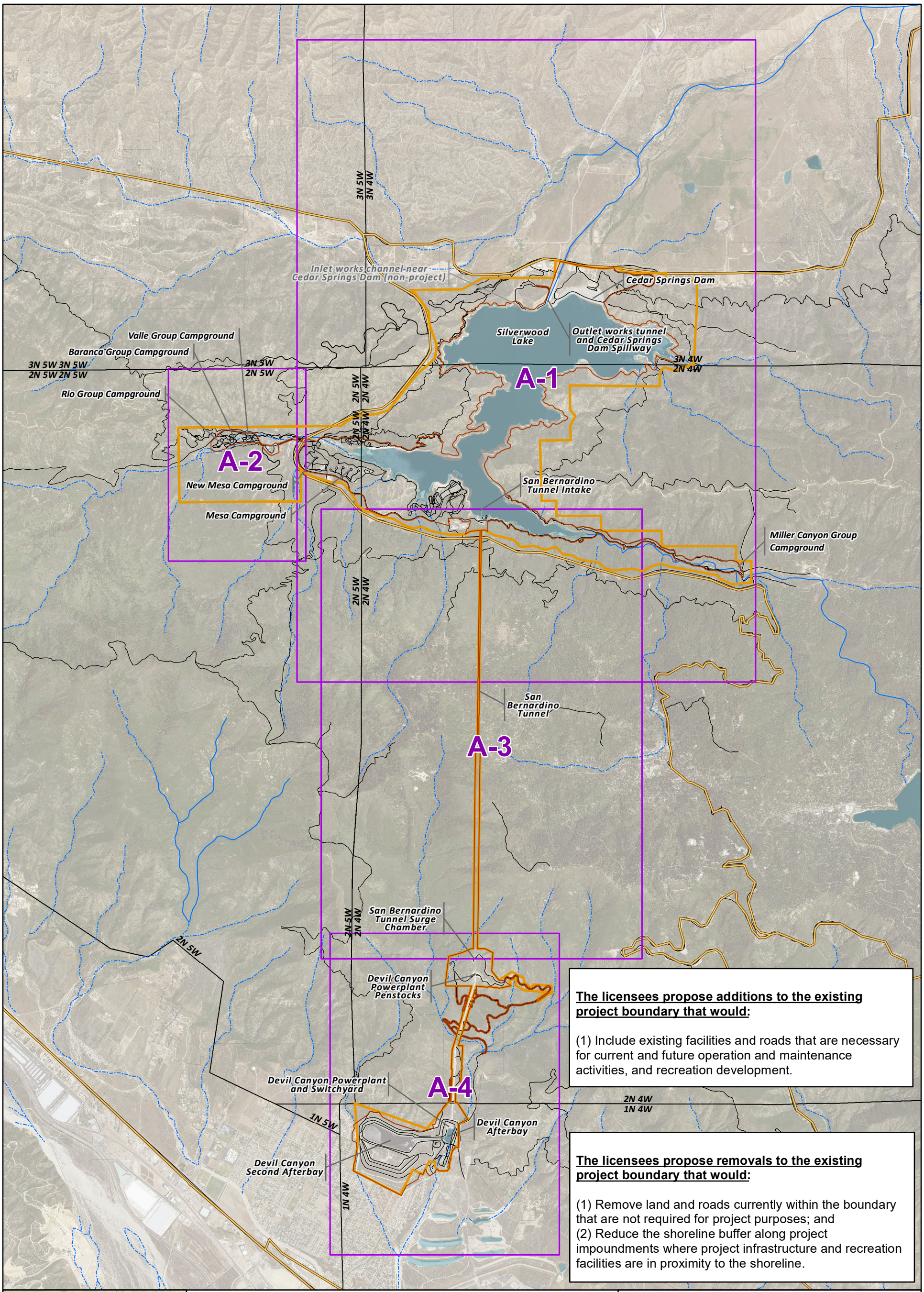
3N 5W
3N 4W
Inlet works channel-near
Cedar Springs Dam (non-project)
Cedar Springs Dam
Silverwood
Lake
Outlet works tunnel
and Cedar Springs
Dam Spillway
Valle Group Campground
Baranca Group Campground
3N 5W 3N 5W
2N 5W 2N 5W
3N 5W
2N 5W
3N 4W
2N 4W
Rio Group Campground
2N 5W
2N 4W
A-1
A-2
New Mesa Campground
Mesa Campground
San Bernardino
Tunnel Intake
Miller Canyon Group
Campground
A-3
San
Bernardino
Tunnel
San Bernardino
Tunnel Surge
Chamber
Devil Canyon
Powerplant
Penstocks
A-4
Devil Canyon Powerplant
and Switchyard
2N 4W
1N 4W
1N 5W
Devil Canyon
Afterbay
Devil Canyon
Second Afterbay
1N 4W
The licensees propose additions to the existing project boundary that would:
(1) Include existing facilities and roads that are necessary for current and future operation and maintenance activities, and recreation development.
The licensees propose removals to the existing project boundary that would:
(1) Remove land and roads currently within the boundary that are not required for project purposes; and
(2) Reduce the shoreline buffer along project impoundments where project infrastructure and recreation facilities are in proximity to the shoreline.
A-1
A-2
A-3
A-4
Crestline
215
San Bernardino
Rialto
66
Legend
Proposed Project Boundary (v.20190821)
Existing FERC Project Boundary (v.20150114)
Map Index Panels
PLSSTownship
Project Road
Major Highways
Stream/Canal/River
Stream - Intermittent
N
0
2,000
4,000
Feet
Prepared: October 2019
Projection: CA SP V NAD83 (ft)
Background: bing (2019)
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DEVIL CANYON PROJECT RELICENSING
FERC PROJECT NO. 14797
DEPARTMENT OF WATER RESOURCES
STATE OF CALIFORNIA
Area by Area Assessment of Existing and Proposed Project Boundary Index Map

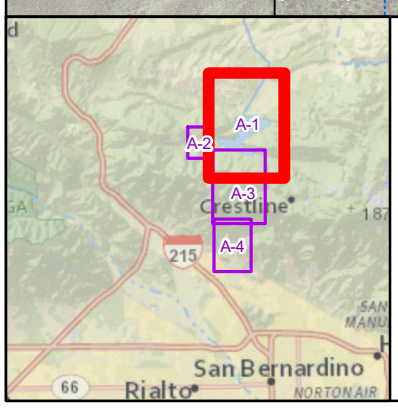
Removals from the Project Boundary

Strips of excess upland undeveloped lands surrounding Silverwood Lake are generally steep or are not near Project reservoir shorelines, therefore no need for Project operation, flood control, Project recreation, protection of fish and wildlife, or other developmental and non-developmental interests of the Project. All Project shoreline recreation facilities and dispersed shoreline use areas at Silverwood Lake are encompassed within the proposed Project boundary and ensure that all buffer areas and potential maintenance routes are enclosed within the boundary.

Additions to the Project Boundary:

None

Las Flores Pipeline (non-Project)
Cedar Springs Dam
Outlet works tunnel and Cedar Springs Dam Spillway
Silverwood Lake
Sycamore Landing Day Use Area
Live Oak Landing Day Use Area
Chamise Day Use Area
USFS #2N33 Road
Transmission Line - Southern California Edison (non-Project)
Cleghorn Day Use Area
Garces Overlook
Cleghorn Boat Launch
New Mesa Campground
Campfire Center
Nature Center
Mesa Campground
Entrance Station
Sawpit Canyon Marina
Sawpit Canyon Boat Ramp
Sawpit Canyon Picnic Area 1
Sawpit Canyon Picnic Area 2
Jamajab Point Overlook
Black Oak Picnic Area
East Fork Trail
Serrano Landing Day Use Area
Sawpit Canyon Picnic Area 3
San Bernardino Tunnel Intake
Sawpit Canyon Day Use Area
Miller Canyon Trail
Lynx Point Overlook
Devil's Pit Overlook
Crestline-Lake Arrowhead Water Agency Pipeline (non-Project)
San Bernardino Tunnel
Miller Canyon Trail
Miller Canyon Group Camp
Miller Canyon Trailhead
Miller Canyon Picnic Area
3N 5W
3N 4W
2N 5W
2N 4W



Legend

- Licensed Facility
- Other (non-Licensed) Facility
- Proposed Project Boundary (v.20190821)
- Existing FERC Project Boundary (v.20150114)
- Map Index Panels
- PLSSTownship
- Project Road
- Major Highways
- Stream/Canal/River
- Stream - Intermittent

N

0 2,000 4,000 Feet

Prepared: October 2019
Projection: CA SP V NAD83 (ft)
Background: bing (2019)
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DEVIL CANYON PROJECT RELICENSING
FERC PROJECT NO. 14797

DEPARTMENT OF WATER RESOURCES · STATE OF CALIFORNIA ·

Area by Area Assessment of Existing and Proposed Project Boundary
Figure: A-1

2N 5W

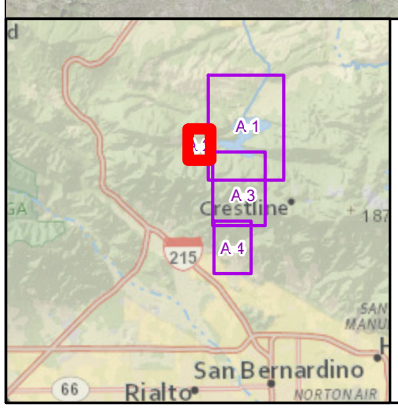
Baranca Group Campground

Valle Group Campgound

Rio Group Campground

Removals from the Project Boundary

Strips of excess lands on north and south of the Cleghorn area of Silverwood Lake SRA (above the West Fork Mojave River channel) that are generally steep and have no other need for Project operation, flood control, recreation, protection of fish and wildlife, or other developmental and non-developmental interests of the Project. All Project shoreline recreation facilities and dispersed shoreline use areas at Silverwood Lake are encompassed within the proposed Project boundary.



Legend

- Licensed Facility
- Proposed Project Boundary (v.20190821)
- Existing FERC Project Boundary (v.20150114)
- Map Index Panels
- PLSSTownship
- Project Road
- Major Highways
- Stream/Canal/River
- Stream - Intermittent

N

0 600 1,200 Feet

Prepared: October 2019
Projection: CA SP V NAD83 (ft)
Background: bing (2019)
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DEVIL CANYON PROJECT RELICENSING
FERC PROJECT NO. 14797

DEPARTMENT OF WATER RESOURCES · STATE OF CALIFORNIA ·

Area by Area Assessment of Existing and Proposed Project Boundary
Figure: A-2

East Fork Trail

Serrano Landing Day Use Area

Sawpit Canyon Picnic Area 3

San Bernardino Tunnel Intake

Sawpit Canyon Day Use Area

Miller Canyon Trail

Crestline-Lake Arrowhead Water Agency Pipeline (non-Project)

Lynx Point Overlook

San Bernardino Tunnel

2N 5W
2N 4W

Removals from the Project Boundary

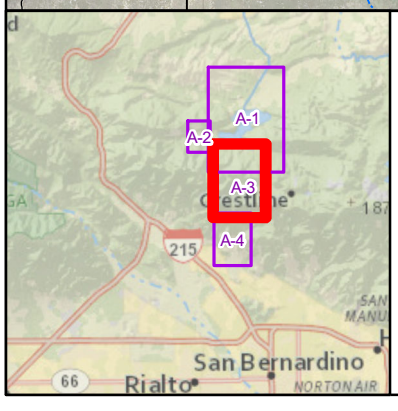
None

Additions to the Project Boundary:

None

2N 5W
2N 4W

San Bernardino Tunnel



Legend

- Licensed Facility
- Other (non-Licensed) Facility
- Proposed Project Boundary (v.20190821)
- Existing FERC Project Boundary (v.20150114)
- Map Index Panels
- PLSSTownship
- Project Road
- Major Highways
- Stream/Canal/River
- Stream - Intermittent

N

0 1,400 2,800 Feet

Prepared: October 2019
Projection: CA SP V NAD83 (ft)
Background: bing (2019)
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DEVIL CANYON PROJECT RELICENSING
FERC PROJECT NO. 14797

DEPARTMENT OF WATER RESOURCES · STATE OF CALIFORNIA ·

Area by Area Assessment of Existing and Proposed Project Boundary
Figure: A-3

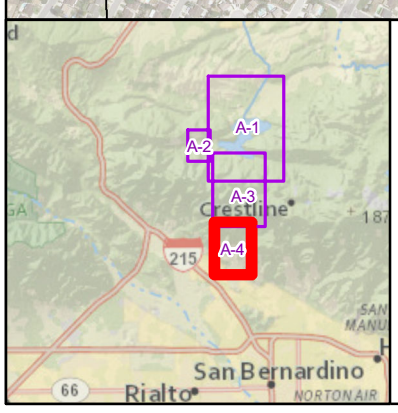
Additions to the Project Boundary:

Include lands associated with primary Project roads leading to the San Bernardino Tunnel and Devil Canyon Powerplant Penstocks.
Also some addition of lands near the toe of the slope of the Second Afterbay and drainage areas leading from those water impoundments that are needed for potential operation and maintenance or monitoring of the facilities.

Removals from the Project Boundary

Excess lands above the Devil Canyon afterbays that are not used or needed for operations and maintenance activities.

San Bernardino Tunnel
San Bernardino Tunnel Surge Chamber
Devil Canyon Powerplant Penstock
Devil Canyon Access Road
Transmission Line - Southern California Edison
Devil Canyon Switchyard
Devil Canyon Powerplant
Afterbay
Water Quality Building
Second Afterbay
Inland Feeder Pipeline
Rialto Pipeline
Azusa Pipeline
Santa Ana Valley Pipeline
2N 5W
2N 4W
1N 4W
2N 4W
1N 4W



Legend

- Licensed Facility
- Other (non-Licensed) Facility
- Proposed Project Boundary (v.20190821)
- Existing FERC Project Boundary (v.20150114)
- Map Index Panels
- PLSSTownship
- Project Road
- Stream - Intermittent

N

0 1,000 2,000 Feet

Prepared: October 2019
Projection: CA SP V NAD83 (ft)
Background: bing (2019)
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DEVIL CANYON PROJECT RELICENSING
FERC PROJECT NO. 14797

DEPARTMENT OF WATER RESOURCES · STATE OF CALIFORNIA ·

Area by Area Assessment of Existing and Proposed Project Boundary
Figure: A-4

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DEVIL CANYON PROJECT RELICENSING
FERC PROJECT NUMBER 14797

Final License Application
Exhibit B – Project Operations and Resource Utilization

November 2019

State of California
California Natural Resources Agency
DEPARTMENT OF WATER RESOURCES
Hydropower License Planning and Compliance Office

GAVIN NEWSOM	**WADE CROWFOOT**	**KARLA A. NEMETH**
Governor	Secretary for	Director
State of California	California Natural Resources	Department of Water Resources

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

COMMONLY USED TERMS, ACRONYMS & ABBREVIATIONS

§	Section
%	percent
°F	degrees Fahrenheit
Agreement Natural Inflow	Non-SWP inflow to Silverwood Lake, computed according to DWR's agreements with LFR and MWA
Agreement SWP Inflow	SWP inflow to Silverwood Lake, computed according to DWR's agreements with LFR and MWA
AF	acre-feet
Application for New License	Application for a New License Major Project – Existing Dam for the Devil Canyon Project Relicensing, Federal Energy Regulatory Commission Project Number 14797
CA	California
CAISO	California Independent System Operator
CDFW	California Department of Fish and Wildlife
CFR	Code of Federal Regulations
cfs	cubic feet per second
CLAWA	Crestline-Lake Arrowhead Water Agency
CSD	Crestline Sanitary District
DWR	California Department of Water Resources
FERC	Federal Energy Regulatory Commission
Gaged Devil Canyon Powerhouse Outflow	Releases from the Devil Canyon Powerhouse, as measured by USGS gage 11063682
Gaged Natural Inflow	Non-SWP inflow to Silverwood Lake, computed using USGS gages 10260700 and 10260550 along with computed ungagged local inflow
Gaged Natural Outflow	Non-SWP releases from Silverwood Lake, computed using USGS gage 10260820
Gaged SWP Inflow	SWP inflow to Silverwood Lake, computed using USGS gage 10260780
GPM	gallons per minute
hp	horsepower

kW	kilowatt
kWh	kilowatt-hour
LFR	Las Flores Ranch
MW	megawatt
MWA	Mojave Water Agency
MWD	Metropolitan Water District of Southern California
NMWSE	Normal Maximum Water Surface Elevation
O&M	operation and maintenance
PCA	Pest Control Advisor
PM&E measures	Protection, Mitigation, and Enhancement measures, which are operation and management activities to: (1) protect resources against impacts from continued operation and maintenance of the Project; (2) mitigate any impacts from continued operation and maintenance of the Project (if the resource cannot be fully protected); and (3) enhance resources affected by continued Project operation and maintenance
POR	period of record
Project	Devil Canyon Project Relicensing, Federal Energy Regulatory Commission Project Number 14797
Project area	The area within the FERC Project boundary and the area immediately surrounding the FERC Project boundary
Project vicinity	The area within the FERC Project boundary and the area surrounding the Project on the order of a USGS 1:24,000 quadrangle
rpm	revolutions per minute
SBCFD	San Bernardino County Fire Department
SBNF	San Bernardino National Forest
State	State of California
SWP	State Water Project
SWRCB	State Water Resources Control Board

U.S.	United States
USACE	U.S. Army Corps of Engineers
USFS	U.S. Department of Agriculture, Forest Service
USGS	U.S. Geological Survey
vegetation	The total plant life or cover in an area; also used as a general term for plant life; the assemblage of plant species in a given area
WY	Water Year

1.0 INTRODUCTION

The California Department of Water Resources (DWR) has prepared this Exhibit B, Project Operations and Resource Utilization, as part of its Application for a New License Major Project – Existing Dam (Application for New License) from the Federal Energy Regulatory Commission (FERC) for the Devil Canyon Project Relicensing, FERC Project Number 14797 (Project). This exhibit has been prepared to conform with Title 18 of the Code of Federal Regulations (CFR), Subchapter B (Regulation under the Federal Power Act), Part 4, Subpart F (Application for License for Major Project – Existing Dam) (Traditional Licensing Process). In particular, this report complies with the regulations in 18 CFR Section (§) 4.51(c). For reference, 18 CFR § 4.51(c) states:

> Exhibit B is a statement of Project operation and resource utilization. If the project includes more than one dam with associated facilities, the information must be provided separately for each such discrete development. The exhibit must contain:
>
> (1) A statement whether operation of the powerplant will be manual or automatic, an estimate of the annual plant factor, and a statement of how the project will be operated during adverse, mean, and high water years,
>
> (2) An estimate of the dependable capacity and average annual energy production in kilowatt-hours (or a mechanical equivalent), supported by the following data:
>
> (i) The minimum, mean, and maximum recorded flows in cubic feet per second of the stream or other body of water at the powerplant intake or point of diversion, with a specification of any adjustment made for evaporation, leakage, minimum flow releases (including duration of releases), or other reductions in available flow, monthly flow duration curves indicating the period of record and the gauging stations used in deriving the curves, and a specification of the period of critical stream flow used to determine the dependable capacity,
>
> (ii) An area-capacity curve showing the gross storage capacity and usable storage capacity of the impoundment, with a rule curve showing the proposed operation of the impoundment and how the usable storage capacity is to be utilized;
>
> (iii) The estimated minimum and maximum hydraulic capacity of the powerplant (maximum flow through the powerplant) in cubic feet per second;

(iv) A tail water rating curve; and

(v) A curve showing powerplant capability versus head and specifying maximum, normal, and minimum heads.

(3) A statement, with load curves and tabular data, if necessary, of the manner in which the power generated at the project is to be utilized, including the amount of power to be used on-site, if any, the amount of power to be sold, and the identity of any proposed purchasers; and

(4) A statement of the applicant's plans, if any, for future development of the project or of any other existing or proposed water power project on the stream or other body of water, indicating the approximate location and estimated installed capacity of the proposed developments.

Excluding this introductory material, this exhibit includes six sections. Section 2.0 gives a general description of the Project. Section 3.0 describes hydrology in the area within the proposed Project boundary and the area immediately surrounding the boundary (Project area). Section 4.0 describes existing Project operations by Project facility, including regulatory and contractual operating constraints. Section 5.0 describes DWR's proposed Project operations. Section 6.0 describes the use of Project power. Section 7.0 discloses DWR's plans for future developments of the Project and DWR's plans for water projects in the watershed.

Refer to Exhibit A for a description of Project facilities and features, Exhibit C for a description of construction history and proposed construction schedule, Exhibit D for costs and financing information, and Exhibit E for a discussion of potential environmental effects and DWR's proposed resource management measures. Project design drawings are included in Exhibit F, and Project maps are included in Exhibit G. Exhibit H includes a detailed description of the need for the power generated by the Project, and other important miscellaneous information.

All elevation data in this exhibit are in United States (U.S.) Department of Commerce, National Oceanic and Atmospheric Association, National Geodetic Survey Vertical Datum of 1929, unless otherwise stated.

2.0 GENERAL DESCRIPTION OF THE PROJECT

The Project is part of a larger water storage and delivery system, the State Water Project (SWP), which is the largest state-owned and operated water supply project of its kind in the United States. The SWP provides southern California with many benefits, including affordable water supply, reliable regional clean energy, opportunities to integrate green energy, accessible public recreation opportunities, and environmental benefits.

The existing Project, which is on the East Branch of the SWP in San Bernardino County, has a FERC-authorized installed capacity of 276,796 kilowatts (kW). Project facilities range in elevation from 5,377 feet to 1,778 feet, and include: Cedar Springs Dam and Silverwood Lake, which are located in the West Fork Mojave River drainage; the San Bernardino Tunnel; the Devil Canyon Powerplant; the Devil Canyon Powerplant Afterbay and adjacent Devil Canyon Second Afterbay; and the Devil Canyon Switchyard. The Project does not include any transmission lines or open water conduits, except for the short Cross Channel that connects the Devil Canyon Afterbay and Devil Canyon Second Afterbay and is described in Section 3.5. The Project's existing boundary includes 3,744.0 acres, of which 221.0 acres are National Forest System lands managed by the U.S. Department of Agriculture, Forest Service (USFS), as part of the San Bernardino National Forest (SBNF). The Project generates electricity using SWP water as the water is delivered to downstream SWP water users.

Under the new license, DWR proposes no modifications to existing Project facilities or operations but does propose adjusting the existing Project boundary. DWR proposes to continue to operate the Project as it has operated historically, with the addition of a number of operation and management activities to: (1) protect resources against impacts from continued operation and maintenance of the Project; (2) mitigate any impacts from continued operation and maintenance of the Project (if the resource cannot be fully protected); and (3) enhance resources affected by continued Project operation and maintenance. These activities are collectively referred to as protection, mitigation and enhancement (PM&E) measures in this exhibit.

Figure 2.0-1 shows the Project vicinity. Figure 2.0-2 shows Project facilities, including DWR's proposed Project boundary, pertinent drainage areas, and the location of reservoir stage and stream flow gages that are referenced in this exhibit.

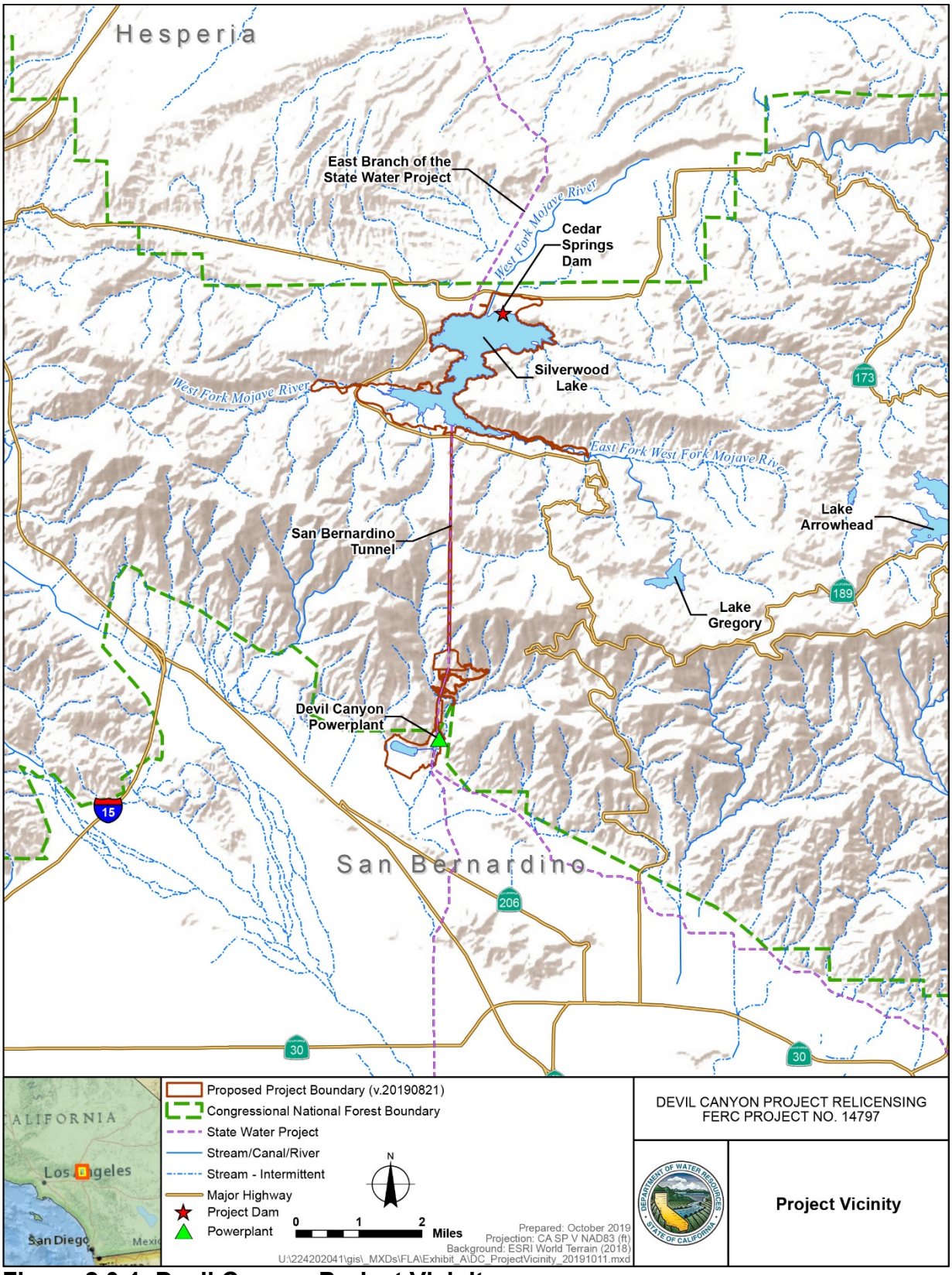
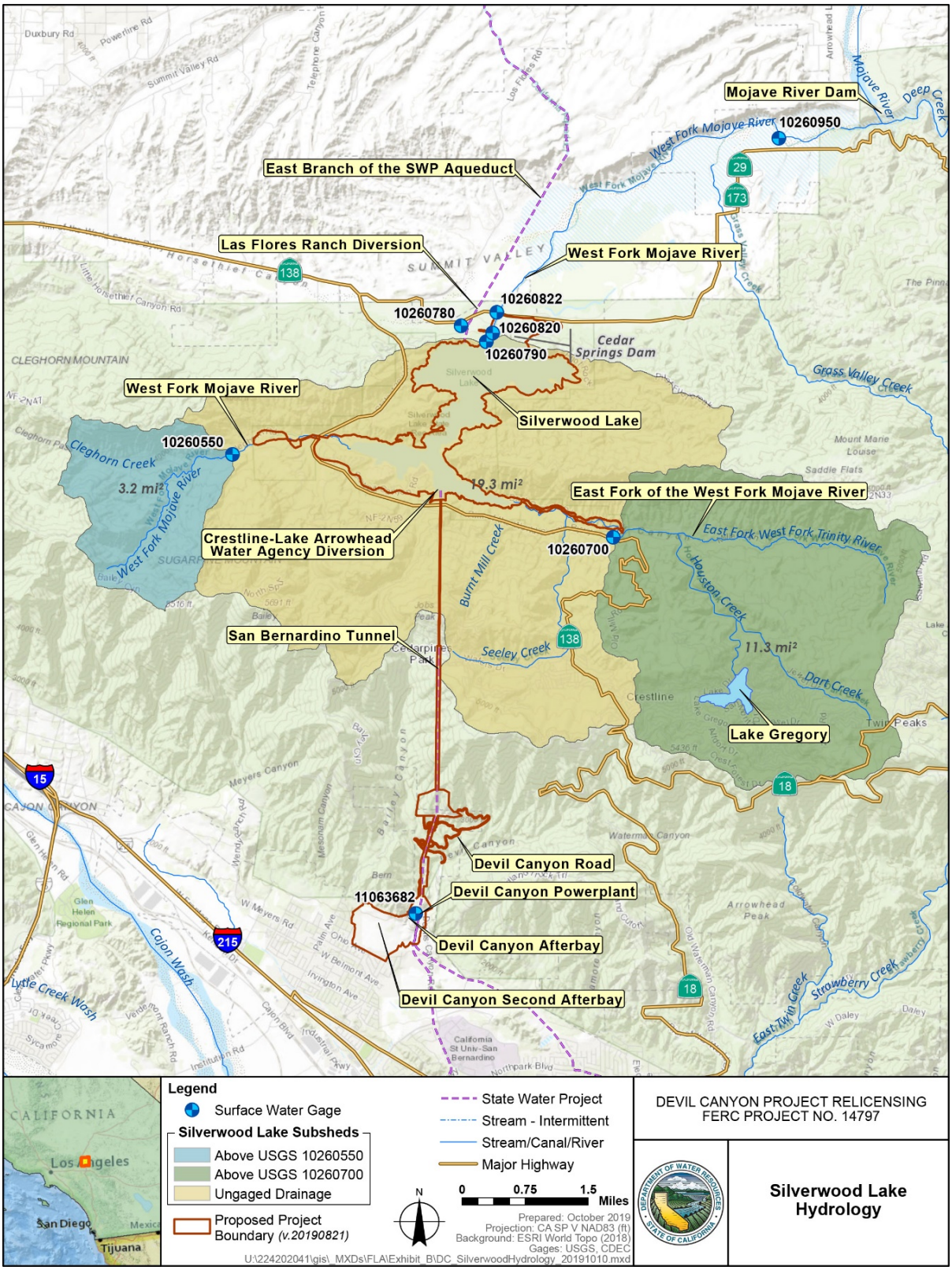


Figure 2.0-1. Devil Canyon Project Vicinity



Note: Drainages for the Devil Canyon Afterbay and Devil Canyon Second Afterbay are not shown since the afterbays do not intercept any surface drainages.

Figure 2.0-2. DWR's Proposed Devil Canyon Project and Local Drainage Areas

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3.0 PROJECT HYDROLOGY

DWR developed a 12-year long hydrology dataset for the relicensing using publicly available data. The relicensing period of record (POR) extends from Water Year (WY) 2006 through WY 2017 (i.e., October 1, 2005 through September 30, 2017). The POR was selected for three reasons. First, it includes both an extended drought (WY 2013 through 2015) and several of the wettest years (WY 2011 and WY 2017) on record, so a longer period of record would not contribute to a wider range of hydrology. Second, gage data for WY 2005 is not available. Third, since Silverwood Lake hydrology is dominated by SWP operations, which have changed over time, evaluating a longer period of record of local hydrology that would primarily include additional moderate years would not provide meaningful insight into current operations of Silverwood Lake, nor inform license conditions for future operations. Reservoir data are end-of-day stage and storage for Silverwood Lake, Devil Canyon Afterbay and Devil Canyon Second Afterbay. Flow data are average daily flow, unless otherwise stated. Appendix A to this exhibit includes the hydrology dataset for the relicensing POR in Microsoft™ Excel format and in U.S. Army Corps of Engineers (USACE), Hydrologic Engineering Center Data Storage System file format.

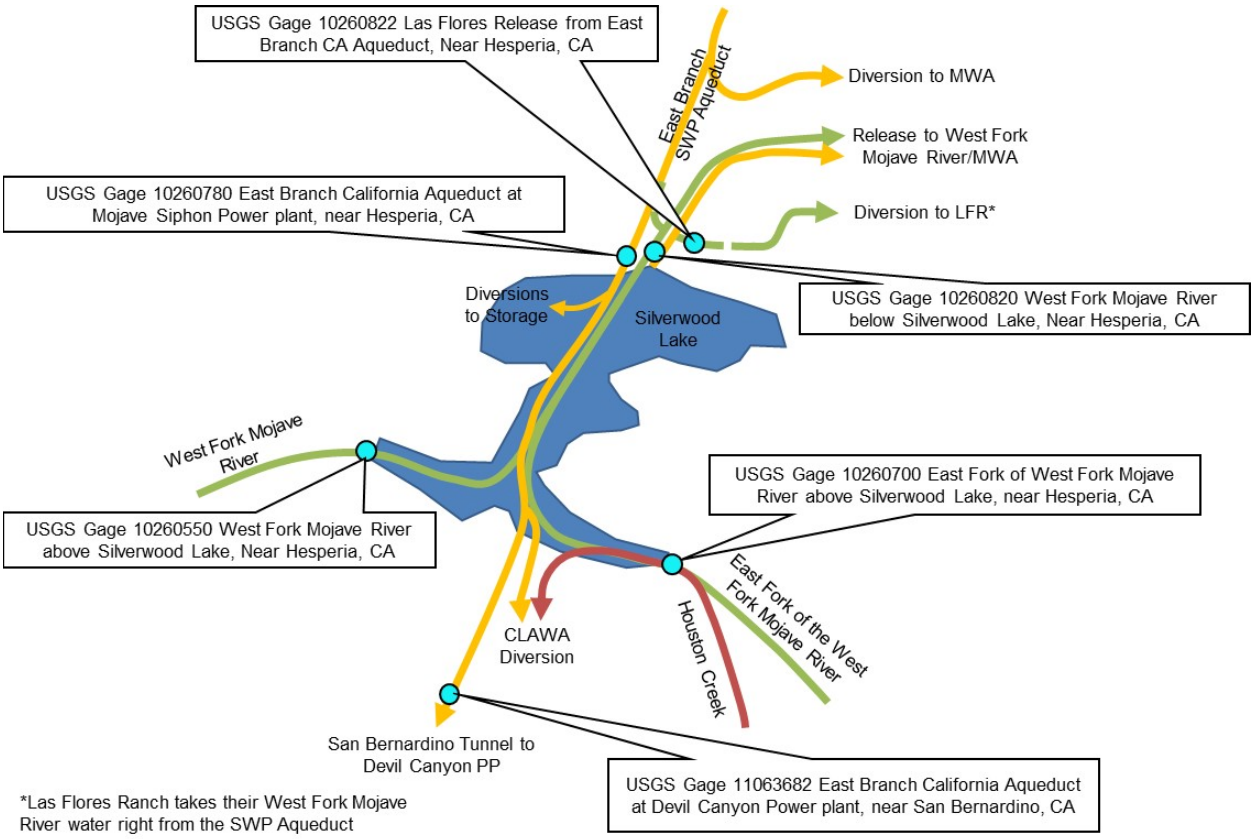
The gages and other information used to compile the relicensing hydrology dataset are described below.

3.1 INFLOW INTO SILVERWOOD LAKE

The Project does not use natural flow into Silverwood Lake for electricity generation; electricity is generated using SWP water. The Project has no rights to the natural inflow to Silverwood Lake and must release such inflow into the West Fork Mojave River in accordance with existing water rights and water delivery agreements that are not related to electricity generation. Figure 3.1-1 depicts the Silverwood Lake hydrologic balance, which is discussed in detail below.

Silverwood Lake receives natural inflow in the drainage and imported water (Figure 3.1-1). Each of these is described below:

- Natural Inflow:
    - West Fork Mojave River
    - East Fork of the West Fork Mojave River
    - Local ungaged drainage
- Imported Water:
    - East Branch of the SWP Aqueduct



Key:
CA = California
CLAWA = Crestline-Lake Arrowhead Water Agency
LFR= Las Flores Ranch
MWA = Mojave Water Agency
PP= Powerplant
SWP = State Water Project
USGS = U.S. Geological Survey

Figure 3.1-1. Schematic of Silverwood Lake Hydrologic Balance

3.1.1 Natural Inflow

The following section describes the natural inflows to Silverwood Lake.

3.1.1.1 West Fork Mojave River

The primary source of data for inflow from the West Fork Mojave River is U.S. Geological Survey (USGS) gage 10260550, West Fork Mojave River above Silverwood Lake, Near Hesperia, California (CA) (Figures 2.0-2 and 3.1-1). The gage is a water stage recorder with a concrete control weir, located on the left bank of the West Fork Mojave River, 1.5 miles upstream from Silverwood Lake. The West Fork Mojave River gage measures a drainage of 3.2 square miles. Average daily flow data are available for the entire relicensing POR and are included in Appendix A.

3.1.1.2 East Fork of the West Fork Mojave River

The primary source of data for inflow from the East Fork of the West Fork Mojave River is USGS gage 10260700, East Fork of West Fork Mojave River above Silverwood Lake, near Hesperia, CA (Figures 2.0-2 and 3.1-1). The gage is a water stage recorder with a concrete control weir, located on the left bank of the East Fork of the West Fork Mojave River, 1.5 miles upstream from Silverwood Lake. The East Fork of the West Fork Mojave River gage has a drainage area of 11.3 square miles. Average daily flow data are available for the entire relicensing POR and are included in Appendix A.

3.1.1.3 Local Ungaged Drainage

The ungaged portion of the watershed upstream from Cedar Springs Dam is 19.3 square miles. The total watershed upstream of Cedar Springs Dam is 33.8 square miles and, as described above, only two gages measure inflow to Silverwood Lake: USGS gages 10260550 and 10260700, which together account for 14.5 square miles of the watershed (Figure 2.0-2). Agreements between DWR and each of the Mojave Water Agency (MWA) and Las Flores Ranch (LFR) include an agreed upon method for determining natural inflow into Silverwood Lake, which incorporates a table (see Table 4.1.1 in Section 4.1.4.3) relating measured inflow at the two USGS gages to total inflow to Silverwood Lake. The flow in the local ungaged drainage is the difference between the calculated total natural inflow and the measured flow at the two upstream gages. Using the Table from the agreements, DWR calculates the ungaged flow for each day in the POR and are included in Appendix A.

3.1.2 Imported Water

The following section describes the imported water to Silverwood Lake.

3.1.2.1 East Branch of the SWP Aqueduct

The primary source of data for inflow from the East Branch of the SWP Aqueduct is USGS gage 10260780, East Branch California Aqueduct at Mojave Siphon Powerplant, near Hesperia, CA (Figures 2.0-2 and 3.1-1). The gage is located on the Aqueduct 0.2 miles upstream from Silverwood Lake. Flow at this site has two components that are combined by USGS for publication: (1) flow through the non-Project Mojave Siphon Powerplant as measured by an acoustic velocity meter on the intake pipes; and (2) bypass flow through the SWP flume as measured by a water stage recorder in a stilling well on the flume. Average daily flow data are available for the entire relicensing POR and are included in Appendix A.

3.2 SILVERWOOD LAKE STORAGE

The primary source of data for Silverwood Lake stage and storage is USGS gage 10260790, Silverwood Lake, Near Hesperia, CA (Figures 2.0-2 and 3.1-1). The gage is a water stage recorder located on Silverwood Lake near Cedar Springs Dam. End-of-day stage and storage data are available for the entire relicensing POR and are included in Appendix A.

3.3 OUTFLOW FROM SILVERWOOD LAKE

Releases from Silverwood Lake are governed by two primary operational categories, deliveries to SWP contractors and deliveries of natural inflow to the users identified in the Mojave River Adjudication Decree issued by the Riverside County Superior Court in 1996. Outflow releases are made in the following four ways (Figure 3.1-1), each of which is further described below:

- Crestline-Lake Arrowhead Water Agency
- West Fork Mojave River:
    - Cedar Springs Dam low-level outlet works and Spillway
    - Cedar Springs Dam seepage
- San Bernardino Tunnel
- Las Flores Ranch Diversion

Note that based on gage data in Appendix A, in some instances the gage data show that natural outflow from Silverwood Lake exceeds the natural inflow when inflow is less than 200 cubic feet per second (cfs). The difference between natural inflow and natural outflow in most of these instances is due to operational issues that require storage and subsequent release of the water. For example, in 2010, the LFR diversion valve was taken out of service for two years for repairs, and during that time, DWR stored water for LFR. The stored water was released once repairs were complete and typically occurred at a rate higher than natural inflow. DWR can also store water for MWA, the Mojave River Decree Watermaster, in Silverwood Lake for subsequent release when it is not possible or practical to release the inflows as they come into Silverwood Lake. The later water delivery releases are often requested orally by MWA.

3.3.1 Crestline-Lake Arrowhead Water Agency

Direct releases from Silverwood Lake to the Crestline-Lake Arrowhead Water Agency (CLAWA) occur on the south shore of Silverwood Lake via an intake near CLAWA's water treatment plant, off of State Highway 138, near the Silverwood Lake Marina (Figures 2.0-2 and 3.1-1). This section provides a discussion of CLAWA's diversions.

CLAWA has the right to divert water from Houston Creek, a tributary to Silverwood Lake, under water rights held by DWR and delivered to CLAWA per the 1989 agreement between both agencies. CLAWA also has a contract with DWR for additional water from the SWP. CLAWA measures its diversions from Silverwood Lake and reports the diversion volumes to DWR. DWR reports CLAWA's total daily diversions from Silverwood Lake in Table 29 of DWR's monthly operations reports. Monthly Operations Reports' Table 29 including daily volumes of total CLAWA diversions are available for the full relicensing POR. These data are included in Appendix A as daily volumes and average daily flow rates.

3.3.2 West Fork Mojave River

The following sections describe releases from Cedar Springs Dam to the West Fork Mojave River.

3.3.2.1 Cedar Springs Dam Low-Level Outlet and Spillway

The primary source of data for outflow from the Cedar Springs Dam's low-level outlet and spillway into the West Fork Mojave River is USGS gage 10260820, West Fork Mojave River below Silverwood Lake, Near Hesperia, CA (Figures 2.0-2 and 3.1-1). Flows through the low-level outlet are measured by a flow meter on the release valve, and flows over the spillway are computed based on a theoretical rating of an ogee weir at the entrance to the spillway. USGS reports the combination of these releases. Average daily flow data are available for the entire POR and are included in Appendix A.

3.3.2.2 Cedar Springs Dam Seepage

DWR monitors on a daily basis seepage from Cedar Springs Dam at seven locations. Total seepage varies considerably over the WY, and from 1972 through 2017, ranged from 0 to 2.28 cfs with a long-term average daily seepage of 0.24 cfs. Daily seepage rates are monitored and recorded in DWR's monthly water accounting reports for Silverwood Lake and are available for the POR and included in Appendix A. Table 3.3-1 shows the long-term average seepage for each location.

Table 3.3-1. Long-Term Average Daily Seepage for Cedar Springs Dam Seepage Monitoring Sites from 1972 through 2017

Seepage Point	Maximum (GPM)	Minimum (GPM)	Average (GPM)
Site A (includes G & H)	11.0	0.2	3.9
Site B	49.4	0.1	23.7
Site G	100.7	0.1	3.1
Site H (Includes G)	76.2	0	4.2
Site C	76.3	0.2	33.9
Site D	11.0	0.2	3.9
Site F	876.8	1.0	43.9
Total Seepage			
Total (GPM)	**1,024.5**	**1.7**	**109.3**
Total (cfs)	**2.28**	**0**	**0.24**

Source: DWR Operations Records
Key: cfs = cubic feet per second GPM = gallons per minute

3.3.3 San Bernardino Tunnel

The primary source of data for flow through the San Bernardino Tunnel is USGS gage 11063682, East Branch California Aqueduct at Devil Canyon Powerplant, near San Bernardino, CA (Figures 2.0-2 and 3.1-1). Flow at this location is recorded using acoustic-velocity meters on five pipes (i.e., the Devil Canyon Powerhouse penstocks), and the components are combined by USGS for publication. Average daily flow data are available for the entire relicensing POR and are included in Appendix A.

3.3.4 Las Flores Ranch

DWR and LFR entered into an agreement to deliver SWP water to LFR directly from the East Branch of the SWP Aqueduct near the non-Project Mojave Siphon. The original LFR diversion was lost with the construction of Cedar Springs Dam and the creation of Silverwood Lake. LFR has held an appropriative right to water dating back to the 1800s and it is included in the 1996 Mojave River Decree. Due to its water right seniority, LFR is to receive the first 23 cfs of natural inflow before any other releases of natural inflow are made. DWR tracks the natural inflow and provides a like amount to LFR from the Aqueduct per the agreement. Accordingly, LFR's diversions are considered an outflow from Silverwood Lake for the purposes of this Application for New License. LFR diversions are measured by USGS gage 10260822, Las Flores Ranch Release from the East Branch Aqueduct, near Hesperia, CA. Average daily flow records are available for the entire period of record and are included in Appendix A.

3.4 INFLOW TO DEVIL CANYON AFTERBAY

The only inflow to the Devil Canyon Afterbay is water that passes through the San Bernardino Tunnel (Section 3.3.3) and the Devil Canyon Powerplant. The Devil Canyon Afterbay is an engineered water body and collects negligible surface runoff; there is a system of drainage ditches around the Devil Canyon Afterbay that diverts local runoff around the Devil Canyon Afterbay.

3.5 OUTFLOW FROM DEVIL CANYON AFTERBAY

The Devil Canyon Afterbay conveys Project water to the Devil Canyon Second Afterbay via a 1,100-foot-long, 40-foot-wide, 27-foot-deep concrete-lined Cross Channel with an approximately 13-foot-high uncontrolled weir structure at the inlet to the Cross Channel. Flow from the Devil Canyon Afterbay to the Devil Canyon Second Afterbay is not gaged and recorded by DWR.

No Project water is directly released to State of California surface waters. While the Devil Canyon Afterbay includes a spillway structure designed for emergency purposes, the structure has never been used and is now obsolete due to the construction of the Devil Canyon Second Afterbay.

Some SWP water is released for consumptive use from the Afterbay into one of the following pipelines: San Bernardino Pipeline, Santa Ana Pipeline, Azusa Pipeline, and

Rialto Pipeline. Each of the pipelines' intakes are all part of the same intake structure in the Afterbay. The San Gabriel Valley Municipal Water District's Azusa pipeline is about 38 miles long and runs west from the Devil Canyon Afterbay to the San Gabriel Canyon Spreading Grounds in Azusa. The pipeline's capacity is 55 cfs. The San Bernardino Valley Municipal Water District's San Bernardino Pipeline is a 72-inch pipeline that conveys water 17 miles eastward to various spreading grounds, agricultural, and wholesale domestic delivery points in the San Bernardino basin. The SWP's Santa Ana Valley Pipeline carries water supply from a 9-foot diameter turnout in the Devil Canyon Afterbay and a 9-foot diameter turnout from the Second Afterbay through a 12-foot diameter high-pressure pipeline approximately 27 miles to the Lake Perris inlet in Riverside County. The Metropolitan Water District of Southern California's (MWD) 30-mile Rialto Pipeline carries water supply from both the Devil Canyon Afterbay and Second Afterbay to MWD's San Dimas Powerplant, with a capacity of 1,000 cfs. The valves, turnouts, meters, and connections for all these SWP delivery pipes are not part of the Project facilities. Since releases to these pipes are not Project-related, flow through them is not reported for the POR in this exhibit or discussed further in this exhibit.

3.6 INFLOW TO DEVIL CANYON SECOND AFTERBAY

The only inflow to the Devil Canyon Second Afterbay occurs from the Devil Canyon Afterbay, as discussed in Section 3.5. Like the Devil Canyon Afterbay, the Devil Canyon Second Afterbay is an engineered water body and collects negligible surface runoff; there is a system of drainage ditches around the Devil Canyon Second Afterbay that diverts local runoff around the Devil Canyon Second Afterbay.

3.7 OUTFLOW FROM DEVIL CANYON SECOND AFTERBAY

The Devil Canyon Second Afterbay, the most downstream Project facility, includes an emergency overflow spillway discharge outlet and a low-level emergency outlet. The overflow spillway is incorporated into the Outlet Structure. The spillway was designed to pass the maximum discharge capacity of 2,960 cfs at an impoundment water surface elevation of 1,934 feet. The spillway crest elevation is 1,931 feet and configured in a sawtooth pattern. Discharge from the overflow spillway enters the Wasteway pipeline, which serves as a low-level emergency outlet. The 144-inch Wasteway pipeline is regulated by two slide gates measuring 96 inches by 120 inches. One gate is capable of dewatering the entire Second Afterbay within six hours. The Second Afterbay spillway has never been used, and the low-level outlet slide gates are exercised every three years to comply with dam safety regulations, but have not otherwise been used. Approximately 0.5 acre-feet (AF) are discharged each time the slide gates are exercised.

In addition, SWP water is released for consumptive use from the Second Afterbay into the Rialto Pipeline and Santa Ana Pipeline, both of which are described above, and the Inland Feeder. The Inland Feeder is a 44-mile-long conveyance system that connects the SWP to Diamond Valley Lake and the Colorado River Aqueduct. The pipeline is a

12-foot diameter, reinforced concrete pipe with a conveyance capacity of 1,000 cfs. The system increases the operational flexibility necessary to store water in wet years, facilitates power generation, delivers water into the system by gravity, and provides SWP supplies to the Colorado River Aqueduct when needed. The Inland Feeder is designed to take advantage of wet years when it can move large amounts of water from the SWP into Diamond Valley Lake. The valves, turnouts, meters, and connections for these SWP delivery pipes are not part of the Project facilities. Since releases to these pipes are not Project-related, flow through them is not reported for the POR in this exhibit or discussed further in this exhibit.

3.8 OVERVIEW OF THE BASIN HYDROLOGY

The Project's Silverwood Lake collects water from two named drainages: the West Fork Mojave River and the East Fork of the West Fork Mojave River. Flow in the West Fork Mojave River is seasonal (intermittent) in that it flows during certain times of the year when smaller upstream waters are flowing and when groundwater provides enough water for river flow. Flow in the East Fork of the West Fork Mojave River is perennial, meaning it generally flows all year round in parts of its streambed during years of normal rainfall. Runoff from rainfall or other precipitation supplements the flows in both tributaries.

The West Fork Mojave River originates at an elevation of 4,960 feet on the north side of a saddle between summits on a ridge running west northwest of Sugarpine Mountain. The West Fork has no significant diversions or withdrawals upstream of Silverwood Lake. As described in Section 3.1.1.1, at its inflow into Silverwood Lake, the West Fork Mojave River drains an area of 3.2 square miles.

The East Fork of the West Fork Mojave River (East Fork) originates at an elevation of 5,500 feet in Twin Peaks, California. Prior to construction of Cedar Springs Dam, the East Fork was a tributary to the West Fork Mojave River. However today, the East Fork flows directly into Silverwood Lake and drains an area of 11.3 square miles (Section 3.1.1.2). Upstream of Silverwood Lake, the East Fork collects water from Houston Creek, which has a small reservoir called Lake Gregory at its headwaters. Lake Gregory Dam was built in 1938 by the Crest Forest County Water District. Today, Lake Gregory primarily serves as a recreation destination and includes a San Bernardino County Regional Park.

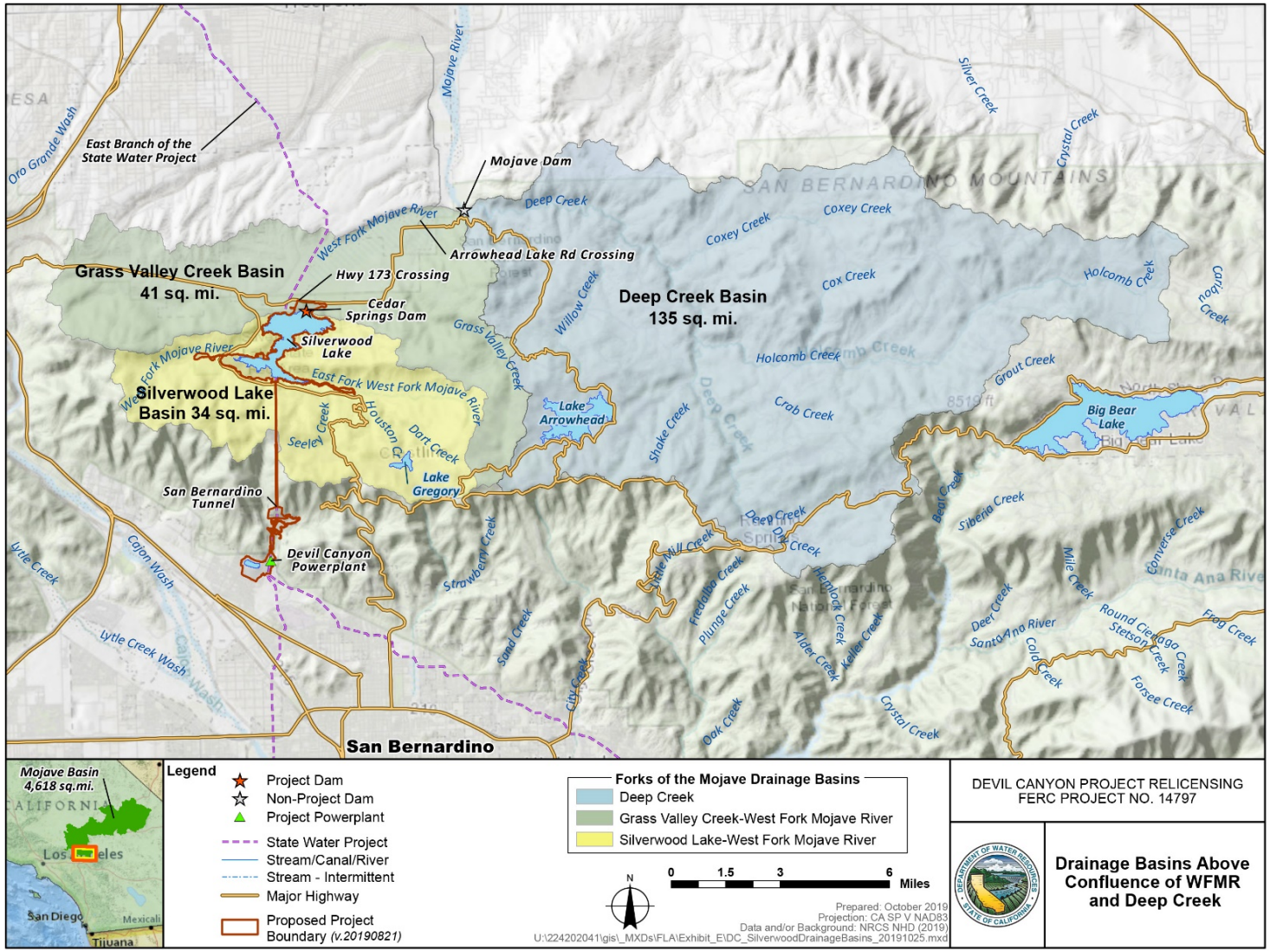
Several un-named tributaries enter Silverwood Lake. However, none of these tributaries are gaged. Collectively, they drain an area of 19.3 square miles (Section 3.1.1.3).

Cedar Springs Dam discharges into the West Fork Mojave River, which flows downstream from the dam approximately 4.3 miles to where Grass Valley Creek enters the West Fork. Grass Valley Creek has a small private reservoir called Grass Valley Lake, which is located near its headwaters.

From its confluence with Grass Valley Creek, the West Fork Mojave River flows another 2.1 miles to join with Deep Creek to form the Mojave River. The area drained by Grass Valley Creek and the 6.4 miles of West Fork Mojave River downstream from Cedar Springs Dam to Deep Creek is approximately 41 square miles and consists of both steep mountainous terrain, with elevations that range from 3,000 feet to 6,000 feet, and a long narrow valley to the west of the West Fork Mojave River.

The sub-basin that is drained by Deep Creek is 135 square miles of rugged mountainous terrain, with elevations that range from 3,000 feet to 8,200 feet. Deep Creek collects water from several tributaries, including Coxey, Holcomb, Willow, and Little Bear Creeks. The privately-owned Lake Arrowhead, formed by Lake Arrowhead Dam, is located near the headwaters of Little Bear Creek. The dam was completed in 1922 by Arrowhead Lake Company to create Lake Arrowhead as a resort destination. Figure 3.8-1 shows the basins contributing to Mojave River flow at the confluence of the West Fork Mojave River and Deep Creek. The Mojave Forks Dam, which is also known as the Mojave River Dam or West Fork Dam is located just downstream of the West Fork Mojave River and Deep Creek confluence. The dam is a USACE flood-control structure completed in 1974 to provide flood protection to the cities located downstream on the Mojave River and can store approximately 179,400 AF of water. Because the dam serves strictly for flood control, the reservoir is usually dry; however, it can fill quickly following heavy winter storms. Flood waters are released as quickly as possible without exceeding the capacity of downstream levees. The reservoir is generally drained within 2–3 days of a flooding event. Because the dam reduces the sharp peaks of flash floods in the Mojave River channel, it also provides incidental groundwater recharge benefits in the Victor Valley area.

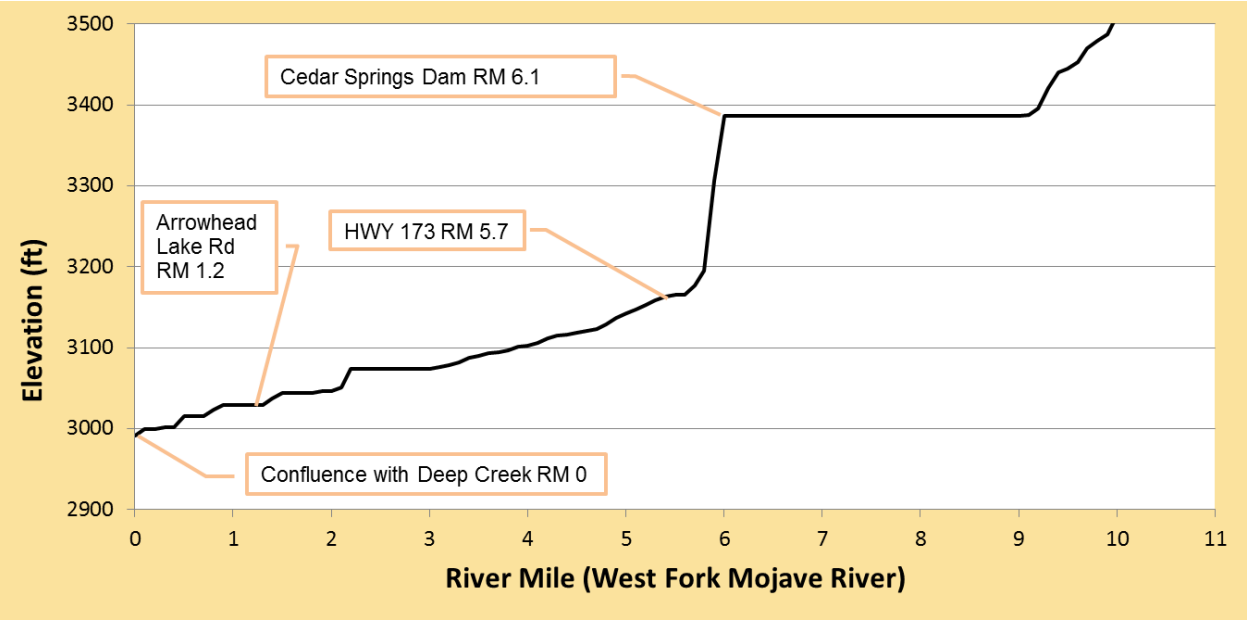
From the Mojave Forks Dam, the Mojave River flows north and east through the California cities of Hesperia, Victorville, and Barstow and through the Mojave Desert for approximately 100 miles before terminating into the Mojave River Wash on the western edge of the Mojave National Preserve. River flow is seasonal, with much of the flow subsurface. The Mojave River basin covers approximately 4,600 square miles. Figure 3.8-1 shows the basins that contribute to the Mojave River at Mojave Dam, along with key watershed features.



Key:
Hwy = highway
sq. mi. = square miles

Figure 3.8-1. Drainage Basins Above the Confluence of the West Fork Mojave River and Deep Creek

Figure 3.8-2 shows the gradient in the West Fork Mojave River, with notable features identified by river mile.



Key:
ft = feet
HWY = Highway
Rd = Road
RM = river mile

Figure 3.8-2. West Fork Mojave River Profile

3.9 CLIMATE IN THE BASIN

The climate in the basin is classified as arid or Cold Desert Climate. The area loses more water via evapotranspiration than falls as precipitation. Average annual precipitation is approximately 6 inches, with rare snowfalls, and the average annual evapotranspiration rate is 57 inches. Air temperatures range from approximately 100 degrees Fahrenheit (°F) in July to about 30°F in January.

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4.0 EXISTING OPERATIONS

4.1 REGULATORY AND CONTRACTUAL OPERATING CONSTRAINTS

This section discusses existing regulatory and contractual operating constraints on the Project.

4.1.1 Conditions in Existing FERC License

The existing FERC license includes 80 articles, only one of which affects operations: Article 58 requires DWR to maintain Silverwood Lake surface elevations at the highest, most practicable level commensurate with other Project purposes during the summer recreation season.

Article 56 in the existing license pertained to construction of the San Bernardino Tunnel. Article 56 required DWR to make available to the USFS, upon request, water in an amount equal in volume to the subterranean water captured by the San Bernardino Tunnel groundwater system; and if the parties could not reach agreement, FERC reserved the right to determine such quantities, after notice and opportunity for hearing. DWR found groundwater levels were affected during construction, however, groundwater levels returned to pre-tunnel levels after construction and USFS did not request water during this period.

The tunnel has been in essentially continuous operation for 48 years, which means the tunnel is under constant pressure with a head of approximately 88 feet (38.1 pounds per square inch [psi]) at the inlet, to approximately 256 feet [111.0 psi] at the outlet) and lined (i.e., the lower 425 feet of tunnel is completely steel-lined with 0.75-inch-thick steel plate, and the remainder of the tunnel is grouted and has a 24-inch-thick concrete lining covering a steel support structure). During that time, there have been no known impacts to the groundwater in the vicinity of the tunnel, either measured or anecdotal.

Seepage is observed in the tunnel when de-watered for inspections. However, during normal operation when the tunnel is pressurized, the effect is reducing seepage or stopping seepage into the tunnel altogether. It is not possible to measure seepage during normal operation, since it is relatively negligible compared to the amount of flow in the tunnel. For example, one measurement of 898 gallons per minute was made in 1979. This number may or may not be indicative of the amount of seepage coming into the tunnel, but, to put the magnitude of this value into perspective, 898 gallons per minute of seepage is 0.07 percent of the tunnel's 2,811 cfs design discharge flow rate. Other factors may affect seepage in the de-watered condition, such as seepage from tunnel water that entered the zone around the tunnel, rainfall, or other local groundwater usage. In any event, the amount of seepage during operation would likely be much less than this amount. DWR monitors both during inspections and visually for any impacts to groundwater.

4.1.2 Water Rights for Power

Under SWP water rights for power generation, DWR has water rights to store SWP water in Silverwood Lake; the point of use is Devil Canyon Powerplant. Note that in this Application for New License, "store" means hold water in storage for 30 days or more.

4.1.3 Water Rights for Beneficial Use or Other Purposes

DWR holds water rights for diversion from the West Fork Mojave River. The Mojave River watershed was declared fully appropriated by the State Water Resources Control Board (SWRCB) in its Decision 1619 issued in 1988. The water rights issued to CLAWA, and transferred to DWR per the 1989 agreement, were the last surface water rights issued for the Mojave River basin. These water rights were issued with the understanding that there would be no net effect to the watershed from CLAWA's diversion due to the fact that the Crestline Sanitary District (CSD) essentially returns all water diverted back to the watershed through the discharge of treated effluent downstream of Cedar Springs Dam. The water rights held by DWR for CLAWA's use allow for the diversion and storage of water from Houston Creek in Silverwood Lake as long as the amount diverted does not exceed the amount of return flows for that year, up to a maximum of 1,302 AF.

4.1.4 Mojave River Decree and Its Effect on Natural Inflow to Silverwood Lake

The Mojave River basin has been known to be in a state of significant overdraft since the 1950s. State laws passed in 1959 to help facilitate development of the SWP also allowed regions around the State to form water agencies to responsibly manage their water supplies and make use of SWP water. Because of this, MWA was formed to help bring SWP water to the Mojave River basin to help supplement what was naturally available. As management of water supplies in the basin expanded, the need to determine the water rights of users in the basin became necessary. An initial attempt to adjudicate the basin was made in 1964. A second, more successful attempt was started in 1990 when many parties filed lawsuits in Riverside County seeking guaranteed amounts of water. The result of the court proceedings was the 1996 Mojave River Decree, which adjudicated the rights of all users of water within the Mojave River basin. Due to the statutory authority granted to MWA by the California Legislature in 1959, the Court decided that MWA should be the Watermaster in charge of administering the Decree. In its role as Watermaster, MWA is responsible for managing the water supplies released from Silverwood Lake for use downstream. DWR makes releases from Silverwood Lake and the non-project Mojave Siphon per its agreements with MWA and LFR, which assist with Decree management. The Project has no rights to the natural inflow to Silverwood Lake and must release such inflow pursuant to the terms of the above mentioned agreements. The Watermaster notes that it is critical that DWR's current management of natural inflow and releases from Silverwood Lake remains unchanged in order to meet the needs of downstream water right holders identified in the Decree.

4.1.5 Measures in Other Agreements and Contracts That Affect Project Operations

This section describes six agreements that affect DWR's operations of Silverwood Lake. Upon construction of Cedar Springs Dam, DWR entered into two operational agreements with CLAWA, and one each with LFR and MWA to satisfy existing consumptive use water rights as identified in the 1996 Mojave River Decree that had been affected by Cedar Springs Dam. None of these parties held water rights for power generation and, with the exception of CLAWA's Houston Creek water rights, none transferred its existing consumptive use water rights to DWR. The other two agreements were entered into by DWR with SBNF and California Department of Fish and Wildlife (CDFW), and pertain to Silverwood Lake water surface elevation. Each of these agreements is described below.

4.1.5.1 CLAWA and DWR 1989 Agreement

As mentioned above, CLAWA was issued two water rights permits, with issuance dates of 1990, for Houston Creek, a tributary to the East Fork of the West Fork Mojave River, with a combined diversion limitation of up to 3.37 cfs and a total annual volume of up to 1,302 AF of storage in Silverwood Lake. Per the decision by the SWRCB that issued permits to CLAWA, return flows discharged from the waste water treatment plants in the CSD system are released via a pipeline that follows State Highway 138 and discharges downstream from Cedar Springs Dam onto LFR's land where the flows contribute to the recharge of the Upper Mojave River Valley groundwater basin, thus creating no net effect.

Per the 1989 agreement between DWR and CLAWA, CLAWA assigned to DWR its combined water rights for Houston Creek. Actual diversion quantities vary depending upon annual amounts of precipitation and are limited according to the amount of return flow to the Mojave watershed each WY.

As outlined in the agreement, in exchange for CLAWA's assignment of Houston Creek water rights to DWR, CLAWA is able to take a like amount of water from Silverwood Lake via CLAWA's diversion structure. The diversion structure is located on the south shore of Silverwood Lake, near CLAWA's water treatment plant, off of State Highway 138, near the Silverwood Lake Marina. CLAWA is responsible for reporting Houston Creek flows to DWR, measured at a gaging station below Crest Forest County Water District's Gregory Lake spillway. DWR adjusts the reported Houston Creek flow measurements to account for losses such as evapotranspiration and percolation between the gaging station and Silverwood Lake, for concurrence by CLAWA. In the event that the Lake Gregory gaging station (Figure 2.0-1) becomes inoperable, the Houston Creek flow is determined by records of Lake Gregory storage change plus measured Lake Gregory inflow. Both DWR and CLAWA record and share their respective operations at Silverwood Lake and their measurements and computations of local water flowing into, stored in, released, and pumped from Silverwood Lake.

4.1.5.2 CLAWA and DWR Water Supply Contract

In addition to the local water from Houston Creek appropriated by DWR for CLAWA, CLAWA has a separate SWP water supply contract for 5,800 AF per WY taken from CLAWA's intake on the south shore of Silverwood Lake. CLAWA diverts its supplies from Silverwood Lake via an intake near CLAWA's water treatment plant, off of State Highway 138, near the Silverwood Lake Marina. All of CLAWA's diversions from Silverwood Lake are measured together, and the portion of its diversion representing its Houston Creek supplies is computed based on CLAWA's agreement with DWR. Daily volumes and average daily flow records are available for the entire period of record and are included in Appendix A. CLAWA's diversions are prioritized as follows:

- Non-Project water (i.e., per its 1989 Houston Creek agreement)
- Non-Project water previously held in Silverwood Lake
- Project water (i.e., SWP contract supplies)

These three categories of supplies are tracked individually and reported by CLAWA to DWR each month. The CLAWA water data, which were used in this report, are available at: http://www.water.ca.gov/swp/operationscontrol/monthly.cfm.

Since the accounting of CLAWA's deliveries between Non-Project and Project supplies are accounted at a monthly level, for purposes of this Application for New License, CLAWA's total daily deliveries from Silverwood Lake are split between SWP and water rights (Non-Project) volumes according to the monthly distribution of delivery volumes of SWP and Non-Project deliveries. For example, if the monthly CLAWA deliveries were 90 percent SWP supplies and 10 percent Non-Project supplies, each day's total deliveries would be split according to the same percentages. Available historical data includes total CLAWA diversions from Table 29 (combined SWP and Non-Project), of DWR's monthly operations reports, and monthly volumes for Non-Project CLAWA deliveries. The data set of daily SWP and Non-Project deliveries is available for the entire relicensing period of record and is included in Appendix A.

4.1.5.3 Las Flores Ranch and DWR 1980 Agreement

LFR has a pre-1914 (1882) water right to divert from the West Fork Mojave River as confirmed by the Mojave River Decree. During the construction of Cedar Springs Dam, DWR removed stream diversion works owned and operated by LFR. As a replacement for the removed LFR diversions, DWR built new diversion works within the DWR right-of-way of the non-Project Mojave Siphon, located upstream from the Mojave Siphon's discharge to Silverwood Lake. The new diversion works includes a 30-inch cone valve with a 23 cfs capacity, the maximum amount LFR can divert under its water right. Diversions to LFR do not come from Silverwood Lake storage; instead, LFR diverts SWP water in exchange for West Fork Mojave River supplies. Since LFR diverted from the West Fork Mojave River prior to the construction of Silverwood Lake, LFR's diversions off the Mojave Siphon are based on computed Silverwood Lake inflow. Since LFR has one of the most senior water rights in

the basin, DWR's agreement with LFR requires all inflow to Silverwood Lake that is less than or equal to 23 cfs to be delivered through exchange off the Mojave Siphon to LFR prior to any other releases of natural inflow. Any flow not used by LFR is returned to the Mojave River. LFR diversions are measured by USGS gage 10260822, Las Flores Ranch Release from the East Branch Aqueduct, near Hesperia, CA, which is described in Section 3.3.4.

The 1980 agreement between DWR and LFR outlines the methodology for determining the amount of flow that would have been available for LFR diversion. This computation is based on the combined gaged inflow at the two USGS gaging stations above Cedar Springs Dam (USGS gages 10260700 [see Section 3.1.1.2] and 10260550 [see Section 3.1.1.1]). Exhibit A of the 1980 agreement provides a synthetic flow based on the inflow at these two gaging stations. When the combined gaged inflow is more than 300 cfs, Exhibit A of the 1980 agreement stipulates that the change in storage method for determining natural outflow will be used. Table 4.1-1 shows Exhibit A of the agreement between DWR and LFR to compute the theoretical synthetic inflow in cfs, which accounts for ungaged runoff to Silverwood Lake.

Within the relicensing POR, there were outages of the LFR diversion for necessary repairs between August 26, 2010 and November 20, 2012, and between February 7, 2013 and May 10, 2013. During this time, DWR held LFR's supplies in Silverwood Lake per the 1980 agreement, and released the water to LFR in 2013 and 2014.

Table 4.1-1. Relationship between Gaged Inflow and Synthetic Inflow, as Described in Exhibit A of Agreements between DWR, LFR, and MWA

Gaged Inflow (AF/Mo)	Synthetic Inflow (AF/Mo)	Gaged Inflow (AF/Mo)	Synthetic Inflow (AF/Mo)	Gaged Inflow (AF/Mo)	Synthetic Inflow (AF/Mo)	Gaged Inflow (AF/Mo)	Synthetic Inflow (AF/Mo)
1	1.7	4.2	7.7	12	23.2	46	94
1.1	1.9	4.4	8	13	25.2	48	98
1.2	2.1	4.6	8.40	14	27.3	50	103
1.3	2.2	4.8	8.8	15	29.3	52	107
1.4	2.4	5	9.2	16	31.3	54	111
1.5	2.6	5.2	9.6	17	33.4	56	116
1.6	2.8	5.4	10	18	35.4	58	120
1.7	3	5.6	10.3	19	37.5	60	125
1.8	3.2	5.8	10.7	20	39.5	62	129
1.9	3.3	6	11.1	21	41.6	64	133
2	3.5	6.2	11.5	22	43.7	66	137
2.1	3.7	6.4	11.9	23	45.8	68	142
2.2	3.9	6.6	12.3	24	47.9	70	147
2.3	4.1	6.8	12.7	25	50	72	151
2.4	4.3	7	13.1	26	52	74	155

Table 4.1-1. Relationship between Gaged Inflow and Synthetic Inflow, as Described in Exhibit A of Agreements between DWR, LFR, and MWA (continued)

Gaged Inflow (AF/Mo)	Synthetic Inflow (AF/Mo)	Gaged Inflow (AF/Mo)	Synthetic Inflow (AF/Mo)	Gaged Inflow (AF/Mo)	Synthetic Inflow (AF/Mo)	Gaged Inflow (AF/Mo)	Synthetic Inflow (AF/Mo)
2.5	4.5	7.2	13.5	27	54	76	160
2.6	4.6	7.4	13.9	28	56	78	164
2.7	4.8	7.6	14.3	29	58	80	168
2.8	5	7.8	14.7	30	60	82	172
2.9	5.2	8	15.1	31	62	84	178
3	5.4	8.2	15.5	32	64	86	182
3.1	5.6	8.4	15.9	33	66	88	186
3.2	5.8	8.6	16.3	34	68	90	190
3.3	5.9	8.8	16.7	35	70	92	195
3.4	6.1	9	17.1	36	72	94	200
3.5	6.3	9.2	17.5	37	75	96	204
3.6	6.5	9.4	17.9	38	77	98	209
3.7	6.7	9.6	18.3	39	79	100	214
3.8	6.9	9.8	18.7	40	81	110	235
3.9	7.1	10	19.1	42	86	120	257
--	7.3	11	21.2	44	90	130	279
140	300	250	532	360	760	540	1130
150	321	260	554	370	780	560	1170
160	342	270	575	380	800	580	1220
170	363	280	595	390	820	600	1260
180	384	290	617	400	840	620	1300
190	405	300	639	420	880	640	1340
200	426	310	660	440	920	660	1390
210	448	320	680	460	970	680	1430
220	469	330	700	480	1010	--	--
230	490	340	720	500	1050	--	--
240	511	350	740	520	1090	--	--

Source: Las Flores Ranch and DWR 1980 Agreement
Key:
-- = no data available
AF/Mo = acre-feet per month

4.1.5.4 MWA and DWR 1982 Water Agreement

As discussed in Section 4.1.4 above, the Mojave Basin water rights were adjudicated per the 1996 Mojave River Court Decree issued by Riverside County which names MWA the Watermaster responsible for the administration of the Decree. As Watermaster, MWA is authorized to manage natural flows from the West Fork Mojave River and its agreement with DWR aides in management of the Decree.

MWA's 1982 agreement with DWR states:

> Current operation of Cedar Springs Dam provides for the release of water, which originates in the watershed tributary thereto, from the dam at the same rate as the inflow to Silverwood Lake.

MWA's agreement allows MWA to hold inflow to Silverwood Lake for subsequent release (within 30 days of inflow) at MWA's request. The agreement outlines the relationship for determining the amount of natural outflow from Cedar Springs Dam that would otherwise have occurred if DWR had not held the water in Silverwood Lake and the corresponding volume of water held in Silverwood Lake. The relationship and computation method for the total combined inflow are identical to those in DWR's 1980 agreement with the LFR, and is reflected in Table 4.1-1 above. DWR maintains an accounting of water held in Silverwood Lake at MWA's request.

MWA also has a SWP Water Supply Contract with DWR and typically takes delivery of SWP water from the East Branch of the SWP Aqueduct upstream from the Mojave Siphon. However, in the case of an outage of the East Branch of the SWP Aqueduct, or other restrictions on deliveries, MWA could receive SWP supplies by release from Silverwood Lake. DWR also facilitates exchanges of SWP water between MWD and MWA. These exchanges of SWP water can occur either from turnouts on the East Branch of the Aqueduct or by release from Silverwood Lake. Though rare, two such exchanges occurred via release from Silverwood Lake during the relicensing POR. The first was an exchange of 14,141 AF of SWP water from September through December 2011, and the other was an exchange of 2,994 AF of SWP water in November of 2012.

DWR tracks releases from Silverwood Lake made for MWA's SWP contract deliveries in DWR's monthly operations reports in addition to releases for natural Mojave River flows. USGS gage 10260820, West Fork Mojave River below Silverwood Lake, CA, reflects releases for these combined purposes. Average daily flows are available for the entire POR for both USGS gage 10260820 and releases of natural flow and contract deliveries to MWA (monthly operations reports Table 29) and are included in Appendix A.

4.1.5.5 USFS and DWR 1968 Agreement, as Amended

The USFS agreement was signed in 1968 and amended in 1971, and is not part of the existing Project license. With regard to Project operational constraints, the agreement establishes operating goals to maintain a water surface elevation in Silverwood Lake from March 1 to September 15 of each year, within a range of not more than 30 inches

during each seven-day period, beginning at midnight Sunday, and within a range of not more than 11 inches each day. However, the agreement also recognized that the weekend water level recovery pattern may result in a daily rise of up to 18 inches during the weekend cycle, and there may be periods of reservoir operations where the fluctuations have to exceed the 11-inches-per-day fluctuation limit to economically meet DWR's commitments for SWP water supply delivery. Therefore, DWR may exceed the 11-inches-per-day fluctuation limit by 3 inches, for a total of 15 days between March 1 and September 15. A consultation process is also provided if there is a need to exceed the 11-inches-per-day limit beyond 15 days. The agreement does not specify any other constraints on water flow through the Project.

4.1.5.6 CDFW and DWR 2003 Agreement

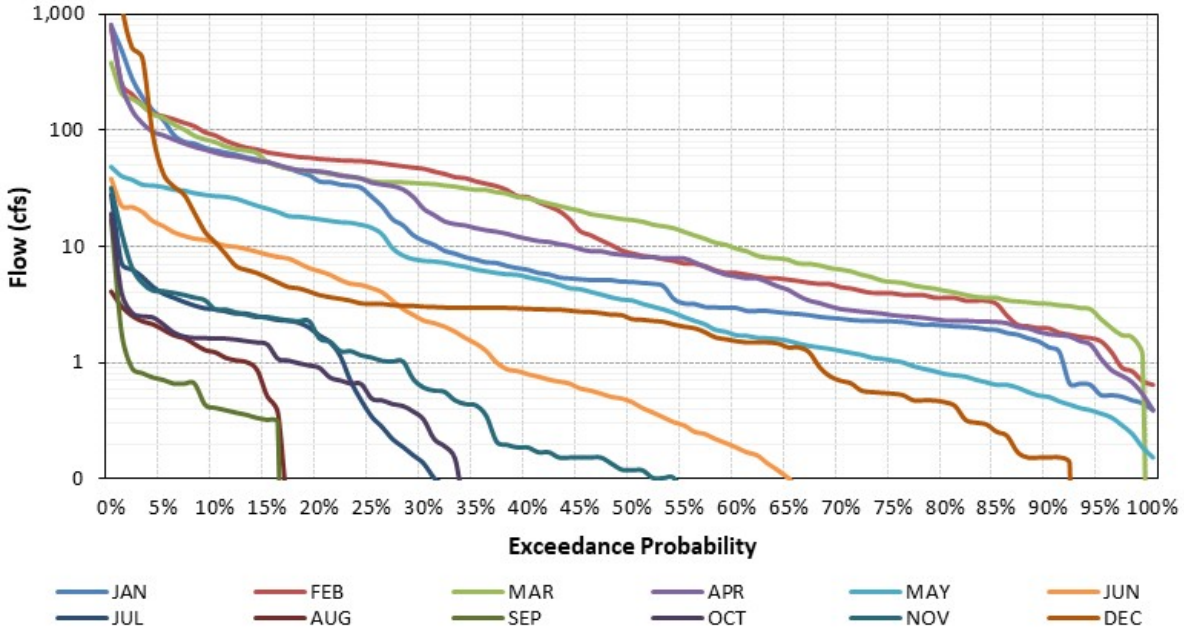
The 2003 agreement with CDFW (formerly California Department of Fish and Game) stipulates operations constraints to help protect bass spawning. On April 1 each year, DWR reports the Silverwood Lake water level to CDFW; and during the period of April 1 to June 30 each year, DWR manages the lake, such that the lake is not lowered more than three feet from the April 1 reported level. A consultation process was established in the agreement in the event DWR needs to lower the lake level by more than three feet during this period.

4.2 OPERATIONS IN TYPICAL DRY, NORMAL AND WET YEARS

The existing Project is operated as a power recovery project using SWP water. For that reason, Project operations do not vary based on changes in local hydrological conditions.

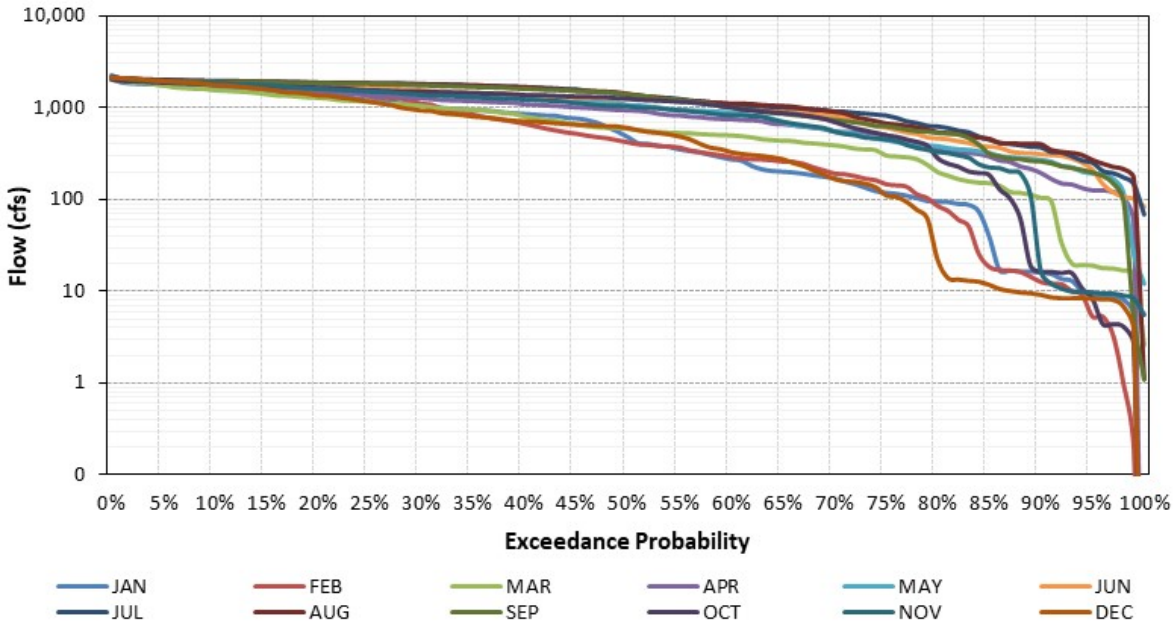
4.2.1 Inflow into Silverwood Lake

Figures 4.2-1, 4.2-2, and 4.2-3 provide monthly flow duration curves for inflow into Silverwood Lake from: (1) SWP; (2) natural flow; and (3) the combination SWP and natural inflow. The natural inflow includes the sum of USGS gage 10260550 as described in Section 3.1.1.1, USGS gage 10260700, as described in Section 3.1.1.2, and the agreement-derived ungaged flow, as described in Section 3.1.1.3. The SWP inflow is the sum of SWP Aqueduct inflow measured by USGS gage 10260780, as described in Section 3.1.2, and a volume of West Fork Mojave River inflow equivalent to the amount exchanged with LFR, computed as the first 23 cfs of natural inflow to Silverwood Lake according to LFR's water rights, as described in Section 3.3.4. In the POR, the peak natural inflow was 5,712 cfs on Dec 22, 2010, the peak SWP inflow was 2,263 cfs on Apr 17, 2007, and the peak total inflow was 7,692 cfs on Dec 22, 2010.



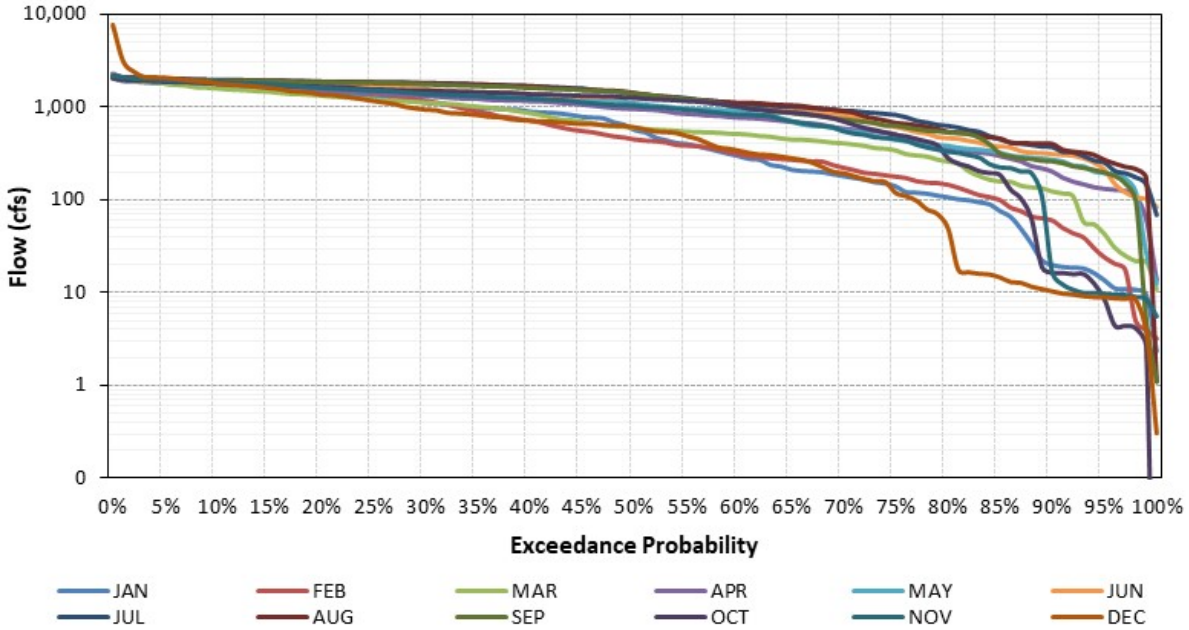
Source: USGS gages 10260550 and 10260700
Key:
% = percent
cfs = cubic feet per second

Figure 4.2-1. Monthly Flow Duration Curves for Natural Inflow to Silverwood Lake for the Relicensing Period of Record



Source: USGS gage 10260780
Key:
% = percent
cfs = cubic feet per second

Figure 4.2-2. Monthly Flow Duration Curves for SWP Inflow to Silverwood Lake for the Relicensing Period of Record



Source: USGS gages 10260550, 10260700, and 10260780
Key:
% = percent
cfs = cubic feet per second

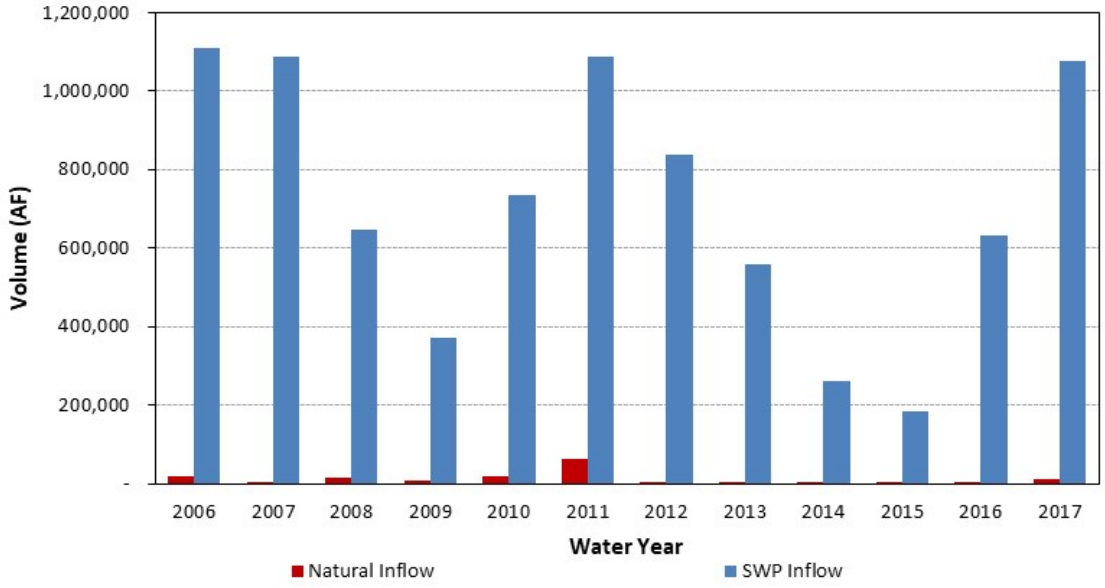
Figure 4.2-3. Monthly Flow Duration Curves for Total Inflow to Silverwood Lake for the Relicensing Period of Record

Figure 4.2-4 shows the relative contribution of the natural inflow and SWP inflow for each year of the POR. Annual volume of natural inflow is rarely noticeable compared to the volume of SWP inflow to Silverwood Lake. The greatest difference between the two volumes of 1,091,276 AF occurred in WY 2006, and the smallest difference between the two volumes of 182,423 AF occurred in WY 2015.

4.2.2 Silverwood Lake Storage

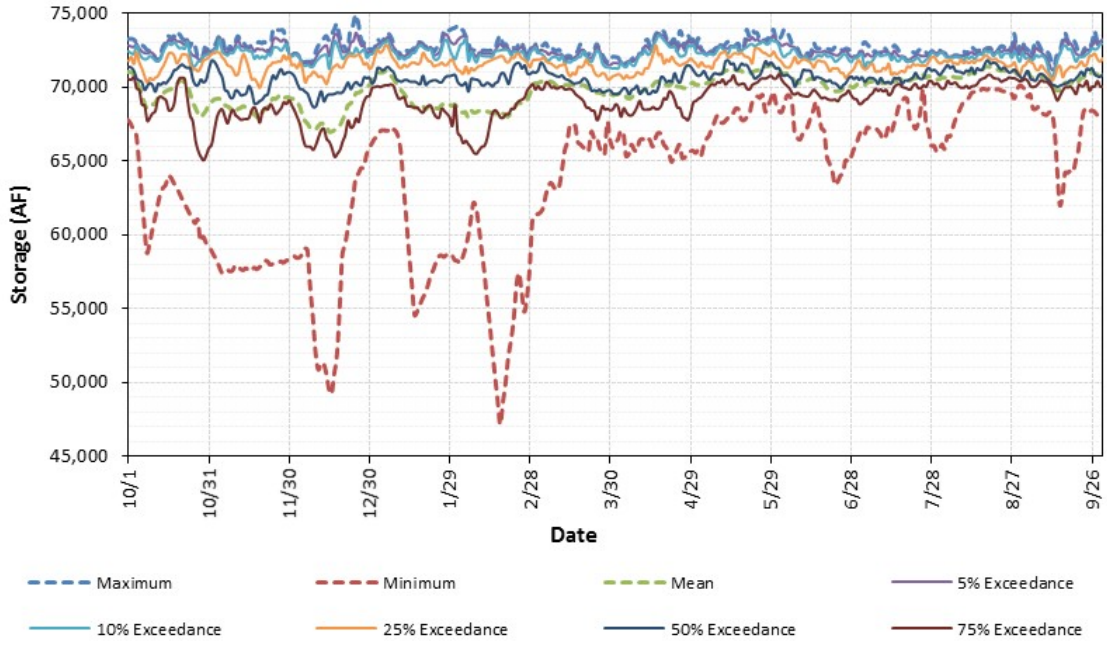
Silverwood Lake is the principal storage facility for the Project. The reservoir has a gross storage capacity of 75,000 AF (i.e., storage at the Normal Maximum Water Surface Elevation [NMWSE] of 3,355 feet) and dead storage at the invert of the Cedar Springs Dam outlet structure at elevation 3,250 feet corresponding to 8,234 AF. The minimum operating pool for the Devil Canyon Powerhouse is 39,211 AF, corresponding to a minimum operating pool elevation of 3,312 feet. The reservoir does not have a regulatory minimum pool requirement or any flood pool restrictions. Article 58 in the existing FERC license (Section 4.1.1) and the existing DWR agreements with USFS (Section 4.1.3.5) and CDFW (Section 4.1.3.6) set some limits on reservoir fluctuations from around March through mid-September.

Figure 4.2-5 shows average daily storage in Silverwood Lake, as well as the maximum daily storage and minimum daily storage for the POR and various percent exceedance levels of daily storage over the POR.



Source: USGS gages 10260550, 10260700, and 10260780
Key:
AF = acre-feet
SWP = State Water Project

Figure 4.2-4. Relative Contribution of Natural Inflow and SWP Inflow to Silverwood Lake

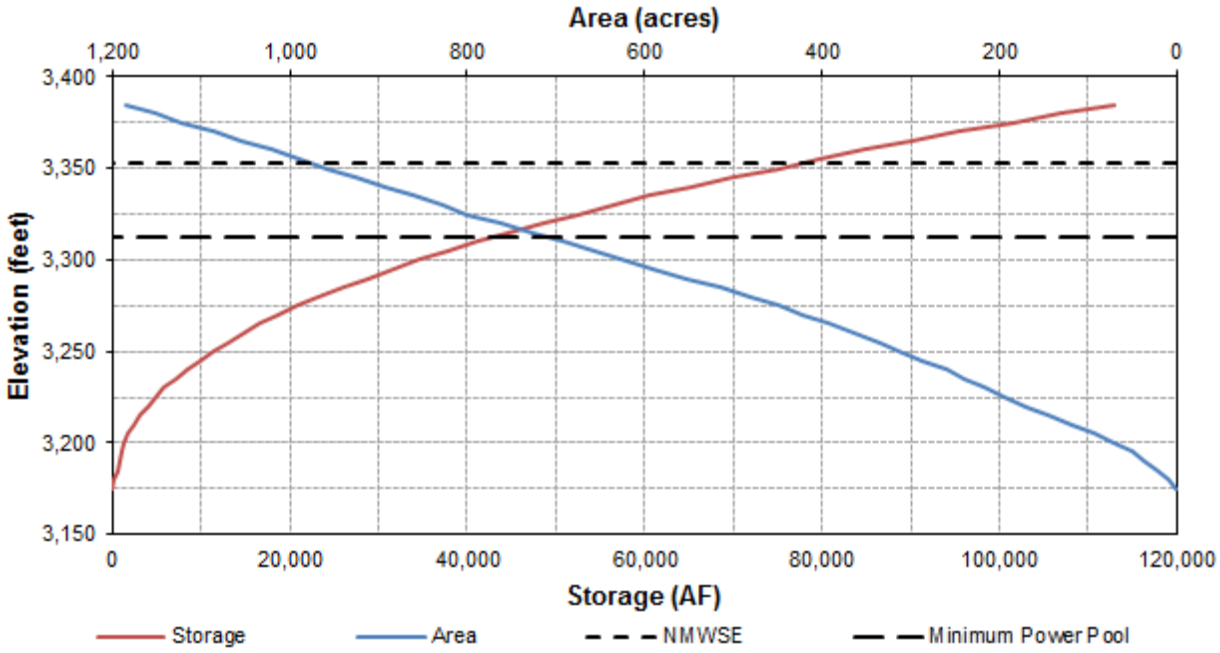


Source: USGS gage 10260790
Key:
% = percent
AF = acre-feet

Figure 4.2-5. Daily Storage Statistics for Silverwood Lake for the Relicensing Period of Record

Figure 4.2-5 shows that for most times in the relicensing POR, storage is consistently kept in the range of 65,000 AF to 75,000 AF. Of the 4,383 days in the relicensing POR, 3,724 (85 percent of days) are within this range. However, there are a few instances of low storage. In 4 of the 12 WYs (i.e., 2007, 2010, 2011, and 2016), storage drops below 55,000 AF. The lowest storage value of 47,100 AF occurred on February 17, 2007. Over the span of about eight days, the reservoir experienced no inflow from the East Branch of the SWP Aqueduct, while the Devil Canyon Powerplant was still operating at a daily average of approximately 800 cfs.

The storage-capacity curve showing the usable and gross storage capacities of Silverwood Lake is shown on Figure 4.2-6. The surface area at the maximum operating pool of 3,353 feet is 962.0 acres, with a storage volume of 73,032 AF. The minimum operating pool for the Devil Canyon Powerplant is at 3,312 feet, corresponding to 690.0 acres of surface area, and 39,211 AF of storage.

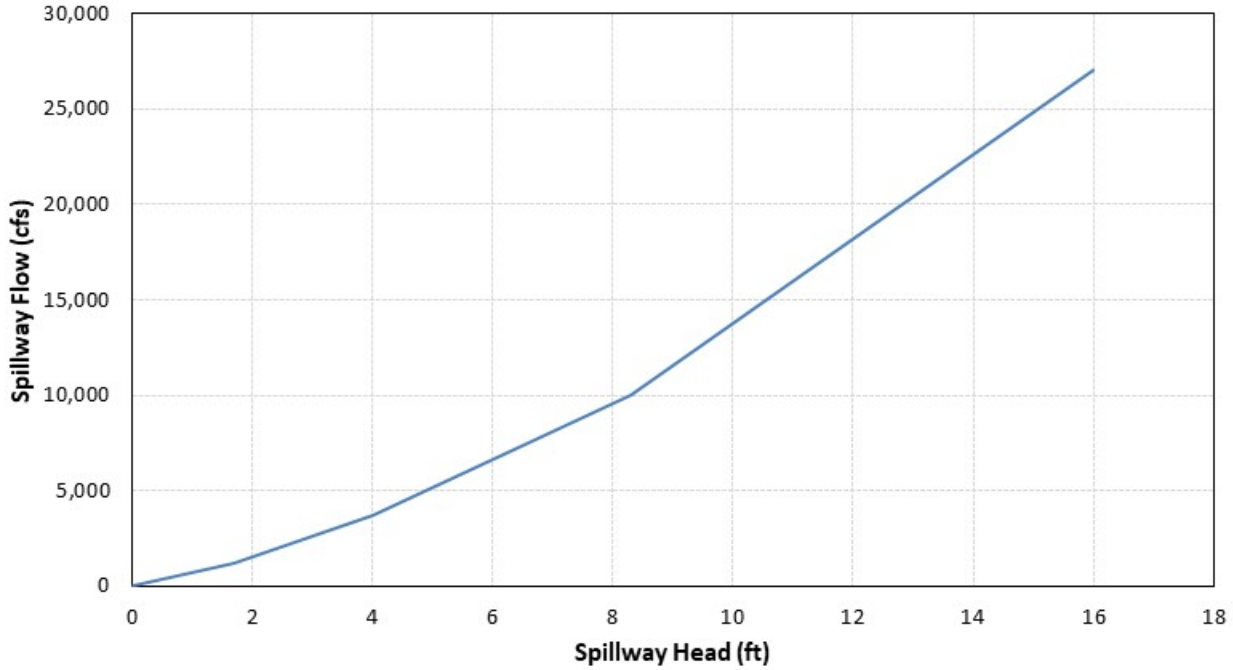


Source: DWR Exhibit L-1-C
Key:
AF = acre-feet
NMWSE = Normal Maximum Water Surface Elevation

Figure 4.2-6. Silverwood Lake Storage-Capacity Curve

There are no rule curves pertinent to Silverwood Lake. In general, the reservoir is maintained as full as possible.

The Cedar Springs Dam spillway is located on the left abutment of the dam and consists of a 120-foot long, un-gated crest with a rectangular, lined concrete channel. The elevation of the spillway crest is 3,355 feet, and the maximum capacity of the spillway is 78,000 cfs. The spillway and low-level outlet discharge into a rock-lined stilling basin. The spillway rating curve is presented on Figure 4.2-7.

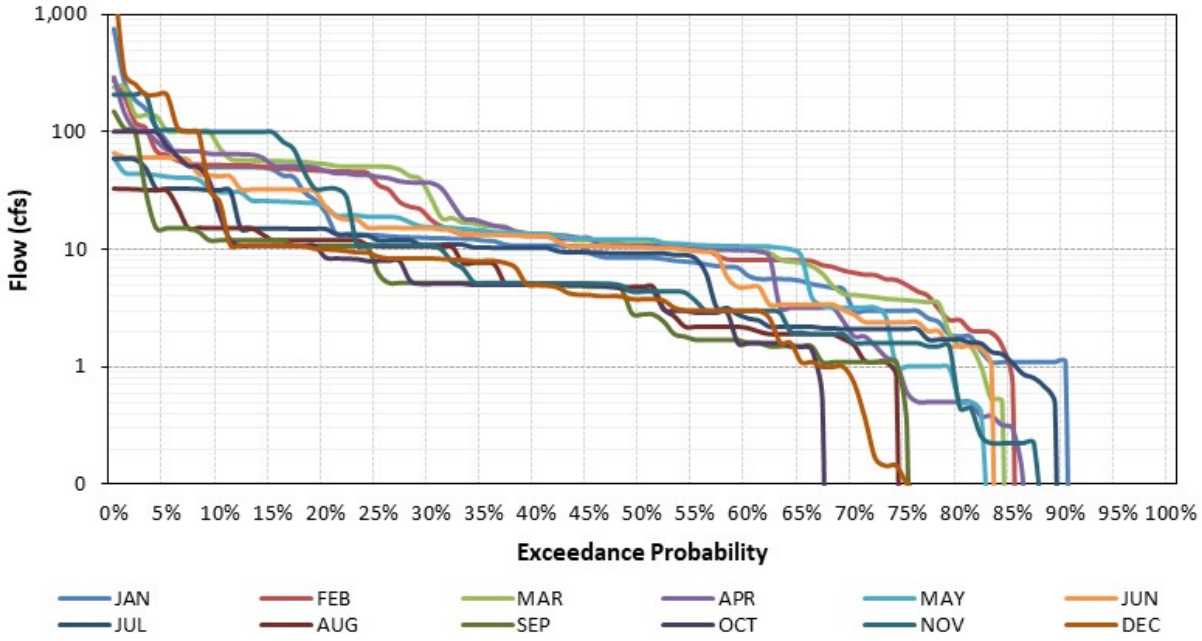


Source: DWR Department of Engineering Cedar Springs Dam Breach and Inundation Study Report 2007
Key:
cfs = cubic feet per second
ft = feet

Figure 4.2-7. Cedar Springs Dam Spillway Rating Curve

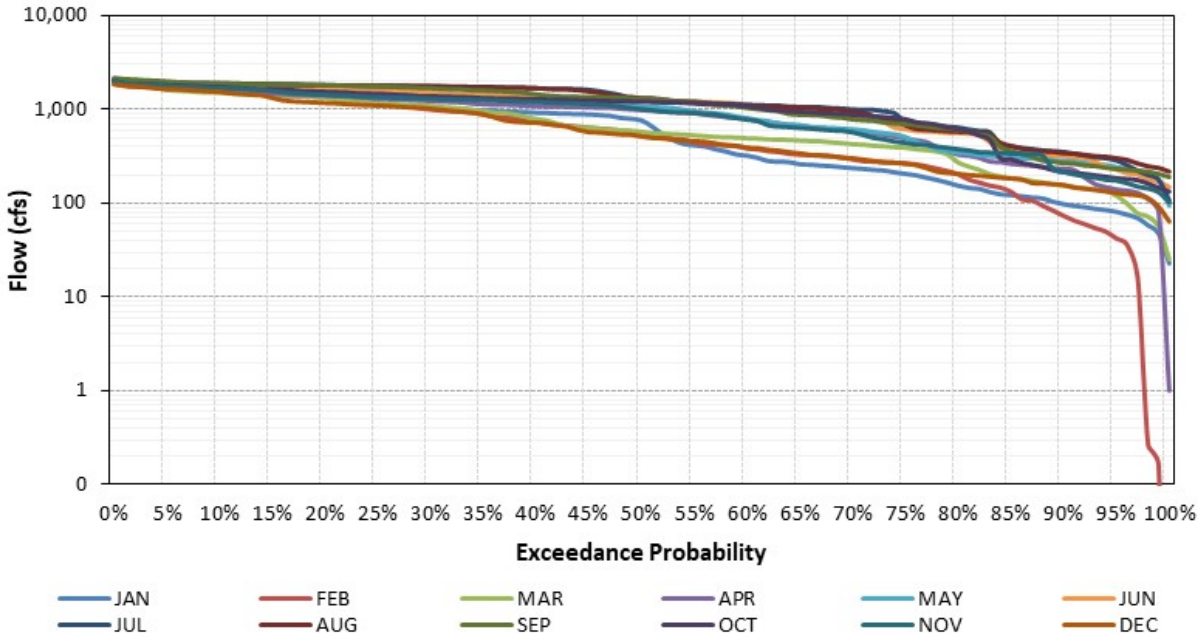
4.2.3 Outflow from Silverwood Lake

Figures 4.2-8, 4.2-9 and 4.2-10 provide monthly flow duration curves for outflow from Silverwood Lake from: (1) SWP; (2) natural flow; and (3) the combination SWP and natural outflow. The natural outflow includes the sum of USGS gage 10260820 as described in Section 3.3.2.1, USGS gage 10260822, as described in Section 3.3.4, and the CLAWA's water rights diversions, as described in Section 3.3.1. The SWP outflow is the sum of San Bernardino Tunnel outflow measured by USGS gage 11063682, as described in Section 3.3.3 and CLAWA SWP diversions, as described in Section 3.3.1. In the POR, the peak natural outflow was 2,140 cfs on Dec 22, 2010, the peak SWP outflow was 2,164 cfs on Sep 23, 2017, and the peak total outflow was 3,300 cfs on Dec 22, 2010.



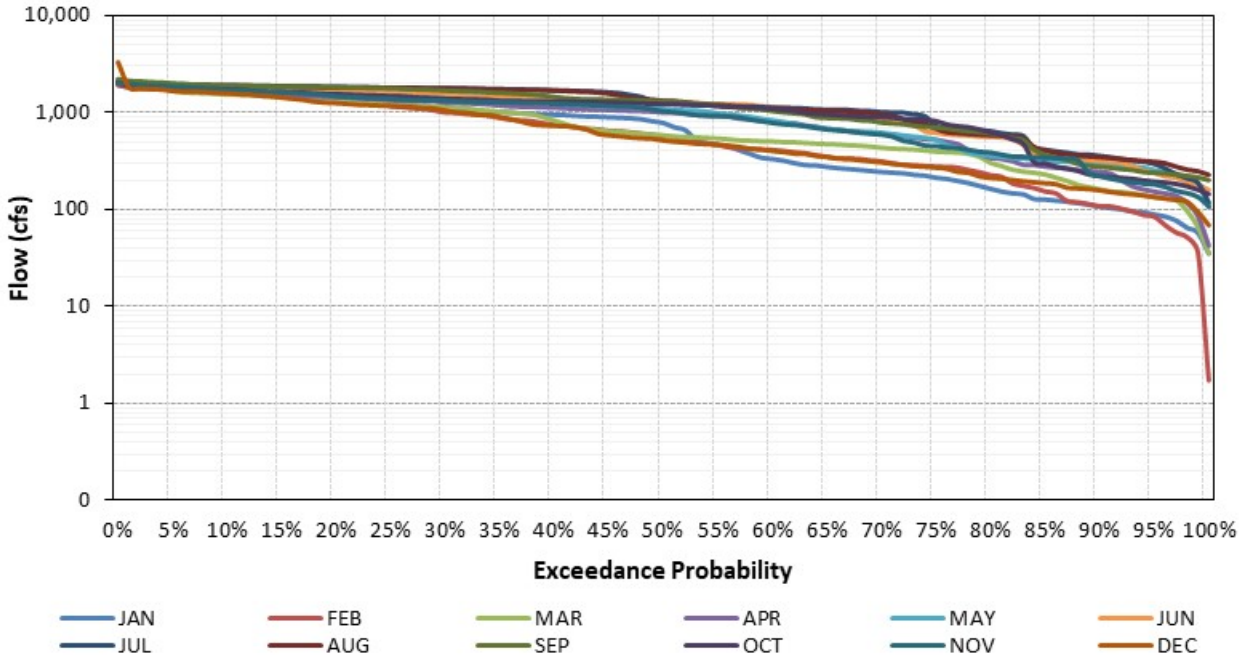
Source: USGS gages 10260820 and 10260822
Key:
% = percent
cfs = cubic feet per second

Figure 4.2-8. Monthly Flow Duration Curves for Natural Outflow from Silverwood Lake for the Relicensing Period of Record



Source: USGS gage 11063682
Key:
% = percent
cfs = cubic feet per second

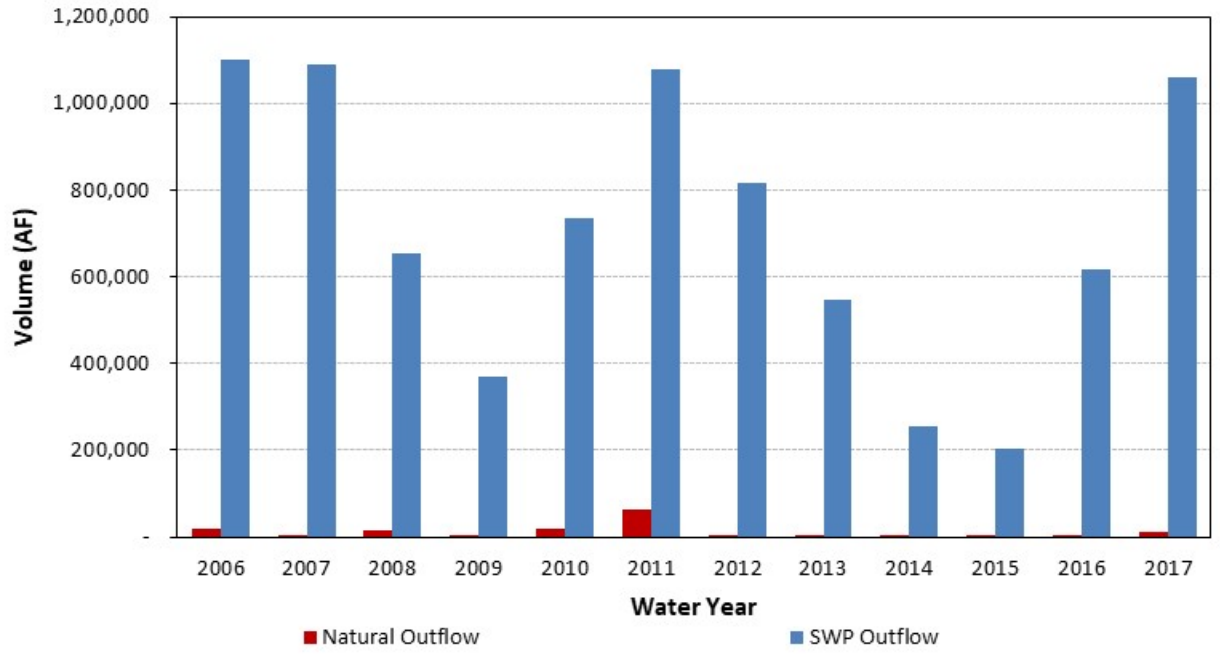
Figure 4.2-9. Monthly Flow Duration Curves for SWP Outflow from Silverwood Lake for the Relicensing Period of Record



Source: USGS gages 10260820, 10260822, and 11063682
Key:
% = percent
cfs = cubic feet per second

Figure 4.2-10. Monthly Flow Duration Curves for Total Outflow from Silverwood Lake for the Relicensing Period of Record

Figure 4.2-11 shows the relative contribution of the natural outflow and SWP outflow for each year of the POR. The annual volume of natural outflow is rarely noticeable compared to the volume of SWP outflow. The greatest difference between the two volumes of 1,088,818 AF occurred in WY 2007, and the smallest difference between the two volumes of 202,317 AF occurred in WY 2015.



Source: USGS gages 10260820, 10260822, and 11063682
Key:
AF = acre-feet
SWP = State Water Project

Figure 4.2-11. Relative Contribution of Natural Outflow and SWP Outflow

4.2.4 San Bernardino Tunnel and Penstocks

Releases of SWP water from Silverwood Lake are made through the San Bernardino Tunnel. The tunnel intake is a vertical reinforced concrete tower on the south end of Silverwood Lake at an invert elevation of 3,265 feet. The San Bernardino Tunnel is 3.81 miles long, concrete-lined, has a design capacity of 2,811 cfs and is primarily 13 feet in diameter up to the lower 425 feet, which is 12.75 feet in diameter and both steel- and concrete-lined. The tunnel delivers water to two above-ground penstocks that run parallel, generally following the ground slope from the south portal, or end, of the San Bernardino Tunnel to the Devil Canyon Powerplant. The maximum capacities of the two penstocks are approximately 1,200 cfs and 1,600 cfs. Flow through the tunnel and penstocks is discussed in the next section.

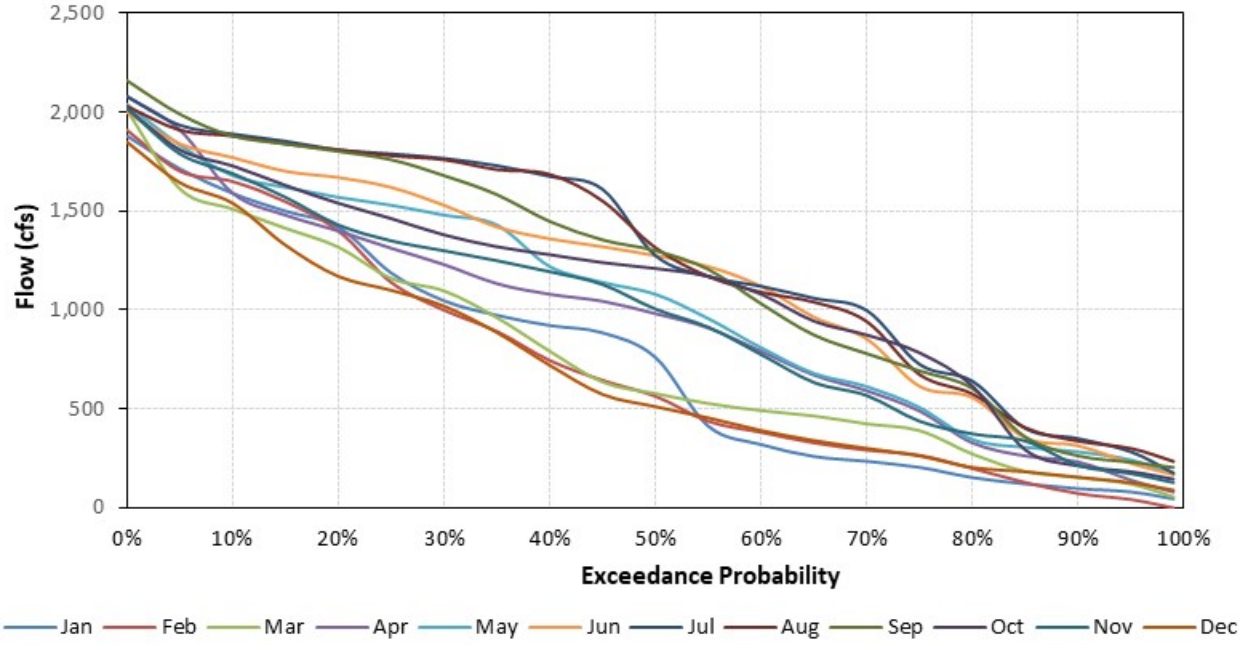
4.2.5 Devil Canyon Powerplant

The Devil Canyon Powerplant generates power using SWP water released for downstream water users. As a general rule, weekly water demands are established, and DWR in coordination with the California Independent System Operator (CAISO) manages that water on a daily and hourly basis to maximize peaking power, and to provide regulation-up, regulation-down and spinning reserve ancillary services in support of the California electric grid. The powerplant is manually operated, with DWR staff on site seven days per week, 24 hours per day.

Minimum-, maximum- and mean-daily average flows through the powerplant over the relicensing POR are 0 cfs, 2,160 cfs and 980 cfs, respectively.

The Devil Canyon Powerplant contains four generation units with a centerline elevation of 1,942 feet. These include one Baldwin-Lima-Hamilton Pelton-type turbine and one Sulzer Escher Wyss Pelton-type turbine, each with 1,357 feet rated head, 277 revolutions per minute (rpm) runner speed, 81,000 horsepower (hp) rated output, 670 cfs approximate rated discharge, and a licensed capacity of 59,850 kW. The other two are Voith Pelton-type turbines each with 1,250 feet rated head, 277 rpm runner speed, 102,064 hp rated output, 800 cfs approximate rated discharge, and licensed capacity of 76,548 kW.

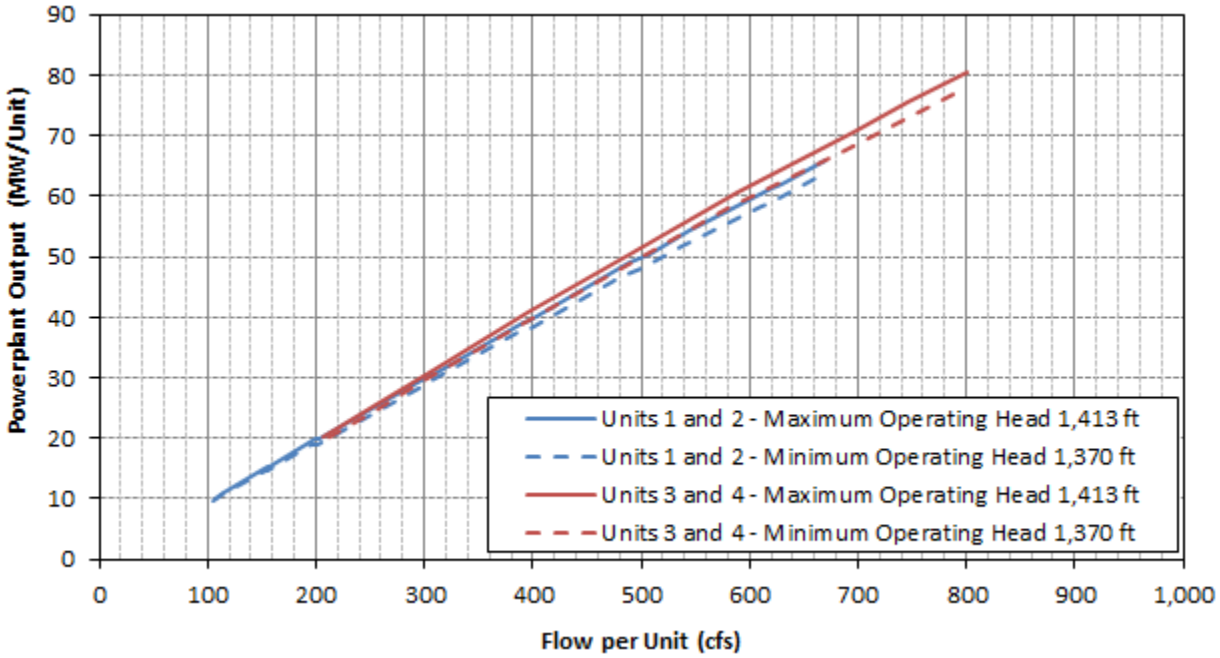
Monthly flow duration curves for releases from Devil Canyon Powerplant over the relicensing POR are provided on Figure 4.2-12.



Source: USGS gage 11063682
Key:
% = percent
cfs = cubic feet per second

Figure 4.2-12. Monthly Flow Duration Curves for Devil Canyon Powerplant for the Relicensing Period of Record Using Gaged Data

Powerhouse capability versus flow is shown on Figure 4.2-13. Normal, minimum- and maximum-operating heads for Devil Canyon Powerplant are 1,411 feet (corresponding to a Silverwood Lake surface elevation of 3,353 feet and 73,032 AF of storage); 1,370 feet (corresponding to a Silverwood Lake surface elevation of 3,312 feet and 39,211 AF of storage); and 1,413 feet (corresponding to a reservoir surface elevation of 3,355 feet and 75,000 AF of storage), respectively.



Source: Devil Canyon Powerplant Efficiency Test, performed June 15-16, 2011
Notes:
[1]Curves for normal operating head (1,411 feet) are not shown; they would be indistinguishable from maximum head curves.
[2]Reported operating head is for gross head (elevation drop between Silverwood Reservoir WSE and Devil Canyon Powerplant turbine.)
Key:
cfs = cubic feet per second
ft = feet
MW = megawatt

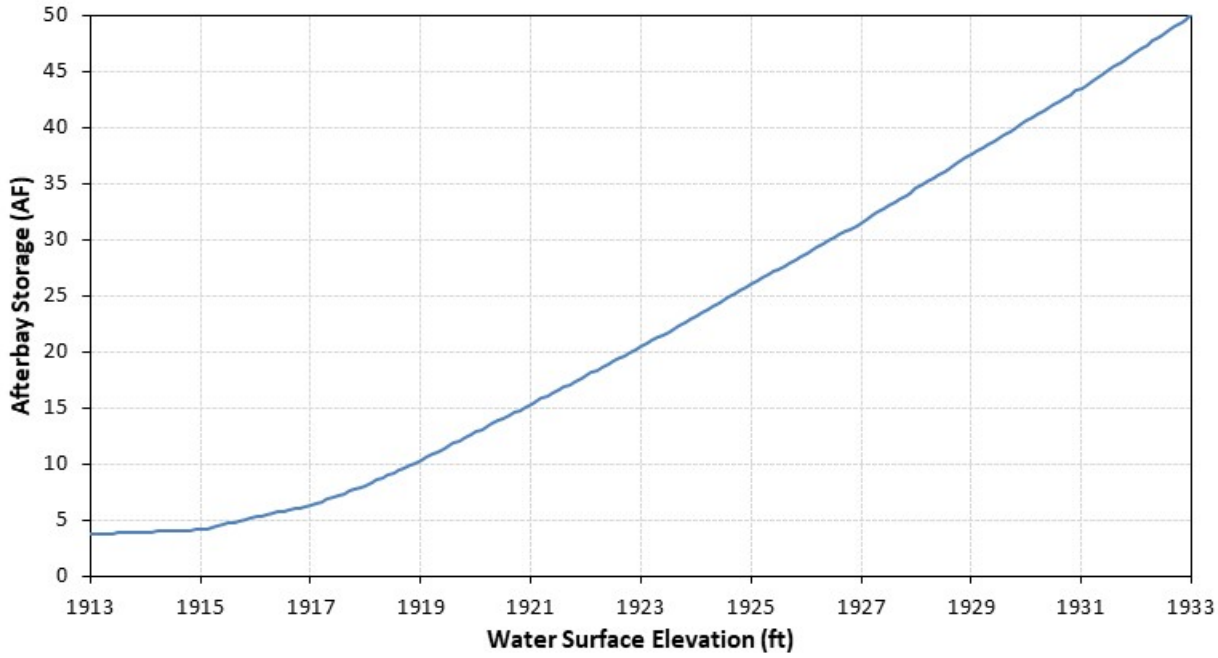
Figure 4.2-13. Devil Canyon Powerplant Capability Curve

The Devil Canyon Powerplant units use Pelton turbines, and are not dependent on tail water elevation. The turbine elevation for the Devil Canyon Powerplant is 1938 feet. The Devil Canyon Powerplant is operated for participation in both energy and ancillary services markets with CAISO. Its daily and weekly operations are driven by energy market demands, so there is no standard load curve.

The Devil Canyon Powerplant has a nameplate capacity of 272,796 kW and a dependable capacity of 250,100 kW, and generates an annual average of 836,000 megawatt-hours per year (refer to Exhibit D).

4.2.6 Devil Canyon Afterbay

The Devil Canyon Afterbay provides a minimal amount of regulatory capacity for matching the Devil Canyon Powerplant's inflow and outflow to different pipelines for SWP water deliveries. At an NMWSE of 1,932 feet, the Devil Canyon Afterbay has a capacity of 49 AF and a surface area of 13.8 acres. The storage capacity curve showing the storage capacities of the Devil Canyon Afterbay is shown on Figure 4.2-14.



Source: DWR
Key:
AF = acre-feet
ft = feet

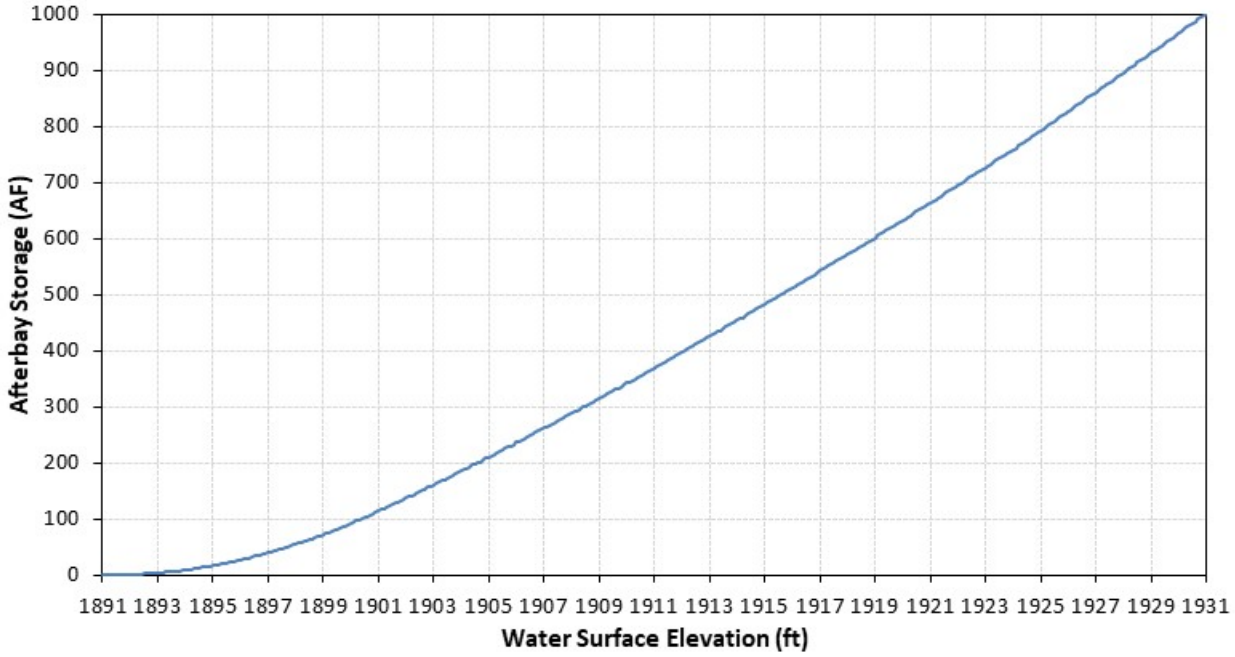
Figure 4.2-14. Devil Canyon Afterbay Elevation-Storage Curve

The Devil Canyon Afterbay includes a spillway structure designed for emergency purposes but has never been used, and is obsolete due to the construction of the Second Afterbay. The Afterbay does not include facilities for releases to surface waters, other than the second Afterbay.

There are no rule curves pertinent to the Afterbay. In general, the Afterbay is maintained at full pool.

4.2.7 Devil Canyon Second Afterbay

The Devil Canyon Second Afterbay, at an NMWSE of 1,930 feet, has a gross storage capacity of 967 AF and a surface area of approximately 36.0 acres. The minimum Devil Canyon Second Afterbay elevation is 1,910 feet, corresponding to 342 AF of storage. The storage capacity curve showing the usable and gross storage capacities of the Devil Canyon Second Afterbay is shown on Figure 4.2-15.



Source: DWR As-Built drawing (Spec. NO. 92-16)
Key:
AF = acre-feet
ft. = feet

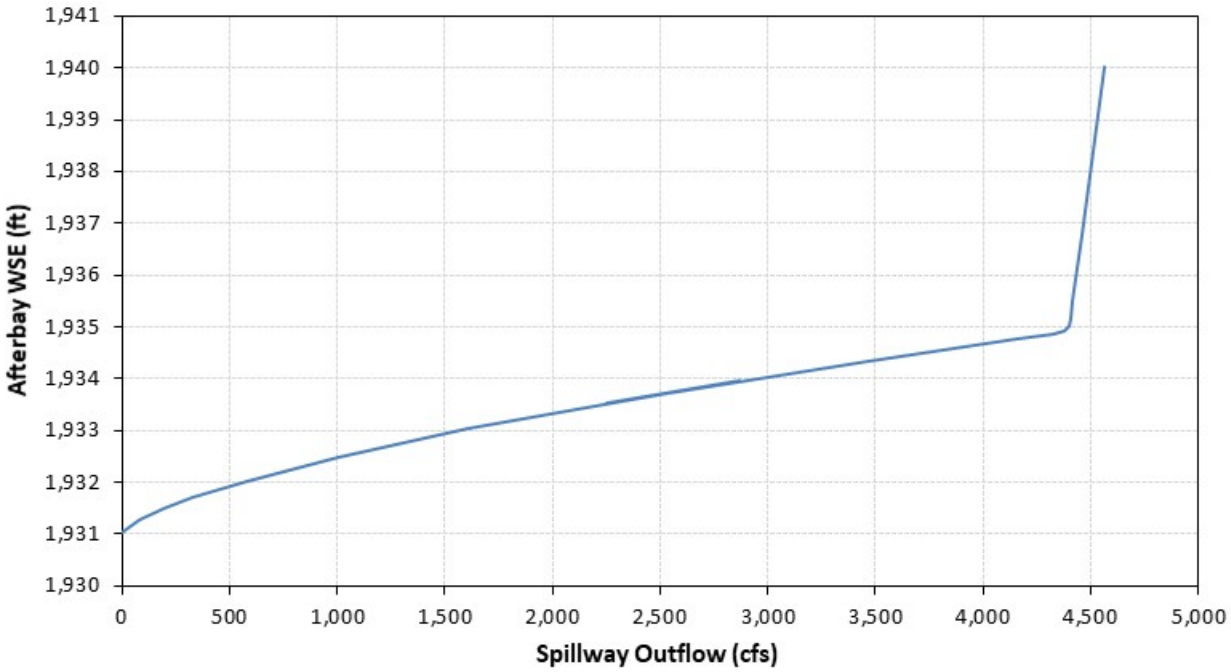
Figure 4.2-15. Devil Canyon Second Afterbay Storage-Capacity Curve

Like the Devil Canyon Afterbay, the Second Afterbay provides a minimal amount of regulatory capacity for matching the Devil Canyon Powerplant's inflow and outflow to different pipelines for SWP water deliveries.

The Devil Canyon Second Afterbay also has an emergency overflow spillway discharge outlet: the Wasteway Pipe (Exhibit F-8A), which releases to Devil Canyon Creek. Flows from the Devil Canyon Second Afterbay can be discharged to the Wasteway Pipe either through two low-level outlet gates, over a spillway with an elevation of 1,931.0 feet. The Devil Canyon Second Afterbay spillway has never been used; the low-level outlet gates are exercised every three years for dam safety purposes.

There are two components to the Devil Canyon Second Afterbay's spillway outflow rating curve: the discharging capacity over the spillway, and the flow carrying capacity of the Wasteway Pipe. The minimum of the above two is the controlling factor for the combined outflow rating. Depending on the water surface elevation within the Second Afterbay, the spillway and Wasteway Pipe can function as two independent outlets or

one outlet. Figure 4.2-16 shows the final rating curve for the Second Afterbay Spillway. When the water surface elevation within the Second Afterbay is less than 1,934.8 feet, the outflow from the spillway is less than the capacity of the Wasteway Pipe. When the Second Afterbay water surface elevation is above 1,934.8 feet, the outflow is limited by the capacity of the Wasteway Pipe inlet.



Source: DWR Devil Canyon Powerplant Second Afterbay, Determination of Spillway Length, January 2017
Key:
cfs = cubic feet per second
ft = feet

Figure 4.2-16. Devil Canyon Second Afterbay Dam Spillway Rating Curve

There are no rule curves pertinent to the Devil Canyon Second Afterbay. In general, the Afterbay is maintained at full pool.

4.3 PROJECT FACILITY MAINTENANCE

4.3.1 San Bernardino Tunnel

The San Bernardino Tunnel is always pressurized, except for one to two periods approximately once every five years when the tunnel is dewatered for inspection.

4.3.2 Devil Canyon Powerplant Maintenance

DWR conducts annual mechanical and electrical inspections and maintenance at the Devil Canyon Powerhouse to verify the structural and/or functional integrity of the facilities and to identify conditions that might disrupt operations. The annual mechanical and electrical inspections and maintenance of the generation units is typically done one unit at a time and occurs in the spring and fall time frame while keeping other units available for water delivery. These annual inspections typically run about 25 days each.

In the fall, half of the powerplant is out at a time for three days for switchyard inspections and maintenance. Penstock inspections are done individually and usually happen in the late fall or early winter, again affecting half the powerplant at a time and leaving two units available for power generation and water delivery.

4.3.3 Other Facility Maintenance

Routine maintenance activities conducted in the vicinity of Project facilities include vegetation management, pest management, road and trail maintenance, maintenance of communication facilities, debris management, and facility painting. Each of these activities is described below.

4.3.4 Vegetation Maintenance

Vegetation management is implemented by DWR at Project facilities. Vegetation management is completed throughout the Project area as necessary to reduce fire hazard, to provide for adequate Project facility access and inspection, to protect Project facilities, and to provide for worker and public health and safety. In general, vegetation management is implemented within approximately 75 feet of the powerhouse and switchyard; within approximately 15 feet on either side of roads and trails to Project facilities; and within and adjacent to recreation areas.

Vegetation management is conducted manually (hand trimming) and chemically (with the use of herbicides). Hand trimming includes cutting grasses and forbs using string trimmers, and removing or trimming overhanging shrubs and tree limbs using a chain saw or other handheld saw or clippers. These management activities are conducted as needed in conjunction with facility inspections.

Herbicides, in combination with surfactants, are used in combination with hand trimming vegetation management activities on an annual basis at Project facilities located on DWR-owned property. All herbicide applications are supervised by a Qualified Applicator under the direction of a licensed Pest Control Advisor (PCA). The PCA prepares pest control recommendations consistent with the specific herbicide label(s) for each site, prescribing specific application direction and associated precautions that must be strictly followed. All-terrain vehicles, other vehicles (e.g., pick-up trucks), backpack sprayers, or small hand-held sprayers are used to apply herbicides. Herbicide application occurs twice annually, at a minimum. These applications occur between December 1 and March 31, as determined by the PCA for pre-emergents. Follow-up visits to apply post-emergent herbicides and/or additional treatments (as needed) are seasonally dependent, and typically occur between April 1 and June 30. A third cycle, if required, would be completed between July 1 and October 14.

4.3.5 Hazard Trees

Hazard trees – generally defined as dead or dying trees or trees with defects that may result in failure and have the potential to cause property damage, personal injury, or death – are removed as needed. Removal is conducted with a chainsaw, handheld saw,

or other equipment. Smaller diameter debris from felled hazard trees is either chipped or lopped and scattered. Downed logs are typically left on-site and are moved only if needed for safety.

4.3.5.1 Vertebrate Pest Management

DWR implements rodent control as needed in facility interiors (i.e., Devil Canyon Powerhouse), recreation areas, and earthen infrastructure to protect public health and the safe operation of Project infrastructure by applying non-restricted rodenticides in accordance with label instructions. Prior to administering a rodenticide, the feasibility of using non-chemical methods will be evaluated in order to the avoid potential effects of carcass consumption by scavenging wildlife.

4.3.5.2 Road Maintenance

Regular inspection of the Project access roads occurs during the course of day-to-day Project activities. Road maintenance on Project and shared roads occurs as needed. Maintenance generally includes, but is not limited to, the following types of activities: debris removal; filling potholes; grading, sealing, and surfacing; maintenance or replacement of erosion control features (e.g., culverts, drains, ditches, and water bars); repair, replacement, or installation of access control structures such as posts, cables, rails, gates, and barrier rock; and repair and replacement of signage. Vegetation management may be conducted concurrently with road maintenance.

4.3.5.3 Facility Painting

DWR paints the exterior of Project facilities, including the powerhouse and ancillary facilities, as needed.

4.3.5.4 Recreation Facilities Maintenance

Maintenance of recreation facilities is conducted by both DWR and the California Department of Parks and Recreation. Maintenance activities include activities to support recreation development and use and include maintaining parking areas, lawns, restrooms, lights, water, power, shelters, and picnic/campground equipment.

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5.0 DWR'S PROPOSED PROJECT OPERATIONS

DWR proposes to continue to operate the Project as it has operated historically.

DWR proposes for inclusion in the new license the following 12 environmental measures to protect or enhance environmental resources at the Project:

Geology and Soils

- Measure GS1 - Implement the Erosion and Sediment Control Plan included in Appendix E of Exhibit E, that includes measures to control sedimentation and erosion when stabilizing slopes affected by the Project. DWR developed this plan in collaboration with interested parties and understands USFS supports this plan.

Water Resources

- Measure WR1 - Maintain Silverwood Lake minimum pool and limit Silverwood Lake water surface elevations for the benefit of recreation and reservoir fishery. This measure, which is included in Appendix E of Exhibit E, incorporates into the new license the Silverwood Lake minimum pool and water surface elevation restrictions in the DWR and USFS 1968 MOU and the DWR and CDFW 2003 MOU, and is substantially consistent with Article 58 in the existing Project license.

- Measure WR2 - Implement the Hazardous Materials Management Plan included in Appendix E of Exhibit E, that includes measures to manage hazardous materials, including response and clean-up of hazardous materials spills. DWR developed this plan in collaboration with interested parties and understands USFS and San Bernardino County Fire Department (SBCFD) supports this plan.

Aquatic Resources

- Measure AR1 - Implement the Silverwood Lake Fish Stocking condition Plan included in Appendix E of Exhibit E, that includes measures to maintain the rainbow trout recreational fishery, including periodic angler surveys. This measure is similar to Article 51 in the existing Project license. DWR developed this measure in collaboration with interested parties and understands CDFW supports this measure.

- Measure AR2 - Implement the Aquatic Invasive Species Management Plan included in Appendix E of Exhibit E, that includes measures to prevent the introduction and spread of aquatic invasive species.

Terrestrial Resources

- Measure TR1 - Implement the Integrated Vegetation Management Plan included in Appendix E of Exhibit E, that includes measures for controlling non-native plant species, protecting special-status species, and re-vegetating disturbed areas.

Recreational Resources

- Measure RR1 – Implement the Recreation Management Plan included in Appendix E of Exhibit E that provides guidance for the management of Project-related recreation facilities and Silverwood Lake shoreline areas, including developed trails and dispersed shoreline areas.

Land Use

- Measure LU1 - Implement the Transportation System Management Plan included in Appendix E of Exhibit E, that provides guidance for the maintenance of Primary Project Roads and Trails. DWR developed this plan in collaboration with interested parties and understands USFS supports this plan.

- Measure LU2 - Implement the Fire Prevention and Response Plan included in Appendix E of Exhibit E, that provides measures for preventing, reporting, and investigating Project-related wildfires. DWR developed this plan in collaboration with interested parties and understands USFS and SBCFD support this plan.

- Measure LU3 - Continue to implement a Project Safety Plan. This measure is similar to Articles 60 and 402 in the existing license.

Aesthetics

- Measure VR1 - Implement the Visual Resources Management Plan included in Appendix E of Exhibit E, that includes measures to reduce the visual contrast of some Project facilities.

Cultural Resources

- Measure CR1 - Implement the Historic Properties Management Plan (Privileged) included in Appendix E of Exhibit E, that provides specific actions and processes to manage historic properties.

These DWR proposed measures would provide adequate protection: DWR’s proposed Project boundary encompasses all Project facilities and features, including Primary Project Roads and Project recreation-related roads, excluding multiple use roads that are not DWR's sole responsibility under the license for operation and maintenance (O&M), and all lands necessary for DWR’s O&M of the Project. DWR's proposed measures, including TR1 and LU1, would be applied to these Primary Project Roads

and Project recreation-related roads. The Pacific Crest National Scenic Trail, while partially within the Project boundary, is not a Project facility.

See Appendix E of Exhibit E for a detailed description of each of the above measures.

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6.0 USE OF POWER

DWR is required to schedule all energy through CAISO for pumping requirements and available resources to meet the SWP load, including energy from the Devil Canyon powerplant. DWR considers power from the Devil Canyon powerplant as used for SWP pumping load requirements. However, CAISO considers all electrical energy received as a power purchase and all energy supplied as a sale.

Table 6.0-1 shows energy used each year on-site for the Devil Canyon powerplant station service.

Table 6.0-1. Consumed Power for the Devil Canyon Powerplant Over the Relicensing Period of Record

Year	Devil Canyon Powerplant Consumed Power (kWh)
2006	81,312
2007	7,995
2008	158,505
2009	919,116
2010	381,988
2011	47,491
2012	32,825
2013	138,281
2014	1,693,287
2015	1,151,405
2016	531,180
2017	91,073
Average	436,205

Key:
kWh = kilowatt-hour

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7.0 PLANS FOR FUTURE DEVELOPMENT OF THE PROJECT AND IN THE WATERSHED

At this time, DWR has no plans, other than those described in this Application for New License, to expand the Project or to develop other water projects in the West Fork Mojave River watershed.

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Appendix A

HYDROLOGY DATASET FOR THE RELICENSING PERIOD OF RECORD

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APPENDIX A

HYDROLOGY DATASET FOR THE RELICENSING PERIOD OF RECORD

Appendix A includes the historical hydrological data. Specifically, the material in Appendix A includes:

- HEC-DSS files of historical hydrology from USGS gages and DWR records.
- Microsoft Excel file with summaries of historical hydrology data as shown in Exhibit B.

Table A-1, below, lists the contents of Appendix A, including total file sizes for each of the file formats on the Disc.

Table A-1. Contents of Appendix A

Name	File Type(s) on Disc	Total File Size on Disc
Hydrology Data		
Silverwood Hydrology	1 DSS files	400 KB
Exhibit B Hydrology Figures (07132018)	1 Microsoft Excel files	2.8 MB
Total Size		**3.17 MB**

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DEVIL CANYON PROJECT RELICENSING
FERC PROJECT NUMBER 14797

Final License Application
Exhibit C – Construction History and Proposed Construction Schedule for the Project

November 2019

State of California
California Natural Resources Agency
DEPARTMENT OF WATER RESOURCES
Hydropower License Planning and Compliance Office

GAVIN NEWSOM	**WADE CROWFOOT**	**KARLA A. NEMETH**
Governor	Secretary for	Director
State of California	California Natural Resources	Department of Water Resources

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COMMONLY USED TERMS, ACRONYMS & ABBREVIATIONS

§	Section
CFR	Code of Federal Regulations
DWR	California Department of Water Resources
FERC	Federal Energy Regulatory Commission
Project	Devil Canyon Project Relicensing, Federal Energy Regulatory Commission Project Number 14797

1.0 INTRODUCTION

The California Department of Water Resources (DWR) has prepared this Exhibit C, Construction History and Proposed Construction Schedule for the Project, as part of its Application for a New License Major Project – Existing Dam from the Federal Energy Regulatory Commission (FERC) for the Devil Canyon Project Relicensing, FERC Project Number 14797 (Project). This exhibit has been prepared to conform with Title 18 of the Code of Federal Regulations (CFR), Subchapter B (Regulation under the Federal Power Act), Part 4, Subpart F (Application for License for Major Project – Existing Dam) (Traditional Licensing Process). In particular, this report complies with the regulations in 18 CFR Section (§) 4.51(d). For reference, 18 CFR § 4.51(d) states:

> Exhibit C is a construction history and proposed construction schedule for the project. The construction history and schedules must contain:
>
> (1) If the application is for an initial license, a tabulated chronology of construction for the existing projects structures and facilities described under paragraph (b) of this section (Exhibit A), specifying for each structure or facility, to the extent possible, the actual or approximate dates (approximate dates must be identified as such) of:
>
> (i) Commencement and completion of construction or installation;
>
> (ii) Commencement of commercial operation, and
>
> (iii) Any additions or modifications other than routine maintenance; and
>
> (2) If any new development is proposed, a proposed schedule describing the necessary work and specifying the intervals following issuance of a license when the work would be commenced and completed.

Excluding this introductory material, this exhibit includes one section: Section 2.0 provides a proposed schedule for construction of new facilities and features.

Refer to Exhibit A for a description of Project facilities and features, Exhibit B for a description of Project operations, Exhibit D for costs and financing information, and Exhibit E for a discussion of potential environmental effects and DWR's proposed resource management measures. Project design drawings are included in Exhibit F, and Project maps are included in Exhibit G. Exhibit H includes a detailed description of the need for the power generated by the Project, and other important miscellaneous information.

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2.0 CONSTRUCTION SCHEDULE FOR DWR PROPOSED NEW FACILITIES AND FEATURES

DWR does not propose any new generation facilities or non-generating facilities to be constructed during the term of the new license.

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DEVIL CANYON PROJECT RELICENSING
FERC PROJECT NUMBER 14797

Final License Application
Exhibit D – Statement of Costs and Financing

November 2019

State of California
California Natural Resources Agency
DEPARTMENT OF WATER RESOURCES
Hydropower License Planning and Compliance Office

GAVIN NEWSOM	**WADE CROWFOOT**	**KARLA A. NEMETH**
Governor	Secretary for	Director
State of California	California Natural Resources	Department of Water Resources

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COMMONLY USED TERMS, ACRONYMS & ABBREVIATIONS

§	Section
Application for New License	Application for a New License Major Project – Existing Dam for the Devil Canyon Project Relicensing, Federal Energy Regulatory Commission Project Number 14797
CAISO	California Independent System Operator
CEC	California Energy Commission
CFR	Code of Federal Regulations
CT	combustion turbine
DPR	California Department of Parks and Recreation
DWR	California Department of Water Resources
DWR's Proposal	Continued operation of the Project, modification of the Project boundary, addition of 1 existing reservoir gage (USGS gage no. 10260790) and 10 existing roads as Project facilities under the new license, and 12 proposed environmental measures
FERC	Federal Energy Regulatory Commission
IOU	investor-owned utility
kW	kilowatt
kW/year	kilowatt per year
LMP	Locational Marginal Price
MW	megawatt
MWh	megawatt hour
O&M	operation and maintenance
PM&E measures	Protection, Mitigation, and Enhancement measures, which are operation and management activities to: (1) protect resources against impacts from continued operation and maintenance of the Project; (2) mitigate any impacts from continued operation and maintenance of the Project (if the resource cannot be fully protected); and (3) enhance resources affected by continued Project operation and maintenance
POU	publicly owned utility
Project	Devil Canyon Project Relicensing, Federal Energy Regulatory Commission Project Number 14797

RA	Resource Adequacy
SWP	State Water Project
U.S.	United States
U.S.C.	United States Code

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1.0 INTRODUCTION

The California Department of Water Resources (DWR) has prepared this Exhibit D, Statement of Costs and Financing, as part of its Application for a New License Major Project – Existing Dam (Application for New License) from the Federal Energy Regulatory Commission (FERC) for the Devil Canyon Project, FERC Project No. 14797 (Project). This exhibit has been prepared in conformance with Title 18 of the Code of Federal Regulations (CFR), Subchapter B (Regulations Under the Federal Power Act), Section (§) 16.8 (Traditional Licensing Process). In particular, § 5.18(5)(iii) requires that Exhibit D meet the requirements of 18 CFR § 4.51(e). As a reference, this section states:

> The [Exhibit D] statement must contain:
>
> (1) If the application is for an initial license, a tabulated statement providing the actual or approximate original cost (approximate costs must be identified as such) of:
>
> (i) Any land or water right necessary to the existing project; and
>
> (ii) Each existing structure and facility described under paragraph (b) of this section (Exhibit A).
>
> (2) If the applicant is a licensee applying for a new license, and is not a municipality or a state, an estimate of the amount which would be payable if the project were to be taken over pursuant to section 14 of the Federal Power Act upon expiration of the license in effect [see 16 United States Code (U.S.C. 807)], including:
>
> (i) Fair value;
>
> (ii) Net investment; and
>
> (iii) Severance damages.
>
> (3) If the application includes proposals for any new development, a statement of estimated costs, including:
>
> (i) The cost of any land or water rights necessary to the new development; and
>
> (ii) The cost of the new development work with a specification of:
>
> (A) Total cost of each major item;

(B) Indirect construction costs such as costs of construction equipment, camps, and commissaries;

(C) Interest during construction; and

(D) Overhead, construction, legal expenses, taxes, administrative and general expenses, and contingencies.

(4) A statement of the estimated average annual cost of the total project as proposed, specifying any projected changes in the costs (life-cycle costs) over the estimated financing or licensing period if the applicant takes such changes into account, including:

(i) Cost of capital (equity and debt);

(ii) Local, state, and Federal taxes;

(iii) Depreciation or amortization;

(iv) Operation and maintenance expenses, including interim replacements, insurance, administrative and general expenses, and contingencies; and

(v) The estimated capital cost and estimated annual operation and maintenance expense of each proposed environmental measure.

(5) A statement of the estimated annual value of project power, based on a showing of the contract price for sale of power or the estimated average annual cost of obtaining an equivalent amount of power (capacity and energy) from the lowest cost alternative source, specifying any projected changes in the cost of power from that source over the estimated financing or licensing period if the applicant takes such changes into account.

(6) A statement specifying the source and extent of financing and annual revenues available to the applicant to meet the costs identified in paragraphs (e)(3) and (4) of this section.

(7) An estimate of the cost to develop the license application.

(8) The on-peak and off-peak values of project power, and the basis for estimating the values, for projects which are proposed to operate in a mode other than run-of-river.

(9) The estimated average annual increase or decrease in project generation, and the estimated average annual increase or decrease of the value of project power due to a change in project operations (i.e., minimum bypass flows, limits on reservoir fluctuations).

Excluding this introductory section, Exhibit D includes 11 sections. Section 2.0 describes DWR's approach for estimating Project economics. Sections 3.0 and 4.0 address the cost of the original Project and cost related to takeover of the Project by another party, respectively. Section 5.0 describes costs related to any DWR proposed new developments. Section 6.0 presents DWR's estimated annual cost of operations and the value of Project power under the No Action Alternative and DWR's Proposal. Section 7.0 compares the amount of power and value of power under the No Action Alternative and DWR's Proposal. Section 8.0 describes the cost of obtaining an equivalent amount of power from another source. Section 9.0 describes how DWR would finance continued Project operations and maintenance (O&M). Section 10.0 and 11.0 describe DWR's need for Project power, and the consequences of license application denial, respectively. Section 12.0 includes a list of references cited.

See Exhibit A for a description of Project facilities and features, Exhibit B for a description of Project operations, Exhibit C for a construction history and a construction schedule, and Exhibit E for a discussion of potential environmental effects and DWR's proposed resource management measures. Project design drawings are included in Exhibit F, and Project maps are included in Exhibit G. Exhibit H contains a detailed description of the need for the electricity provided by the Project, the availability of electrical energy alternatives, and other miscellaneous information.

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2.0 PROJECT ECONOMICS APPROACH

Under FERC's approach to evaluating the economics of hydropower projects as articulated in FERC's Order Issuing a New License to the Mead Corporation (FERC 1995), the methodology is a "current cost approach" in that all costs are presented in current dollars (e.g. no consideration for potential future power costs, inflation, escalation, or deflation beyond the license issuance date; and costs to be expended over the license term are summed and normalized as current dollars). FERC's current cost economic analysis provides a general estimate of the potential developmental benefits and costs and non-developmental benefits and costs of a project. DWR has prepared this Exhibit D using FERC's current cost methodology.

This Exhibit D provides economic information regarding two alternatives:

- No Action Alternative. This is the current operation of the Project under its existing license conditions and operations. Under the No Action Alternative, the inflow to the Project and downstream water demands are the same as they have been historically. Under the No Action Alternative, there are no changes to existing Project facilities or operations. Costs under the No Action Alternative are DWR's best estimate of the average annual costs to operate the Project in the future.

- DWR's Proposal. This is DWR's proposed Project, including DWR's proposed mitigation and enhancement (PM&E) measures, which is described in DWR's license application. Costs under DWR's Proposal are similar to the costs under the No Action Alternative, with the exception of DWR's proposed changes to the PM&E measures.

Basic economic assumptions used by DWR in developing costs and benefits under both the No Action Alternative and DWR's Proposal are summarized in Table 2.1-1.

Table 2.1-1. Economic Assumptions DWR Used in Developing Costs and Power Benefits under the No Action Alternative and DWR's Proposal

Assumption	Value
Dollars	United States (U.S.) dollars to the nearest $1,000
Period of Analysis	30 Years
Term of Financing	30 Years
Insurance Rate	0%
Base Year for Costs and Benefits	Calendar Year 2018
Interest Rate	2.0%
Discount Rate	5.0%

Key:
% = percent
U.S. = United States

While FERC's current cost approach requires an applicant to base costs on a 30-year license term, DWR hereby requests from FERC a new license with a term of 50 years. FERC's Policy Statement on Establishing License Terms for Hydroelectric Projects, 161 FERC ¶ 61,078 (2017), establishes a default license term of 40 years absent special considerations. Section 36(c) of the Federal Power Act as added by the America's Water Infrastructure Act of 2018, Pub. L. No. 115-270, 132 Stat. 3765, requires FERC to give equal weight to investments by the licensee over the term of the existing license that resulted in redevelopment, new construction, new capacity, efficiency, modernization, rehabilitation or replacement of major equipment, safety improvements, or environmental, recreation, or other measures that were not expressly considered by FERC in setting or extending the existing license term.

Based on these FERC and Congressional directives, a license term of 50 years is warranted. Over the years, DWR has invested considerable funds in the Project not required by the current license. These projects include: $152,567,000 for Devil Canyon Powerplant Enlargement and Second Afterbay; $25,400,000 for San Bernardino Intake Reconstruction; and other improvements. None of these investments were considered in the original license in setting the license term of 50 years and FERC has never extended the license (since 50 years is the statutory maximum). Therefore, DWR believes that a 50-year license term for the new license is necessary and appropriate to recognize these major Project investments.

3.0 ORIGINAL COSTS

This application is for a new license, not an initial license. The expiration date of the existing license covering the Project is January 31, 2022. Since this is not an application for an initial license, a tabulated statement of the actual original cost of Project land, water rights, structures, and facilities is not required to be included in DWR's Application for New License.

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4.0 COST OF PROJECT TAKEOVER

DWR is a municipality, established under the laws of the State of California, within the meaning of Section 3(7) of the Federal Power Act. Since DWR is a State of California agency, the Project is not subject to the takeover provisions of Section 14 of the Federal Power Act (16 U.S.C. § 807). Accordingly, an estimate of the amount that would be payable if the Project were taken over pursuant to Section 14 is not required to be included in DWR's Application for New License.

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5.0 COST OF NEW POWER DEVELOPMENT

At this time, DWR is not proposing to add any additional power generation facilities to the existing Project.

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6.0 ANNUAL COST OF OPERATIONS AND VALUE OF PROJECT POWER UNDER THE NO ACTION ALTERNATIVE AND DWR'S PROPOSAL

Section 6 is divided into two major sections, each of which addresses the No Action Alternative and DWR's Proposal. Section 6.1 discusses Project costs, and Section 6.2 presents Project power benefits.

6.1 ANNUAL COST OF OPERATIONS

6.1.1 No Action Alternative

DWR estimates that, based on historical expenditures, the average annual O&M cost under the No Action Alternative is approximately $27,015,000. The estimated average annual cost includes four components: (1) $20,754,000 incurred by DWR for O&M, station power, annual renewals and replacements, major infrastructure repairs/ improvements and capital components; (2) $4,949,000 incurred by the California Department of Parks and Recreation (DPR) for O&M of Project recreation facilities within the Silverwood Lake State Recreation Area; (3) $372,000 by DWR in miscellaneous recreation costs; and (4) $500,000 by DWR for implementation of environmental measures. In addition, under the No Action Alternative, DWR intends to recover its cost to obtain a new license for the Project. DWR estimates this cost is $13,200,000, or $440,000 annually over 30 years (see Section 8 of this Exhibit D). As a State of California agency, DWR is not subject to payment of any State, local, or federal taxes associated with the Project.

DWR does not have shareholders and, therefore, does not finance projects, including the relicensing, with equity capital. Any new construction, as well as the relicensing, is financed through various financial instruments, mainly the issuance of Revenue Bonds. DWR has maintained an exceptional bond rating throughout the years, including maintaining a AAA Standard and Poor's rating since 2001.

Costs of borrowings for new construction that has taken place since the original Project facilities were completed are reported in Bulletin 132, an annual publication produced by DWR and available on the following web site: http://www.water.ca.gov/.

6.1.2 DWR's Proposal

DWR estimates that the average annual O&M cost under DWR's Proposal is approximately $28,201,000. Under DWR's Proposal, the non-environmental and non-recreational average annual cost of $20,754,000 and the average annual cost of $440,000 for recovery of relicensing costs under the No Action Alternative would not change. This is because DWR's Proposal includes no significant changes to non-environmental and non-recreational O&M, and DWR would recover its relicensing costs. DPR's current average annual cost of $4,949,000 for O&M of the Project recreation facilities would increase to $5,804,000 under DWR's Proposal. In contrast, under DWR's Proposal, the $372,000 DWR currently expends annually for miscellaneous recreation costs would increase to $392,000, and the $500,000 DWR expends annually

under existing conditions for environmental measures would increase to $811,000. Table 6.1-1 shows DWR's estimated costs for implementation of its proposed measures under DWR's Proposal.

Table 6.1-1. DWR's Estimated Costs Related to Implementation of DWR's Proposed Measures

DWR's Proposed Measure[1]		Total Capital Cost Over 30 Years (2018 U.S. Dollars)	Total O&M Cost Over 30 Years (2018 U.S. Dollars)	Annualized Cost Over 30 Years[2] (2018 U.S. Dollars)
Designation	**Description**			
Environment Related Measures				
GS1	Implement Erosion and Sediment Control Plan	$0	$0	$0[3]
WR1	Implement Silverwood Lake Water Surface Elevation Restrictions	$0	$450,000	$15,000
WR2	Implement Hazardous Materials Management Plan	$0	$150,000	$5,000
AR1	Implement Silverwood Lake Fish Stocking Measure	$0	$8,806,000	$294,000
AR2	Implement Aquatic Invasive Species Management Plan	$0	$7,891,000	$263,000
TR1	Implement Integrated Vegetation Management Plan	$0	$1,112,000	$37,000
RR1	Recreation Management Plan	$14,837,000	$171,030,000[4]	$6,196,000[4]
LU1	Implement Transportation System Management Plan	$0	$3,450,000	$115,000

Table 6.1-1. DWR's Estimated Costs Related to Implementation of DWR's Proposed Measures (continued)

DWR's Proposed Measure[1]		Total Capital Cost Over 30 Years (2018 U.S. Dollars)	Total O&M Cost Over 30 Years (2018 U.S. Dollars)	Annualized Cost Over 30 Years[2] (2018 U.S. Dollars)
Designation	**Description**			
Environment Related Measures				
LU2	Implement Fire Prevention and Response Plan	$0	$60,000	$2,000
LU3	Develop and Implement Project Safety Plan	$0	$60,000	$2,000
VR1	Implement Visual Resources Management Plan	$0	$31,000	$1,000
CR1	Implement Historic Properties Management Plan	$0	$2,296,000	$77,000
Total		**$14,837,000**	**$195,336,000**	**$7,007,000**

Notes:
[1]Refer to Appendix E of Exhibit E in this Application for New License for the complete text of each of DWR's proposed measures.
[2]Total annualized costs are calculated by summing Capital Cost and Total O&M Cost, and dividing the sum by 30.
[3]DWR will include the cost for implementing this measure in the cost of a specific project when DWR proposes that project.
[4]The cost includes an estimated average annual cost of $4,949,000 expended by DPR for O&M of the Project recreation facilities at Silverwood Lake and $372,000 expended by DWR in miscellaneous recreation costs.
Key:
O&M = operation and maintenance
U.S. = United States

Refer to Appendix E of Exhibit E for the full text of each of DWR's proposed measures, and to the resource sections in Exhibit E for a description of how each measure was developed.

6.2 VALUE OF PROJECT POWER

6.2.1 No Action Alternative

The Project's installed and dependable capacity under the No Acton Alternative are 272,796 kilowatts (kW) and 250,100 kW, respectively. DWR calculated dependable capacity by multiplying the Devil Canyon Powerplant's average monthly Resource Adequacy (RA) data for 2013 through 2017 by the yearly RA capacity. DWR used the California Public Utility Commission's 2017RAReport.pdf report file multiplied the local

Los Angeles Basin area RA price by the annual RA average capacity to estimate the yearly benefit of dependable capacity.

The Project generates on average 836,000 megawatt-hours (MWh) or energy annually. This is based on multiplying the Project's installed capacity by the reported Devil Canyon Powerplant operating availability average of 89.31 percent for the 2010 through 2017 period. DWR allocated the daily generation values among the California Independent System Operator (CAISO) definition for peak energy, partial peak energy, off-peak energy, and super off-peak energy to calculate generation in each of these periods. The value of the generation in each period was based on the monthly Locational Marginal Price (LMP) forecast.

The Project provides ancillary services to CAISO in the form of regulation-up, regulation-down and spinning reserves. The amount of these services in terms of MWh was averaged over the 2015 through 2017 period. The value of the ancillary service was based on the monthly LMP price for these services. Capacity, energy and ancillary service values under the No Action Alternative are provided in Table 7.0-1. Capacity, energy and ancillary service benefits under the No Action Alternative are provided in Table 6.2-1.

6.2.2 DWR's Proposal

DWR does not propose to add or remove generation facilities from the Project, and proposes to operate the Project as it has been operated historically. Therefore, under DWR's Proposal, the amount and value of the Project's capacity, energy and ancillary services will not change from the amounts and values under the No Action Alternative shown in Table 6.2-1.

Table 6.2-1. Average Annual Project Power Under the No Action Alternative

Value	No Action Alternative[1]
Annual Capacity	
Installed (kW)	272,796
Dependable (kW)	250,100
Total Average Annual Value of Capacity (2018 U.S. Dollars)	**$3,067,000**
Average Annual Energy	
Peak Energy (MWh)	203,500
Partial Peak Energy (MWh)	32,100
Off-Peak Energy (MWh)	526,200
Super Off-Peak (MWh)	74,200
Total Average Annual Value of Energy (2018 U.S. Dollars)	**$27,623,000**
Average Annual Ancillary Services	
Regulation-Up (MWh)	98,850
Regulation-Down (MWh)	102,447
Spinning Reserve (MWh)	194,810
Total Average Annual Value of Ancillary Services (2018 U.S. Dollars)	**$3,069,000**
Total Project Power Value (2018 U.S. Dollars)	**$33,759,000**

Note:
[1]Refer to Section 6.2.1 regarding how DWR calculated the values in this table.
Key:
DPR = California Department of Parks and Recreation
kW = kilowatt
MWh = megawatt hours
U.S. = United States

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7.0 CHANGES IN PROJECT COST, POWER, AND VALUE

Table 7.0-2 compares the annual Project benefits and cost of the No Action Alternative and DWR's Proposal.

Table 7.0-2. Comparison of Average Annual Power Benefits and Costs between the No Action Alternative and DWR's Proposal

Value	No Action Alternative	DWR's Proposal	Change[1]
Average Annual Gross Benefits (2018 U.S. Dollars)[2]			
Capacity	$3,067,000	$3,067,000	$0
Energy	$27,623,000	$27,623,000	$0
Ancillary Services	$3,069,000	$3,069,000	$0
Total Gross Benefits	**$33,759,000**	**$33,759,000**	**$0**
Average Annual Costs (2018 U.S. Dollars)[3]			
Non Environmental / Recreation O&M Costs	$20,754,000	$20,754,000	$0
Recovery of Relicensing Costs	$440,000	$440,000	$0
Recreation Costs	$5,321,000	$6,196,000	$875,000
Environmental Costs	$500,000	$811,000	$311,000
Total Costs	**$27,015,000**	**$28,201,000**	**$1,186,000**
Average Annual Net Benefits (2018 U.S. Dollars)[4]			
Net Benefits	$6,744,000	$5,558,000	-$1,186,000

Note:
[1]Calculated by subtracting the No Action Alternative from the value of DWR's Proposal.
[2]Refer to Section 6.2 for source of Average Annual Benefits.
[3]Refer to Section 6.1 for Average Annual Costs.
[4]Calculated by subtracting Average Annual Cost from the Average Annual Gross Benefits.
Key:
DPR = California Department of Parks and Recreation
kW = kilowatt
MWh = megawatt hours
PM&E = Protection Mitigation and Enhancement

In summary, DWR's Proposal would not affect Project power, but would increase annual Project costs by $1,186,000, thereby decreasing the net Project benefit from $6,744,000 to $5,558,000, or by 17.6 percent.

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8.0 COST TO OBTAINING AN ANNUAL EQUIVALENT AMOUNT OF POWER FROM THE LOWEST COST ALTERNATIVE SOURCE

From DWR's perspective, to truly be considered an alternative to the Project's power, an alternative, or suite of alternatives, must meet two criteria: (1) be a zero-carbon emissions resource; and (2) be able to be developed by DWR such that revenues offset DWR's State Water Project (SWP) energy costs for delivery of SWP water to the same extent as the current Project.

Any decrease in power generation at the Project would need to be offset by increased purchases of zero emissions energy or by construction of new zero emission power generating facilities. All generation of the Project is sold directly through the CAISO energy markets. Although DWR does not maintain reserve margins, it is important that DWR maintains a source of zero emission generation to adhere to DWR's Climate Action Plan and to comply with California's Clean Energy and Pollution Reduction Act (Senate Bill 350), which establishes California's greenhouse gas reduction target of 40 percent below 1990 levels by 2030 and 80 percent by 2050; and to California's Renewables Portfolio Standard Program (Senate Bill 100), which mandates that all retail sellers, such as DWR, procure electricity products from eligible renewable energy resources and zero-carbon resources so that the kWh of those products sold to their retail end-use customers achieve 60 percent by December 31, 2030 and 100 percent by December 31, 2045 of any given agency's total energy portfolio. Alternative sources to Project power might include importing zero emission power from sources outside the region and/or siting a new zero emission generation facility or facilities in California. While importing power into the region to offset Project generation will be possible during some seasons, imports will be impossible during some seasons and hydrologic year types given the physical limits of the current transmission grid.

With regard to new generation sources, Table 8.0-1 shows a range of annual levelized cost of alternative energy as published by the California Energy Commission (CEC) in its 2015 report, Estimated Cost of New Renewable and Fossil Generation in California.

Table 8.0-1. Summary of 2013 Mid Case Levelized Costs

Start-Year = 2013 (Nominal $)	Size	Merchant		IOU		POU	
	MW	$/kW/ year	$/MWh	$/kW/ year	$/MWh	$/kW/ year	$/MWh
Generation Turbine 49.9 MW	49.9	275.66	662.81	185.13	2215.54	193.34	311.60
Generation Turbine 100 MW	100	273.83	660.52	183.47	2202.75	191.81	310.11
Generation Turbine - Advanced 200 MW	200	252.33	403.83	159.41	1266.91	200.67	215.62
Combined Cycle - 2 CTs No Duct Firing 500 MW	500	551.42	116.51	495.20	104.54	482.63	102.35
Combined Cycle - 2 CTs With Duct Firing 550 MW	550	548.14	115.81	492.86	104.05	481.32	102.08
Biomass Fluidized Bed Boiler 50 MW	50	812.34	122.04	941.97	141.53	820.03	123.54
Geothermal Binary 30 MW	30	561.31	90.63	743.97	120.21	519.74	84.98
Geothermal Flash 30 MW	30	653.36	112.48	851.61	146.72	627.91	109.50
Solar Parabolic Trough W/O Storage 250 MW	250	329.92	168.18	448.52	228.73	325.42	167.93
Solar Parabolic Trough With Storage 250 MW	250	405.52	127.40	601.76	189.12	423.90	134.81
Solar Power Tower W/O Storage 100 MW	100	342.48	152.58	471.26	210.04	336.00	151.53
Solar Power Tower With Storage 100 MW 6 hours	100	421.46	145.52	630.53	217.79	440.07	153.81
Solar Power Tower With Storage 100 MW 11 hours	100	459.85	114.06	692.04	171.72	479.73	120.45
Solar Photovoltaic (Thin-Film) 100 MW	100	206.11	111.07	315.22	170.00	219.97	121.30
Solar Photovoltaic (Single Axis) 100 MW	100	241.22	109.00	365.48	165.22	254.52	116.57
Solar Photovoltaic (Thin-Film) 20 MW	20	224.21	121.31	344.46	186.51	239.16	132.42
Solar Photovoltaic (Single Axis) 20 MW	20	259.52	117.74	394.71	179.16	273.72	125.86
Wind - Class 3 100 MW	100	181.75	85.12	223.75	104.74	160.77	75.80
Wind - Class 4 100 MW	100	173.08	84.31	213.61	103.99	153.55	75.29

Source: CEC 2015 (Table 4)
Notes:
[1]In its 2015 report, the CEC report considered three financing options for the cost of constructing and owning a power plant: merchant, IOU, and publicly owned utility. The financing of each project is highly variable depending on the project sponsor, the markets, the terms and conditions of power sales agreements, and the technology type. Merchant and IOUs finance projects based on debt and equity. POU plants do not rely on equity financing as they rely solely on debt (issue bonds). The cost of money for merchant and IOU plants is melding of two sources: equity (such as ownership shares) and debt (such as corporate bonds or loans from large banks). The publicly owned utility cost is therefore much lower as these utilities are allowed to raise money solely through debt. (CEC 2015.)
[2]Levelized cost reflects the lifetime cost of O&M combined with the installed cost expressed as a constant stream of costs per unit of value over the lifetime of the plant. It is most commonly measured in dollars per megawatt-hour, but is sometimes reported at dollars per kW/year. (CEC 2015)
[3]Traditionally, levelized costs are presented using deterministic single-value estimates. In the 2009 Cost of Generation Report, the Energy Commission presented levelized costs in three deterministic values: mid, high, and low. The high and low values presented too wide of variation to be useful. In this version, high and low levelized cost values are estimated using probabilistic analysis, while the mid case continues to be estimated in the traditional deterministic fashion. These high and low probabilistic estimates are developed using 8 Lumina's Analytica Model in conjunction with the Energy Commission's COG Model, designated as Analytica Cost of Generation Analysis Tool. (CEC 2015, pp. 7-8)
Key:
CT = combustion turbine
IOU = investor-owned utility
kW/year= kilowatt per year
MW = megawatt
MWh = megawatt hour
POU = publicly owned utility

It is unlikely that the Project's generation power could be replaced in the short term due to planning and permitting timeframes for a new source. In the long term and to meet California's zero emission and renewable energy resources goals, the only available alternatives to the Project's generation are geothermal, biomass, solar, or wind alternatives. Using the costs in Table 8.0-1 for a single Solar Parabolic Trough With Storage 250 megawatt facility, the least expensive of the zero emission sources in Table 8.0-1 that can replace the Project's generation with about a single facility and assuming that a public-owned utility such as DWR develops the resource, the levelized cost would be $134.81 in 2013 dollars, or $144.02/MWh in 2018 dollars using the U.S. Bureau of Labor Statistics Consumer Price Index Inflation Calculator to escalate the costs from 2013 to 2018. Therefore, the cost to replace the existing Project's average annual generation using the single least expensive zero emissions source would be approximately $120,396,000 (i.e., $144.02 times 836,000 MWh, the average annual generation of the Project). Of note, this facility would not replace the Project's ancillary benefits, and the estimated cost does not include capital and O&M costs for a new electric transmission line to connect the new facility to the grid. Of course, the Project's power could be replaced by a combination of geothermal, biomass, solar, or wind sources, but the costs for this alternative cannot be estimated at this time due to the complexity of obtaining these sources.

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9.0 SOURCES OF FINANCING AND ANNUAL REVENUES TO MEET PROJECT COSTS

DWR's sources of financing and revenue are sufficient to meet the continuing O&M needs of the Project, as evidenced by DWR's 45 year-long history of operating and maintaining the existing Project in a safe and efficient manner. Historically, DWR has funded Project O&M by issuance of short-term Commercial Paper, Long-Term Revenue Bonds, and power sales with ultimate repayment of all expenditures by the 29 SWP Contractors.

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10.0 NEED FOR POWER

The power generated at the Project is critical for the continued operation of DWR's SWP. The energy required to transport SWP water to southern California makes up one of the largest cost components annually of the SWP. While the Devil Canyon Powerplant output is delivered to the California Power Grid, its output effectively helps DWR partially offset the costs for energy needed for operating the SWP. More specifically, the revenue from power generation offsets the cost of delivering water to southern California, keeping water costs more affordable in the region and preserving economic vitality and quality of life for residents. Additionally, the Project is necessary in both the short and long term to maintain system reliability, operational flexibility, and low-cost electricity.

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11.0 CONSEQUENCE OF LICENSE APPLICATION DENIAL

If DWR were to not receive a new license for the Project, DWR would retain its non-power generating facilities because they are used to provide consumptive water to DWR's service territory and because DWR currently holds the consumptive water rights for use of the existing Project facilities. However, DWR would not receive the energy revenue from the existing Project, which would result in higher costs to its customers for consumptive water. In addition, the many environmental and recreation benefits of the Project that are realized through the FERC license, would be lost.

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12.0 REFERENCES CITED

California Energy Commission (CEC). 2015. Estimated Cost of New Renewable and Fossil Generation in California (Final Staff Report). March. Available online: http://www.energy.ca.gov/2014publications/CEC-200-2014-003/CEC-200-2014-003-SF.pdf. Accessed: June 19, 2018.

Federal Energy Regulatory Commission (FERC), Office of Hydropower Relicensing. 1995. Order Issuing New License, Mead Corporation. Project No. 2506. Washington, D.C.

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DEVIL CANYON PROJECT RELICENSING
FERC PROJECT NUMBER 14797

Final License Application
Exhibit F – General Design Drawings

November 2019

State of California
California Natural Resources Agency
DEPARTMENT OF WATER RESOURCES
Hydropower License Planning and Compliance Office

GAVIN NEWSOM	**WADE CROWFOOT**	**KARLA A. NEMETH**
Governor	Secretary for	Director
State of California	California Natural Resources	Department of Water Resources

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COMMONLY USED TERMS, ACRONYMS & ABBREVIATIONS

§	Section
CEII	Critical Energy Infrastructure Information
CFR	Code of Federal Regulations
CUI	Controlled Unclassified Information
DWR	California Department of Water Resources
FERC	Federal Energy Regulatory Commission
Project	Devil Canyon Project Relicensing, Federal Energy Regulatory Commission Project Number 14797

1.0 INTRODUCTION

The California Department of Water Resources (DWR) has prepared this Exhibit F, General Design Drawings, as part of its Application for a New License Major Project – Existing Dam (Application for New License) from the Federal Energy Regulatory Commission (FERC) for the Devil Canyon Project Relicensing, FERC Project Number 14797 (Project). This exhibit is prepared in conformance with Title 18 of the Code of Federal Regulations (CFR), Subchapter B (Regulations under the Federal Power Act), Part 4, Subpart F (Application for License for Major Project – Existing Dam) (Traditional Licensing Process).

In particular, this exhibit conforms to the regulations in 18 CFR Section (§) 5.18(a)(5)(iii), which requires in part that an application include an Exhibit F in conformance with 18 CFR § 4.41(g) and § 4.39. Section 4.41(g) pertains to design drawings and § 4.39 provides specifications for maps and drawings. For reference, § 4.41(g) states:

> 18 CFR § 4.41(g): Exhibit F consists of general design drawings of the principal project works described under paragraph (b) of this section (Exhibit A) and supporting information used as the basis of design. If the Exhibit F submitted with the application is preliminary in nature, applicant must so state in the application. The drawings must conform to the specifications of § 4.39.
>
> (1) The drawings must show all major project structures in sufficient detail to provide a full understanding of the project, including:
>
> (i) Plans (overhead view);
>
> (ii) Elevations (front view);
>
> (iii) Profiles (side view); and
>
> (iv) Sections.
>
> (2) The applicant may submit preliminary design drawings with the application. The final Exhibit F may be submitted during or after the licensing process and must show the precise plans and specifications for proposed structures. If the project is licensed on the basis of preliminary designs, the applicant must submit a final Exhibit F for Commission approval prior to the commencement of any construction of the project.
>
> (3) *Supporting design report.* The applicant must furnish, at a minimum, the following supporting information to demonstrate that existing and proposed structures are safe and adequate to fulfill their stated functions, and must submit such information in a

separate report at the time the application is filed. The report must include:

(i) An assessment of the suitability of the site and the reservoir rim stability based on geological and subsurface investigations, including investigations of soils and rock borings and tests for the evaluation of all foundations and construction materials sufficient to determine the location and type of dam structures suitable for the dam site;

(ii) Copies of boring logs, geology reports and laboratory tests reports;

(iii) An identification of all borrow areas and quarry sites and an estimate of required quantities and suitable construction material;

(iv) Stability and stress analyses for all major structures and critical abutment slopes under all probable loading conditions, including seismic and hydrostatic forces induced by water loads up to the Probable Maximum Flood as appropriate; and

(v) The basis for determination of seismic loading and the Spillway Design Flood in sufficient detail to permit independent staff evaluation.

(4) The applicant must submit two copies of the supporting design report described in paragraph (g)(3) of this section at the time preliminary and final design drawings are submitted to the Commission for review. If the report contains preliminary drawings, it must be designated a “Preliminary Supporting Exhibit Report.”

Excluding this introductory material, this exhibit includes two sections. Section 2.0 provides a list of all design drawings needed to show all major Project structures in sufficient detail to provide a full understanding of the Project. These details include plan, elevation, and section profiles. The single-line electrical diagrams and general design drawings are included in Appendix A and are considered Critical Energy Infrastructure Information (CEII). Section 3.0 addresses the use of DWR’s Part 12 Independent Safety Inspection Reports to meet the requirements for a Supporting Design Report for existing Project facilities.

See Exhibit A for a description of Project facilities and features, Exhibit B for a description of Project operations and resource utilization, Exhibit C for construction history and construction schedule, Exhibit D for costs and financing information, and Exhibit E for a discussion of potential environmental effects and DWR’s proposed

resource management measures. Project maps are included in Exhibit G. Exhibit H contains a detailed description of the need for the electricity provided by the Project, the availability of electrical energy alternatives, and other miscellaneous information.

All elevation data in this exhibit are in United States Coast and Geodetic Survey (United States Code and Geodetic Survey Datum [1929]) unless otherwise specified.

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2.0 GENERAL DESIGN DRAWINGS

General design drawings for DWR's Project as described in Exhibit A are provided in the exhibit drawings listed in Table 2.0-1. DWR considers these design drawings to be final and prepared in conformance with 18 CFR § 4.39. These drawings provide plan, elevation, profiles, and sections in accordance with the requirements of 18 CFR § 4.41(g), and were developed primarily from FERC-approved Exhibit L drawings, which depict the as-built principal Project works. For ease of reference, DWR lists the design drawings by their current exhibit number, and the proposed new Exhibit F denotations.

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Table 2.0-1. Proposed Relicensing Drawing List for the Devil Canyon Project

Drawing Number in Existing License	Date of FERC Order Approving Drawing	FERC-Assigned Drawing Number	Licensees' Proposed Drawing Number in New License	Licensees' Proposed Drawing Name	Changes Made from Existing to Proposed Drawings
L-2-c	8/10/1984	2426-259	F-1	Cedar Springs Dam, General Plan	First drawing in new license exhibit. Removed Spillway Rating Curve and Slide Gate Discharge Outlet Works Graph.
L-3-c	8/10/1984	2426-260-1	F-2	Cedar Springs Dam, Profiles and Sections - Sheet 1 of 2	Previously one drawing in existing license (L-3-c). Split into two separate drawings (F-2 and F-3) in new license. Added Plan View for the Cedar Springs Dam and details for tunnel section upstream and downstream of gate chamber and spillway chute cross section. Removed Area Capacity Curves.
L-3-c	8/10/1984	2426-260-2	F-3	Cedar Springs Dam, Profiles and Sections - Sheet 2 of 2	Added additional profile details to show Cedar Springs Dam sections at different stations.
F-1	2/9/1995	2426-416	F-4	San Bernardino Tunnel, Intake, Site Plan – Sheet 1 of 2	Road detail added.
F-2	2/9/1995	2426-417	F-5	San Bernardino Tunnel, Intake, Site Plan – Sheet 2 of 2	Road detail added. The tunnel intake plan view is zoomed out to show more detail.
F-3	2/9/1995	2426-418	F-6	San Bernardino Tunnel, Intake, General Arrangement Section	Tunnel detail added. Updated tunnel intake section to show all of the components.
F-5	2/9/1995	2426-420	F-7	San Bernardino Tunnel, Intake, Tunnel Section Through Centerline	Updated the callouts and linework for the section through centerline of intake and tunnel.
F-6	2/9/1995	2426-421	F-8	San Bernardino Tunnel, Intake, Front View - Channel Section	Section P-P removed from drawing.
L-5-c	8/10/1984	2426-262	F-9	San Bernardino Tunnel, Plan and Profile – Sheet 1 of 2	Cleaned up the callouts and some linework on the existing plan and profile details.
L-6-c	8/10/1984	2426-263	F-10	San Bernardino Tunnel, Plan and Profile – Sheet 2 of 2	Cleaned up the callouts and some linework on the existing plan and profile details.
L-9-c	8/10/1984	2426-266	F-11	San Bernardino Tunnel, Intake, Front View - Channel Section	Added table for station, spacing and size of structural steel ribs. Cleaned up the text and linework.
L-10-c	8/10/1984	2426-267	F-12	San Bernardino Tunnel, Tunnel Sections and Steel Liner Details	Added additional details.
N/A	N/A	N/A	F-13	Surge Chamber – Elevations and Sections	New drawing.
N/A	N/A	N/A	F-14	Surge Chamber – Juncture Structure Details	New drawing.
F-4c	12/24/1987	2426-327	F-15	San Bernardino Tunnel, South Portal - Portal Excavation and Steel liner, Plan, Profile and Section	Added additional details.
L-14-c	8/10/1984	2426-271	F-16	Devil Canyon Powerplant, Transverse Section	Cleaned up text and linework.
F-5	5/6/1993	2426-405	F-17	Devil Canyon Powerplant, Devil Canyon Penstock, Plan and Profile	N/A
F-6	5/6/1993	2426-406	F-18	Devil Canyon Powerplant, Site Plan	Weir details added. Channel to Second Afterbay added. Updated the Powerplant site plan with a closer view of the entire facility.

Table 2.0-1. Proposed Relicensing Drawing List for the Devil Canyon Project (continued)

Drawing Number in Existing License	Date of FERC Order Approving Drawing	FERC-Assigned Drawing Number	Licensees' Proposed Drawing Number in New License	Licensees' Proposed Drawing Name	Changes Made from Existing to Proposed Drawings
F-7a	5/6/1993	2426-407	F-19	Devil Canyon Powerplant, Powerhouse, Plan and Elevation	N/A
F-7b	5/6/1993	2426-408	F-20	Devil Canyon Powerplant, Powerhouse, Plan and Elevation 1970.0	N/A
F-7c	5/6/1993	2426-409	F-21	Devil Canyon Powerplant, Powerhouse, Plan and Elevation 1954.0	N/A
F-7d	5/6/1993	2426-410	F-22	Devil Canyon Powerplant, Powerhouse, Plan and Elevation 1938.0	N/A
F-7e	5/6/1993	2426-411	F-23	Devil Canyon Powerplant, Powerhouse, Plan and Elevation 1931.0	N/A
F-7f	8/3/1999	2426-412	F-24	Devil Canyon Powerplant, Powerhouse, Transverse Section B-B	N/A
F-7g	5/6/1993	2426-413	F-25	Devil Canyon Powerplant, Longitudinal Sections C-C and D-D	N/A
F-9	5/6/1993	2426-414	F-26	Devil Canyon Powerplant, Single Line Diagram	N/A
F-10	8/3/1999	2426-465	F-27	Devil Canyon Powerplant, Outlet Channel, Plan and Profile	N/A
F-10a	8/3/1999	2426-466	F-28	Devil Canyon Second Afterbay, Outlet Channel Rectangular Section	N/A
F-12	2/18/2000	2426-468	F-29	Devil Canyon Powerplant, General Plan	N/A
F-13	2/18/2000	2426-469	F-30	Devil Canyon Powerplant, Debris Basin and Drainage Channel, General Plan	N/A
F-14	2/18/2000	2426-470	F-31	Devil Canyon Powerplant, Debris Basin, Plan and Profile	Updated the Notes.
F-15	2/18/2000	2426-471	F-32	Devil Canyon Powerplant, Debris Basin, Profile and Sections	N/A
F-16	2/18/2000	2426-472	F-33	Devil Canyon Powerplant, Debris Basin Outlet Works, Details	N/A
F-17	2/18/2000	2426-473	F-34	Devil Canyon Powerplant, Drainage Channel, Sections	N/A
F-18	2/18/2000	2426-474	F-35	Devil Canyon Powerplant, Powerplant Parking Lot, Plan, Sections and Detail	N/A
F-19	2/18/2000	2426-475	F-36	Devil Canyon Powerplant, Water Quality Building, Site Plan	N/A
F-20	2/18/2000	2426-476	F-37	Devil Canyon Powerplant, Water Quality Building, Floor Plan	N/A
F-21	2/18/2000	2426-477	F-38	Devil Canyon Powerplant, Water Quality Building Exterior, Elevations and Sections	N/A
F-7	7/23/1990	2426-371-1	F-39	Devil Canyon Afterbay, Spillway, Plan & Sections - Sheet 1 of 3	Previously one drawing in existing license (F-7). Split into three separate drawings (F-37, F-38, and F-39) in new license. Supersedes 2426-337 in 1989 amendment. Added additional details for the spillway structure.
F-7	7/23/1990	2426-371-2	F-40	Devil Canyon Afterbay, Spillway, Plan & Sections - Sheet 2 of 3	Added additional details for the spillway structure.
F-7	7/23/1990	2426-371-3	F-41	Devil Canyon Afterbay, Spillway, Plan & Sections - Sheet 3 of 3	Added additional details for the spillway structure.
F-8a	7/23/1990	2426-372	F-42	Devil Canyon Second Afterbay, General Plan	Added in 1989 amendment. Updated the general plan to be focused on the Second Afterbay and included more details and callouts.
F-8b	7/23/1990	2426-373	F-43	Devil Canyon Second Afterbay, Sections	Afterbay payline details added. Afterbay level line details added. Added in 1989 amendment. Updated the sections.

Table 2.0-1. Proposed Relicensing Drawing List for the Devil Canyon Project (continued)

Drawing Number in Existing License	Date of FERC Order Approving Drawing	FERC-Assigned Drawing Number	Licensees' Proposed Drawing Number in New License	Licensees' Proposed Drawing Name	Changes Made from Existing to Proposed Drawings
F-11	8/3/1999	2426-467	F-44	Devil Canyon Second Afterbay, Inlet Chute and Stilling Basin, Plan and Section	N/A
F-13a	7/23/1990	2426-380A	F-45	Devil Canyon Second Afterbay, Outlet, Plans - Sheet 1 of 3	Structure detail added. Previously one drawing in existing license (F-13a). Split into three separate drawings (F-43, F-44, and F-45) in new license. Added in 1989 amendment. Added detailed Plan Elevations.
F-13a	7/23/1990	2426-380B-	F-46	Devil Canyon Second Afterbay, Outlet, Plans - Sheet 2 of 3	Added detailed Plan Elevations.
F-13a	7/23/1990	2426-380C	F-47	Devil Canyon Second Afterbay, Outlet, Plans - Sheet 3 of 3	Added detailed Plan Elevations.
F-13b	7/23/1990	2426-381	F-48	Devil Canyon Second Afterbay, Outlet Sections	Structure details modified. Added in 1989 amendment. Updated Sections with more detail.
F-13c	7/23/1990	2426-382	F-49	Devil Canyon Second Afterbay, Outlet - Pipelines, Plan and Sections	Pipeline plan updated. Profile alignment detail modified. Added in 1989 amendment. Updated Plan and Profile with more details.
F-9	--	2426-464	F-50	Devil Canyon Afterbay, Outlet, Plan and Sections	N/A
F-35	11/25/2003	2426-495	F-51	Devil Canyon Second Afterbay, Inland Feeder Connection - General Arrangement Plan - Elevations 1940.00 and 1924.00	N/A
F-36	11/25/2003	2426-496	F-52	Devil Canyon Second Afterbay, Inland Feeder Connection, General Arrangement Transverse and Longitudinal Sections	N/A
F-37	11/25/2003	2426-497	F-53	Devil Canyon Second Afterbay, Inland Feeder Connection, Valve Actuator Hydraulic Piping, Plan and Detail	N/A
F-38	11/25/2003	2426-498	F-54	Devil Canyon Second Afterbay, Inland Feeder Connection - Valve and Hydraulic System General Arrangement - Transverse and Longitudinal Sections	N/A
F-39	11/25/2003	2426-499	F-55	Devil Canyon Second Afterbay, Inland Feeder Connection, Equipment Layout - Sections and Details	N/A
F-40	11/25/2003	2426-500	F-56	Devil Canyon Second Afterbay, Inland Feeder Connection, Bulkhead Gate - Location Key Plan	N/A
TF-12a	7/23/1990	2426-378	F-57	Devil Canyon Second Afterbay, Wasteway Pipeline Plan and Profile	Pipeline plan updated. Profile alignment detail modified. Added in 1989 amendment. Plan and Profile updated with more details.
F-12b	7/23/1990	2426-379	F-58	Devil Canyon Second Afterbay, Wasteway Stilling Basin, Plan, Profile and Sections	Pipeline plan updated. Profile alignment detail modified. Added in 1989 amendment. Updated Plan and Profile and added more details.

Source: California Department of Water Resources, Division of Engineering
Key:
FERC = Federal Energy Regulatory Commission N/A = Not applicable

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3.0 SUPPORTING DESIGN REPORT FOR EXISTING FACILITIES

Section 4.41(g)(3) requires that an applicant file with FERC two copies of a Supporting Design Report when the applicant files a license application. The purpose of the Supporting Design Report is to demonstrate "…that existing and proposed structures are safe and adequate to fulfill their stated functions…" DWR's recent Part 12 Independent Dam Safety Inspection Reports and supporting correspondence have been filed with FERC, and DWR proposes that the documentation fulfills the requirements of the regulations for filing a Supporting Design Report for existing Project facilities as part of the Application for New License. All of the Project's Independent Dam Safety Inspection Reports are on file with FERC.

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Appendix A

CEII Single-Line Electrical Diagrams and General Design Drawings

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APPENDIX A

CEII SINGLE-LINE ELECTRICAL DIAGRAMS AND GENERAL DESIGN DRAWINGS

In accordance with Section (§) 5.30 and § 4.32(k) of the Federal Energy Regulatory Commission (FERC) regulations, and in light of national security concerns, the California Department of Water Resources requests that the single-line electrical diagram and general design drawings included in this Appendix A of Exhibit F be treated by FERC as Critical Energy Infrastructure Information (CEII) under § 388.112 of FERC's regulations, and not be released to the public.

The diagram satisfies the definition of CEII in § 388.112(c) of FERC's regulations because it contains design information about existing critical infrastructure that relates to details about the generation and transmission of electrical energy, and could be useful to a person planning an attack on critical infrastructure. Moreover, such information is exempt from disclosure under the freedom of Information Act 5 United States Code § 552, and does not simply give the general location of the critical infrastructure.

Procedures for the public to obtain access to CEII may be found at 18 Code of Federal Regulations § 388.113. Requests for access should be made to FERC's CEII coordinator.

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DEVIL CANYON PROJECT RELICENSING
FERC PROJECT NUMBER 14797

Final License Application
Exhibit G – Project Maps

November 2019

State of California
California Natural Resources Agency
DEPARTMENT OF WATER RESOURCES
Hydropower License Planning and Compliance Office

GAVIN NEWSOM	**WADE CROWFOOT**	**KARLA A. NEMETH**
Governor	Secretary for	Director
State of California	California Natural Resources	Department of Water Resources

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APPENDICES

COMMONLY USED TERMS, ACRONYMS & ABBREVIATIONS

§	Section
Application for New License	Application for a New License Major Project – Existing Dam for the Devil Canyon Project Relicensing, Federal Energy Regulatory Commission Project Number 14797
CFR	Code of Federal Regulations
DWR	California Department of Water Resources
DWR's Proposal	Continued operation of the Project, modification of the Project boundary, addition of 1 existing reservoir gage (USGS gage no. 10260790) and 10 existing roads as Project facilities under the new license, and 12 proposed environmental measures
FERC	Federal Energy Regulatory Commission
Project	Devil Canyon Project Relicensing, Federal Energy Regulatory Commission Project Number 14797

1.0 INTRODUCTION

The California Department of Water Resources (DWR) has prepared this Exhibit G, Project Maps, as part of its Application for a New License Major Project – Existing Dam (Application for New License) from the Federal Energy Regulatory Commission (FERC) for the Devil Canyon Project Relicensing, FERC Project Number 14797 (Project). This exhibit is prepared in conformance with Title 18 of the Code of Federal Regulations (CFR), Subchapter B (Regulations under the Federal Power Act), Part 4, Subpart F (Application for License for Major Project – Existing Dam) (Traditional Licensing Process).

In particular, this exhibit conforms to the regulations in 18 CFR Section (§) 5.18(a)(5)(iii), which requires in part that the application include an Exhibit G in conformance with 18 CFR § 4.41(h) and § 4.39. Section 4.41(h) pertains to Project maps and § 4.39 provides specifications for maps and drawings. For reference, § 4.41(h) states:

> 18 CFR § 4.41(h): Exhibit G is a map of the project that must conform to the specifications of § 4.39. In addition, to the other components of Exhibit G, the Applicant must provide the project boundary data in a geo-referenced electronic format--such as ArcView shape files, GeoMedia files, MapInfo files, or any similar format. The electronic boundary data must be positionally accurate to ±40 feet, in order to comply with the National Map Accuracy Standards for maps at a 1:24,000 scale (the scale of United States Geological Survey quadrangle maps). The electronic Exhibit G data must include a text file describing the map projection used (i.e., Universal Transverse Mercator, State Plane, Decimal Degrees, etc.), the map datum (i.e., feet, meters, miles, etc.). Three sets of the maps must be submitted on compact disk or other appropriate electronic media. If more than one sheet is used for the paper maps, the sheets must be numbered consecutively, and each sheet must bear a small insert sketch showing the entire project and indicate that portion of the project depicted on that sheet. Each sheet must contain a minimum of three known reference points. The latitude and longitude coordinates, or state plane coordinates, of each reference point must be shown. If at any time after the application is filed there is any change in the project boundary, the applicant must submit, within 90 days following the completion of project construction, a final exhibit G showing the extent of such changes. The map must show:
>
> (1) *Location of the project and principal features.* The map must show the location of the project as a whole with reference to the affected stream or other body of water and, if possible, to a nearby town or any other permanent monuments or objects, such as roads, transmission lines or other structures, that can be noted on the map and recognized in the field. The map must also show the relative

locations and physical interrelationships of the principal project works and other features described under paragraph (b) of this section (Exhibit A).

(2) *Project boundary.* The map must show a project boundary enclosing all project works and other features described under paragraph (b) of this section (Exhibit A) that are to be licensed. If accurate survey information is not available at the time the application is filed, the applicant must so state, and a tentative boundary may be submitted. The boundary must enclose only those lands necessary for operation and maintenance of the project and for other project purposes, such as recreation, shoreline control, or protection of environmental resources (see paragraph (f) of this section (Exhibit E)). Existing residential, commercial, or other structures may be included within the boundary only to the extent that underlying lands are needed for project purposes (e.g., for flowage, public recreation, shoreline control, or protection of environmental resources). If the boundary is on land covered by a public survey, ties must be shown on the map at sufficient points to permit accurate platting of the position of the boundary relative to the lines of the public land survey. If the lands are not covered by a public land survey, the best available legal description of the position of the boundary must be provided, including distances and directions from fixed monuments or physical features. The boundary must be described as follows:

(i) *Impoundments.*

(A) The boundary around a project impoundment must be described by one of the following:

(1) Contour lines, including the contour elevation (preferred method);

(2) Specified courses and distances (metes and bounds);

(3) If the project lands are covered by a public land survey, lines upon or parallel to the lines of the survey; or

(4) Any combination of the above methods.

(B) The boundary must be located no more than 200 feet (horizontal measurement) from the exterior margin of the reservoir, defined by the normal maximum surface

elevation, except where deviations may be necessary in describing the boundary according to the above methods or where additional lands are necessary for project purposes, such as public recreation, shoreline control, or protection of environmental resources.

(ii) *Continuous features.* The boundary around linear (continuous) project features such as access roads, transmission lines, and conduits may be described by specified distances from center lines or offset lines of survey. The width of such corridors must not exceed 200 feet unless good cause is shown for a greater width. Several sections of a continuous feature may be shown on a single sheet with information showing the sequence of contiguous sections.

(iii) *Noncontinuous features.*

(A) The boundary around noncontinuous project works such as dams, spillways, and powerhouses must be described by one of the following:

(1) Contour lines;

(2) Specified courses and distances;

(3) If the project lands are covered by a public land survey, lines upon or parallel to the lines of the survey; or

(4) Any combination of the above methods.

(B) The boundary must enclose only those lands that are necessary for safe and efficient operation and maintenance of the project or for other specified project purposes, such as public recreation or protection of environmental resources.

(3) *Federal lands.* Any public lands and reservations of the United States (Federal lands) [see 16 United States Code 796 (1) and (2)] that are within the project boundary, such as lands administered by the U.S. Forest Service, Bureau of Land Management, or National Park Service, or Indian tribal lands, and the boundaries of those Federal lands, must be identified as such on the map by:

(i) Legal subdivisions of a public land survey of the affected area (a protraction of identified township and section lines is sufficient for this purpose); and

(ii) The Federal agency, identified by symbol or legend, that maintains or manages each identified subdivision of the public land survey within the project boundary; or

(iii) In the absence of a public land survey, the location of the Federal lands according to the distances and directions from fixed monuments or physical features. When a Federal survey monument or a Federal bench mark will be destroyed or rendered unusable by the construction of project works, at least two permanent, marked witness monuments or bench marks must be established at accessible points. The maps show the location (and elevation, for bench marks) of the survey monument or bench mark which will be destroyed or rendered unusable, as well as of the witness monuments or bench marks. Connecting courses and distances from the witness monuments or bench marks to the original must also be shown.

(iv) The project location must include the most current information pertaining to affected Federal lands as described under §4.81(b)(5).

(4) *Non-Federal lands.* For those lands within the project boundary not identified under paragraph (h)(3) of this section, the map must identify by legal subdivision:

(i) Lands owned in fee by the applicant and lands that the applicant plans to acquire in fee; and

(ii) Lands over which the applicant has acquired or plans to acquire rights to occupancy and use other than fee title, including rights acquired or to be acquired by easement or lease.

Excluding this introductory material, this Exhibit G includes two sections. Section 2.0 provides a description of DWR's proposed changes to the Project boundary. Section 3.0 provides a list of Project boundary maps proposed for inclusion in the new license. The maps are included in Appendix A to this exhibit.

See Exhibit A for a description of Project facilities and features, Exhibit B for a description of Project operations, Exhibit C for a construction history and a construction schedule, Exhibit D for costs and financing information, and Exhibit E for a discussion of potential environmental effects and DWR's proposed resource management measures. Design drawings are included in Exhibit F. Exhibit H contains a detailed description of the need for the electricity provided by the Project, the availability of electrical energy alternatives, and other miscellaneous information.

All elevation data in this exhibit are in the North American Datum of 1983 unless otherwise specified.

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2.0 DESCRIPTION OF DATA PRESENTED IN PROJECT MAPS

DWR proposes specific changes to the existing Project boundary that are listed in Table 2.0-1. The net effect of modifying the existing Project boundary is discussed further in Exhibit A (Project Description) of this Application for New License.

Table 2.0-1. Proposed Changes to Devil Canyon Project Existing Project Boundary

Drawing Number in Existing License	Date of FERC Order Approving Drawing	FERC-Assigned Drawing Number	Licensees' Proposed Drawing Number in New License	Licensees' Proposed Drawing Name	Changes Made from Existing to Proposed Project Boundary
G-1 G-2	9/30/2014	2426-501 2426-502	G-1	Devil Canyon Project: Proposed Project Boundary Overview Map	Combined Drawings G-1 and G-2 in existing license to create updated index map showing spatial layout of Boundary Drawings G-2 and G-3. Drawing depicts complete updated proposed boundary following Project waterways, reservoirs, generation, and recreation facilities.
G-1	9/30/2014	2426-501	G-2	Devil Canyon Project: Proposed Project Boundary Map	Updated drawing shows detail for the north half of the Project area. The land area surrounding Silverwood Lake was reduced in size to eliminate lands not needed for Project purposes. The existing boundary followed Public Land Survey section or quarter section lines, rather than encompassing just the lands necessary for Project facilities, operation and maintenance. These excess, unused lands are not included, as they are not needed for Project operation and maintenance of Project facilities. The proposed boundary follows the contour of Silverwood Lake more closely and provides an adequate buffer zone between maximum surface water levels, and the proposed shoreline boundary.
G-2	9/30/2014	2426-502	G-3	Devil Canyon Project: Proposed Project Boundary Map	Updated drawing shows detail in the south half of the Project area. Proposed boundary reduced some land areas around the Devil Canyon afterbays that are not needed for Project operations and maintenance, and also added some primary Project roads that are needed for ongoing operations and maintenance of the penstocks, surge chamber and San Bernardino Tunnel outlet facilities.

Key:
FERC = Federal Energy Regulatory Commission

3.0 LIST OF PROJECT MAPS

General maps for DWR's Proposal, as described in Exhibit A, are provided in the Exhibit G maps listed in Table 3.0-1. These maps depict the proposed Project boundary in conformance with 18 CFR § 4.39 and are included in Appendix A.

Table 3.0-1. DWR's Proposed Project Boundary Maps

Drawing Number	Title
G-1	Devil Canyon Project Proposed Project Boundary Overview Map
G-2	Devil Canyon Project Proposed Project Boundary Map
G-3	Devil Canyon Project Proposed Project Boundary Map

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Appendix A

Project Maps

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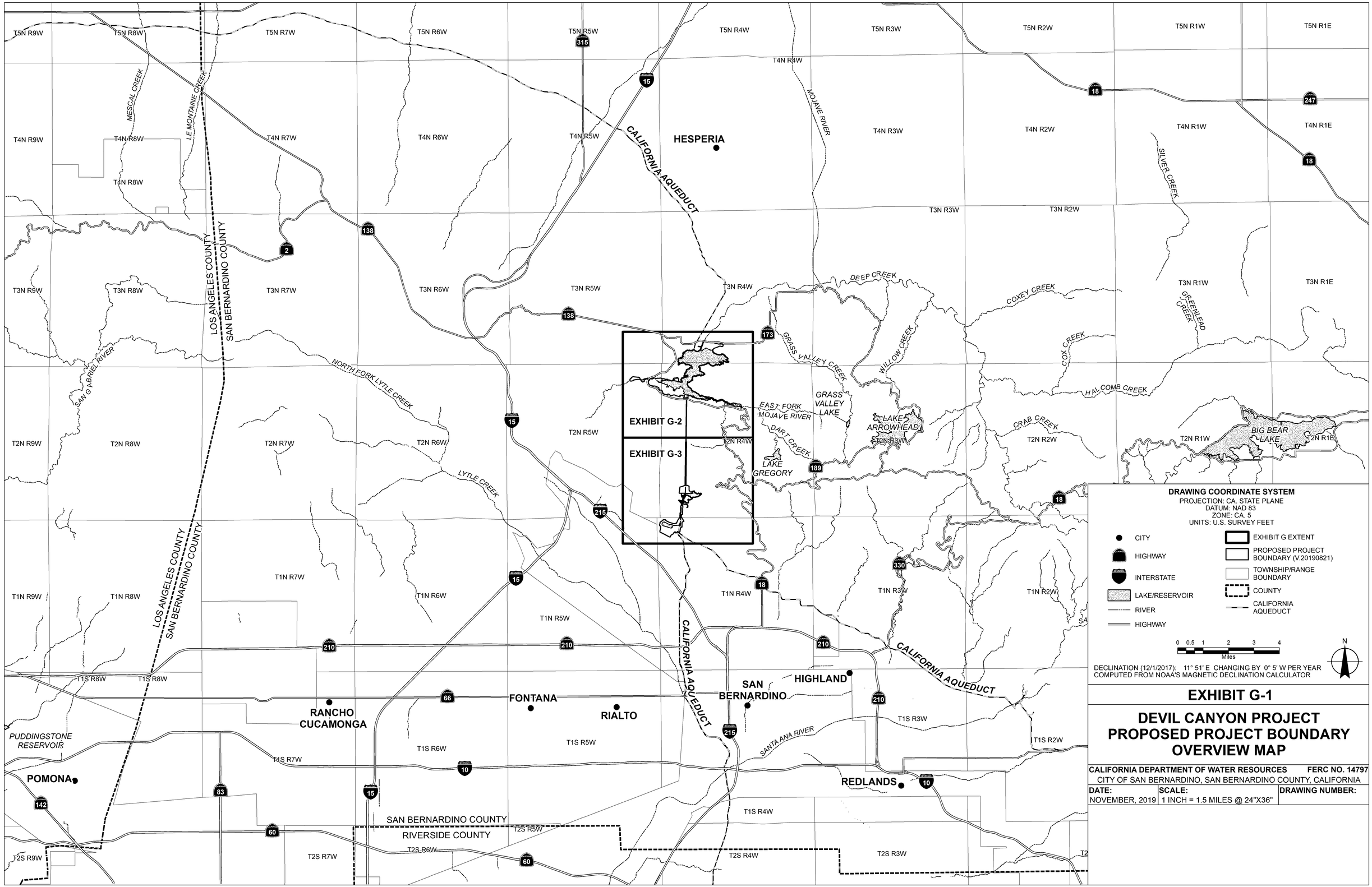


DRAWING COORDINATE SYSTEM
PROJECTION: CA. STATE PLANE
DATUM: NAD 83
ZONE: CA. 5
UNITS: U.S. SURVEY FEET

- CITY
- HIGHWAY
- INTERSTATE
- LAKE/RESERVOIR
- RIVER
- HIGHWAY
- EXHIBIT G EXTENT
- PROPOSED PROJECT BOUNDARY (V.20190821)
- TOWNSHIP/RANGE BOUNDARY
- COUNTY
- CALIFORNIA AQUEDUCT

0 0.5 1 2 3 4
Miles

N

DECLINATION (12/1/2017): 11° 51' E CHANGING BY 0° 5' W PER YEAR
COMPUTED FROM NOAA'S MAGNETIC DECLINATION CALCULATOR

EXHIBIT G-1

DEVIL CANYON PROJECT
PROPOSED PROJECT BOUNDARY
OVERVIEW MAP

CALIFORNIA DEPARTMENT OF WATER RESOURCES **FERC NO. 14797**
CITY OF SAN BERNARDINO, SAN BERNARDINO COUNTY, CALIFORNIA

DATE:	SCALE:	DRAWING NUMBER:
NOVEMBER, 2019	1 INCH = 1.5 MILES @ 24"X36"	

CEDAR SPRINGS DAM LOW-LEVEL OUTLET WORKS

CITY OF HESPERIA

PRIVATE

APN: 0357223 13

USGS GAUGE#: 10260820

USGS GAUGE#: 10260790

G2-1
N: 1933604
E: 6756610

APN: 035714102

US FOREST SERVICE

APN: 035722126

APN: 035722125

APN: 035714106

R. 5W.

R. 4W.

CEDAR SPRINGS DAM SPILLWAY

CEDAR SPRINGS DAM

STATE OF CALIFORNIA

Chamise Day Use Area

Sycamore Landing Day Use Area

Live Oak Landing Day Use Area

PACIFIC CREST TRAIL

APN: 035723125

APN: 035724113

APN: 035723131

APN: 035724112

2N41

T. 3N.

T. 2N.

APN: 034801107

APN: 034803109

APN: 034101105

2N47A

Rio Group Camp

Baranca Group Camp

Valle Group Camp

SILVERWOOD LAKE
NORM. MAX WS
EL 3353'

APN: 034107137

APN: 034110103

G2-2
N: 1928439
E: 6772395

APN: 033701101

US FOREST SERVICE

CLEGHORN RD

CLEGHORN RD
WEST FORK MOJAVE RIVER

USGS GAUGE#: 10260550

Nature Center

New Mesa Campground

Cleghorn Day Use Area

Cleghorn Boat Launch

Garces Overlook

STATE OF CALIFORNIA

APN: 034109101

APN: 034119101

SAN BERNARDINO TUNNEL INTAKE

Mesa Campground

Entrance Station

Campfire Center

APN: 034803107

Sawpit Canyon Marina

Sawpit Canyon Boat Launch

Jamajab Point Overlook

Sawpit Canyon Day Use Area

Sawpit Canyon Picnic Area 2

Sawpit Canyon Picnic Area 3

Black Oak Picnic Area

Serrano Landing Day Use Area

APN: 034118111

APN: 034119203

2N33

2N59

2N45

Sawpit Canyon Picnic Area 1

Miller Canyon Picnic Area

Lynx Point Overlook

Devils Pit Overlook

Miller Canyon Trailhead

APN: 033703103

APN: 034111119

APN: 034112105

APN: 034114135

APN: 034118114

APN: 034115104

G2-3
N: 1921687
E: 6761742

APN: 034115102

APN: 034115106

APN: 034115105

2N43

2N03

STATE OF CALIFORNIA

Miller Canyon Group Camp

USGS GAUGE#: 10260700

EAST FORK MOJAVE RIVER

APN: 034118112

US FOREST SERVICE

APN: 034119204

PRIVATE

SEE INSET

SAN BERNARDINO TUNNEL

SEELEY CREEK

APN: 034303103

APN: 033706101

APN: 034309108

APN: 034309109

APN: 034303104

APN: 033707101

APN: 033707102

2N03X

INSET

MATCHLINE "A"

MATCHLINE "B"

APN: 034120121

APN: 034120120

APN: 034120122

APN: 034214115

APN: 034214144

APN: 034214148

APN: 034214139

APN: 034214138

APN: 034210305

APN: 034210206

APN: 034210112

APN: 034208154

APN: 034208149

APN: 034208206

APN: 034208203

APN: 034208120

APN: 034208174

APN: 034201119

APN: 034214215

APN: 034214414

APN: 034214306

APN: 034208118

APN: 034208119

APN: 034214304

APN: 034208204

APN: 034215403

APN: 034208205

APN: 034208150

APN: 034215431

APN: 034208153

APN: 034210107

APN: 034220209

APN: 034210118

APN: 034220208

APN: 034210308

APN: 034220203

APN: 034214216

APN: 034214307

APN: 034214308

APN: 034215305

APN: 034215335

APN: 034215404

APN: 034215430

APN: 034215429

APN: 034220225

APN: 034220216

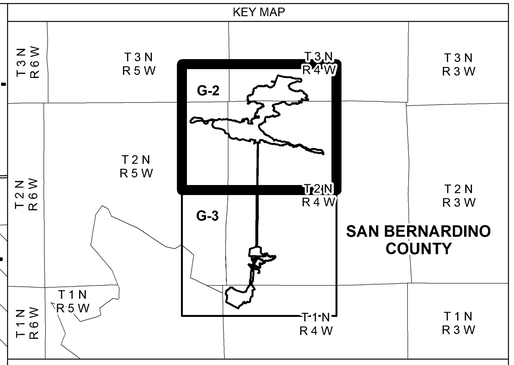
APN: 034220211

APN: 034220212

APN: 034220207

APN: 034220201

KEY MAP



SURVEYORS STATEMENT

I HEREBY STATE THAT THE P-14797 PROJECT BOUNDARY DELINEATION FOR THE DEVIL CANYON PROJECT IS SHOWN ON THIS EXHIBIT "G" IS DEVELOPED WITHIN REASONABLE ACCURACIES AS REQUIRED IN 18CFR4.41 TO THE GEOGRAPHIC LOCATION BASED ON A GRAPHICAL POSITIONING IN REFERENCE TO USGS QUADRANGLE MAPPING WITHIN +/- 40 FEET. THE P-14797 DOCUMENT PROJECT BOUNDARY WAS DIGITIZED TO GRAPHICALLY BEST FIT THE FEATURES ON USGS EROS HIGH RESOLUTION ORTHO IMAGERY AND WAS NOT FIELD SURVEYED.

LS STAMP

DRAWING COORDINATE SYSTEM

PROJECTION: CA. STATE PLANE
DATUM: NAD 83
ZONE: CA. 5
UNITS: U.S. SURVEY FEET

THE LICENSE EITHER OWNS IN FEE SIMPLE, POSSESSES ADEQUATE LAND RIGHTS, OR WILL AQUIRE ADEQUATE LAND RIGHTS OVER ALL LANDS SHOWN THAT ARE INSIDE THE PROJECT BOUNDARY

- SECTION CORNER
- REFERENCE POINT
- GATE
- PROJECT COMPLIANCE GAUGE STATION
- PROJECT ROAD
- PAVED ROAD
- UNPAVED ROAD
- PACIFIC CREST TRAIL
- OTHER TRAILS
- STREAM / RIVER
- CALIFORNIA AQUEDUCT
- CITY LIMITS
- PROPOSED PROJECT BOUNDARY (V.20190821)
- TOWNSHIP / RANGE LINE
- RESERVOIR

LAND OWNERSHIP

- CITY
- STATE OF CALIF
- US FOREST SERVICE
- PRIVATE

RECREATION LEGEND

- BOAT-IN DAY USE AREA
- CAMPGROUND
- DAY USE AREA
- OVERLOOK

0 375 750 1,500 2,250 3,000
Feet

N

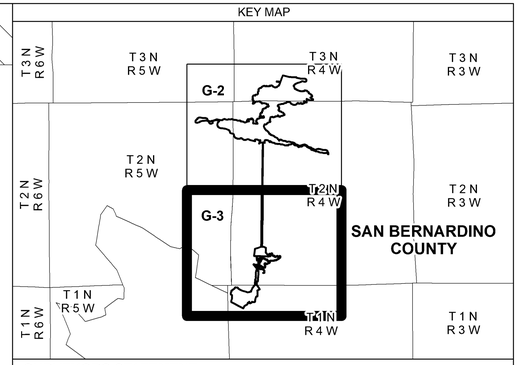
DECLINATION (12/1/2017): 11° 51' E CHANGING BY 0° 5' W PER YEAR
COMPUTED FROM NOAA'S MAGNETIC DECLINATION CALCULATOR

EXHIBIT G-2

DEVIL CANYON PROJECT PROPOSED PROJECT BOUNDARY MAP

CALIFORNIA DEPARTMENT OF WATER RESOURCES		FERC NO. 14797
CITY OF SAN BERNARDINO, SAN BERNARDINO COUNTY, CALIFORNIA		
DATE: NOVEMBER, 2019	SCALE: 1 INCH = 1000 FEET @ 24"X36"	DRAWING NUMBER:

KEY MAP



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DRAWING COORDINATE SYSTEM

PROJECTION: CA. STATE PLANE
DATUM: NAD 83
ZONE: CA. 5
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- TOWNSHIP / RANGE LINE
- RESERVOIR

LAND OWNERSHIP

- CITY
- STATE OF CALIF
- US FOREST SERVICE
- PRIVATE

0 375 750 1,500 2,250 3,000 Feet

N

DECLINATION (12/1/2017): 11° 51' E CHANGING BY 0° 5' W PER YEAR
COMPUTED FROM NOAA'S MAGNETIC DECLINATION CALCULATOR

EXHIBIT G-3

DEVIL CANYON PROJECT PROPOSED PROJECT BOUNDARY MAP

CALIFORNIA DEPARTMENT OF WATER RESOURCES		FERC NO. 14797
CITY OF SAN BERNARDINO, SAN BERNARDINO COUNTY, CALIFORNIA		
DATE:	SCALE:	DRAWING NUMBER:
NOVEMBER, 2019	1 INCH = 1000 FEET @ 24"X36"	

DEVIL CANYON PROJECT RELICENSING
FERC PROJECT NUMBER 14797

Final License Application
Exhibit H – Plans and Ability of Applicant to Operate Efficiently

November 2019

State of California
California Natural Resources Agency
DEPARTMENT OF WATER RESOURCES
Hydropower License Planning and Compliance Office

GAVIN NEWSOM	**WADE CROWFOOT**	**KARLA A. NEMETH**
Governor	Secretary for	Director
State of California	California Natural Resources	Department of Water Resources

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TABLE OF CONTENTS

LIST OF TABLES

COMMONLY USED TERMS, ACRONYMS & ABBREVIATIONS

§	Section
ACC	Area Control Center
Application for New License	Application for a New License Major Project – Existing Dam for the Devil Canyon Project Relicensing, Federal Energy Regulatory Commission Project Number 14797
CFR	Code of Federal Regulations
DWR	California Department of Water Resources
DWR's Proposal	Continued operation of the Project, modification of the Project boundary, addition of 1 existing reservoir gage (USGS gage no. 10260790) and 10 existing roads as Project facilities under the new license, and 12 proposed environmental measures
FERC	Federal Energy Regulatory Commission
MWh	megawatt hour
O&M	operation and maintenance
Project	Devil Canyon Project Relicensing, Federal Energy Regulatory Commission Project Number 14797
SCADA	Supervisory Control and Data Acquisition
SCE	Southern California Edison
SFD	Southern Field Division
SWP	State Water Project
WUE	Water Use and Efficiency Branch

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1.0 INTRODUCTION

The California Department of Water Resources (DWR) has prepared this Exhibit H, Plans and Ability of Applicant to Operate Efficiently, as part of its Application for a New License Major Project – Existing Dam (Application for New License) from the Federal Energy Regulatory Commission (FERC) for the Devil Canyon Project Relicensing, FERC Project Number 14797 (Project). This exhibit is prepared in conformance with the requirements of Code of Federal Regulations (CFR) 18, Chapter 1, Subchapter B, Section (§) 16.10:

(a) *Information to be supplied by all applicants.* All applicants for a new license under this part must file the following information with the Commission:

(1) A discussion of the plans and ability of the applicant to operate and maintain the project in a manner most likely to provide efficient and reliable electric service, including efforts and plans to:

(i) Increase capacity or generation at the project;

(ii) Coordinate the operation of the project with any upstream or downstream water resource projects; and

(iii) Coordinate the operation of the project with the applicant's or other electrical systems to minimize the cost of production.

(2) A discussion of the need of the applicant over the short and long term for the electricity generated by the project, including:

(i) The reasonable costs and reasonable availability of alternative sources of power that would be needed by the applicant or its customers, including wholesale customers, if the applicant is not granted a license for the project;

(ii) A discussion of the increase in fuel, capital, and any other costs that would be incurred by the applicant or its customers to purchase or generate power necessary to replace the output of the licensed project, if the applicant is not granted a license for the project;

(iii) The effect of each alternative source of power on:

(A) The applicant's customers, including wholesale customers;

(B) The applicant's operating and load characteristics; and

(C) The communities served or to be served, including any reallocation of costs associated with the transfer of a license from the existing licensee.

(3) The following data showing need and the reasonable cost and availability of alternative sources of power:

(i) The average annual cost of the power produced by the project, including the basis for that calculation;

(ii) The projected resources required by the applicant to meet the applicant's capacity and energy requirements over the short and long term including:

(A) Energy and capacity resources, including the contributions from the applicant's generation, purchases, and load modification measures (such as conservation, if considered as a resource), as separate components of the total resources required;

(B) A resource analysis, including a statement of system reserve margins to be maintained for energy and capacity; and

(C) If load management measures are not viewed as resources, the effects of such measures on the projected capacity and energy requirements indicated separately;

(iii) For alternative sources of power, including generation of additional power at existing facilities, restarting deactivated units, the purchase of power off-system, the construction or purchase and operation of a new power plant, and load management measures such as conservation:

(A) The total annual cost of each alternative source of power to replace project power;

(B) The basis for the determination of projected annual cost; and

(C) A discussion of the relative merits of each alternative, including the issues of the period of availability and dependability of purchased power, average life of alternatives, relative equivalent availability of generating

alternatives, and relative impacts on the applicant's power system reliability and other system operating characteristics; and

(iv) The effect on the direct providers (and their immediate customers) of alternate sources of power.

(4) If an applicant uses power for its own industrial facility and related operations, the effect of obtaining or losing electricity from the project on the operation and efficiency of such facility or related operations, its workers, and the related community.

(5) If an applicant is an Indian tribe applying for a license for a project located on the tribal reservation, a statement of the need of such tribe for electricity generated by the project to foster the purposes of the reservation.

(6) A comparison of the impact on the operations and planning of the applicant's transmission system of receiving or not receiving the project license, including:

(i) An analysis of the effects of any resulting redistribution of power flows on line loading (with respect to applicable thermal, voltage, or stability limits), line losses, and necessary new construction of transmission facilities or upgrading of existing facilities, together with the cost impact of these effects;

(ii) An analysis of the advantages that the applicant's transmission system would provide in the distribution of the project's power; and

(iii) Detailed single-line diagrams, including existing system facilities identified by name and circuit number, that show system transmission elements in relation to the project and other principal interconnected system elements. Power flow and loss data that represent system operating conditions may be appended if applicants believe such data would be useful to show that the operating impacts described would be beneficial.

(7) If the applicant has plans to modify existing project facilities or operations, a statement of the need for, or usefulness of, the modifications, including at least a reconnaissance-level study of the effect and projected costs of the proposed plans and any alternate plans, which in conjunction with other developments in the area would conform with a

comprehensive plan for improving or developing the waterway and for other beneficial public uses as defined in section 10(a)(1) of the Federal Power Act.

(8) If the applicant has no plans to modify existing project facilities or operations, at least a reconnaissance-level study to show that the project facilities or operations in conjunction with other developments in the area would conform with a comprehensive plan for improving or developing the waterway and for other beneficial public uses as defined in section 10(a)(1) of the Federal Power Act.

(9) A statement describing the applicant's financial and personnel resources to meet its obligations under a new license, including specific information to demonstrate that the applicant's personnel are adequate in number and training to operate and maintain the project in accordance with the provisions of the license.

(10) If an applicant proposes to expand the project to encompass additional lands, a statement that the applicant has notified, by certified mail, property owners on the additional lands to be encompassed by the project and governmental agencies and subdivisions likely to be interested in or affected by the proposed expansion.

(11) The applicant's electricity consumption efficiency improvement program, as defined under section 10(a)(2)(C) of the Federal Power Act, including:

(i) A statement of the applicant's record of encouraging or assisting its customers to conserve electricity and a description of its plans and capabilities for promoting electricity conservation by its customers; and

(ii) A statement describing the compliance of the applicant's energy conservation programs with any applicable regulatory requirements.

(12) The names and mailing addresses of every Indian tribe with land on which any part of the proposed project would be located or which the applicant reasonably believes would otherwise be affected by the proposed project.

(b) *Information to be provided by an applicant who is an existing licensee.* An existing licensee that applies for a new license must provide:

(1) The information specified in paragraph (a).

(2) A statement of measures taken or planned by the licensee to ensure safe management, operation, and maintenance of the project, including:

(i) A description of existing and planned operation of the project during flood conditions;

(ii) A discussion of any warning devices used to ensure downstream public safety;

(iii) A discussion of any proposed changes to the operation of the project or downstream development that might affect the existing Emergency Action Plan, as described in subpart C of part 12 of this chapter, on file with the Commission;

(iv) A description of existing and planned monitoring devices to detect structural movement or stress, seepage, uplift, equipment failure, or water conduit failure, including a description of the maintenance and monitoring programs used or planned in conjunction with the devices; and

(v) A discussion of the project's employee safety and public safety record, including the number of lost-time accidents involving employees and the record of injury or death to the public within the project boundary.

(3) A description of the current operation of the project, including any constraints that might affect the manner in which the project is operated.

(4) A discussion of the history of the project and record of programs to upgrade the operation and maintenance of the project.

(5) A summary of any generation lost at the project over the last five years because of unscheduled outages, including the cause, duration, and corrective action taken.

(6) A discussion of the licensee's record of compliance with the terms and conditions of the existing license, including a list of all incidents of noncompliance, their disposition, and any documentation relating to each incident.

(7) A discussion of any actions taken by the existing licensee related to the project which affect the public.

(8) A summary of the ownership and operating expenses that would be reduced if the project license were transferred from the existing licensee.

(9) A statement of annual fees paid under Part I of the Federal Power Act for the use of any Federal or Indian lands included within the project boundary.

(c) *Information to be provided by an applicant who is not an existing licensee.* An applicant that is not an existing licensee must provide:

(1) The information specified in paragraph (a).

(2) A statement of the applicant's plans to manage, operate, and maintain the project safely, including:

(i) A description of the differences between the operation and maintenance procedures planned by the applicant and the operation and maintenance procedures of the existing licensee;

(ii) A discussion of any measures proposed by the applicant to implement the existing licensee's Emergency Action Plan, as described in subpart C of part 12 of this chapter, and any proposed changes;

(iii) A description of the applicant's plans to continue safety monitoring of existing project instrumentation and any proposed changes; and

(iv) A statement indicating whether or not the applicant is requesting the licensee to provide transmission services under section 15(d) of the Federal Power Act.

(d) *Inclusion in application.* The information required to be provided by this section must be included in the application as a separate exhibit labeled “Exhibit H.”

Excluding this introductory material, Exhibit H includes 20 sections. Section 2.0 describes the Project’s efficient and reliable service, and Section 3.0 explains the need for the Project and availability of alternative power sources. Section 4.0 addresses the extent to which Project power is used for the Licensees’ industrial facilities. Sections 5.0 and 6.0 address the Indian tribes’ need for the Project’s electricity and the impact on the Licensees’ transmission systems from receiving or not receiving the Project license, respectively. Section 7.0 describes plans to modify existing Project facilities or operations, and Section 8.0 addresses the comprehensive plans that may pertain to the Project relicensing. Section 9.0 describes financial and personnel resources of the Project. Section 10.0 provides details regarding proposed Project boundary changes for the Project. Section 11.0 discusses DWR’s electricity consumption efficiency improvement programs. Section 12.0 addresses Indian tribes. Section 13.0 addresses the safe management, operation and maintenance of the Project. Section 14.0 describes the Project’s current operations and constraints, and Section 15.0 addresses the Project’s history. Section 16.0 describes the generated power lost over the last five

years, Section 17.0 addresses the Project's compliance record, and Section 18.0 discusses the actions taken by DWR that affect the public. Section 19.0 details the effect on ownership and operating expenses should the license be transferred. Section 20.0 addresses annual fees paid to FERC by DWR relative to the Project. Section 21.0 lists the references cited in this exhibit.

See Exhibit A for a description of Project facilities and features, Exhibit B for a description of Project operations, Exhibit C for a construction history and a construction schedule, Exhibit D for costs and financing information, and Exhibit E for a discussion of potential environmental effects and DWR's proposed resource management measures. Project design drawings are included in Exhibit F, and Project maps are included in Exhibit G.

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2.0 EFFICIENT AND RELIABLE ELECTRIC SERVICE

DWR has consistently demonstrated its capability to manage, operate, and maintain the Project in a manner that delivers efficient and reliable electricity in an environmentally sensitive manner. Over the years, DWR has implemented several enhancements to increase energy recovery from the Project. These projects include upgrades of the Devil Canyon Powerplant and associated facilities. Additionally, DWR's preventative maintenance and inspection programs are designed to pinpoint potential trouble spots so that repairs can be made before the equipment fails. As new test equipment becomes available and monitoring technologies improve, DWR will look for applications that will continue to improve Project efficiency and reliability.

2.1 INCREASE IN CAPACITY OR GENERATION

DWR's Proposal does not include new capacity or generation. DWR concluded, after a careful evaluation, that increases in capacity and generation were not warranted at this time.

2.2 PROJECT COORDINATION WITH OTHER WATER RESOURCE PROJECTS

DWR actively coordinates Project operations with the State Water Project (SWP), which is the largest state-owned and operated water supply project of its kind in the United States.

2.3 PROJECT COORDINATION WITH OTHER ELECTRICAL SYSTEMS TO MINIMIZE COST OF PRODUCTION

Project power connects to the power grid at Southern California Edison (SCE) transmission lines that connect to the Devil Canyon Switchyard.

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3.0 NEED FOR THE PROJECT AND AVAILABILITY OF ALTERNATIVE POWER SOURCES

3.1 DWR'S NEED FOR PROJECT POWER

The power generated at the Project is critical for the continued operation of DWR's SWP. The energy required to transport SWP water to southern California makes up one of the largest cost components annually of the SWP. While Devil Canyon Powerplant output is delivered to the California Power Grid, its output effectively helps DWR partially offset the costs and energy needed for operating the SWP. More specifically, the revenue from power generation offsets the cost of delivering water to southern California, keeping water costs more affordable in the region and preserving economic vitality and quality of life for residents. Additionally, the Project is necessary in both the short and long term to maintain system reliability, operational flexibility, and low-cost electricity.

3.2 COSTS AND AVAILABILITY OF ALTERNATIVE SOURCES OF POWER

Refer to Section 8.0 in Exhibit D for a discussion regarding the costs and availability of alternative sources of power to replace the Project's power.

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4.0 EFFECT ON INDUSTRIAL FACILITY

DWR does not use the Project power for its own industrial facilities. Therefore, this item is not applicable.

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5.0 INDIAN TRIBE NEED FOR ELECTRICITY

DWR is not an Indian tribe. Therefore, this item is not applicable.

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6.0 EFFECT ON TRANSMISSION SYSTEM

DWR does not currently own or operate an independent electrical transmission system. Power from the Project is provided to SCE, which transmits the power to the California Power Grid, as described in Section 2.3. Therefore, this item is not applicable.

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7.0 PLANS TO MODIFY EXISTING PROJECT FEATURES OR OPERATIONS

DWR has no plans to modify the existing Project facilities or their operations.

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8.0 COMPREHENSIVE DEVELOPMENT OF WATERWAYS

At the outset of the current relicensing process, DWR undertook a reconnaissance-level analysis to identify potential Project modifications that would enhance the Project's contribution to the comprehensive improvement and development of the waterway and for other beneficial public uses. The analysis did not identify any necessary modification to Project facilities that, in conjunction with other developments in the area, are needed to conform with comprehensive plans for improving or developing the waterway and other beneficial public uses, as described in Section 10(a)(1) of the Federal Power Act. Refer to Section 5.6 of Exhibit E for a detailed discussion regarding Project consistency with FERC's qualifying comprehensive plans.

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9.0 FINANCIAL AND PERSONNEL RESOURCES

9.1 FINANCIAL RESOURCES

DWR's sources of financing and revenue are sufficient to meet the continuing operation and maintenance (O&M) needs of the Project. Historically, DWR has financed Project O&M by issuance of short-term Commercial Paper, long-term Revenue Bonds, and power sales with ultimate repayment of all expenditures by the 29 SWP Contractors. The California Department of Parks and Recreation receives funding for the Silverwood Lake State Recreation Area through State legislative appropriations and other means.

9.2 PERSONNEL RESOURCES

DWR has experienced personnel operating and maintaining the Project in a safe, efficient, and reliable manner. DWR's current workforce comprises approximately 3,357 positions. Of that number, the Project employs approximately 31 positions at the Devil Canyon site, and is supported by approximately 36 positions in DWR's Division of Operations and Maintenance located at its headquarters building in Sacramento. DWR's current personnel resources are sufficient to meet the obligations of a new license. In addition, DWR's Training Office provides a high quality and extensive training program to meet the needs of DWR managers, supervisors, and staff in all areas of professional, occupational, and personal training and development. The Training Office also meets the changing needs of DWR by developing and providing instruction on new organizational, technical, business, and leadership practices and current DWR programs, policies, and procedures.

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10.0 PROJECT BOUNDARY EXPANSION

As described in Exhibit G, DWR proposes to adjust the existing Project boundary to encompass all of the Project facilities. The Project will not be expanded with any new Project facility; rather, the adjustments to the Project boundary will ensure all existing Project facilities are within the proposed Project boundary.

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11.0 ELECTRICITY CONSUMPTION EFFICIENCY IMPROVEMENT PROGRAM

California has an energy conservation program known as Flex Alert, which calls on consumers to voluntarily conserve electricity when there is a predicted shortage of energy supply, especially if the grid operator needs to dip into reserves to cover demand. By encouraging a reduction of electricity use at critical times, possible power outages may be prevented. More information about the program can be found at the following website: http://www.flexalert.org.

Additionally, through partnerships, grant and loan programs, and research and data analysis, the Water Use and Efficiency Branch (WUE) of DWR works with agencies and individuals to provide assistance for improving water use efficiency and developing and meeting efficient water use requirements, including:

- Agriculture and urban water and energy planning and conservation.
- Drought contingency planning.
- Alternative water supplies development and use, such as water recycling, desalination, stormwater capture, and graywater collection.

WUE also has two programs that provide tools and data for managing water use:

- California Irrigation Management Information System provides reference evapotranspiration and weather data to the public for irrigation scheduling, water balance analyses, pest management, energy generation, firefighting, weather forecasting, and scientific research.
- Land and Water Use program collects land use data and develops water use estimates used in a variety of statewide water planning efforts.

More information regarding the WUE and its programs can be found at: https://www.water.ca.gov/Programs/Water-Use-And-Efficiency.

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12.0 INDIAN TRIBES NAMES AND MAILING ADDRESSES

The Project is not located on Indian tribe lands.

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13.0 SAFE MANAGEMENT, OPERATION, AND MAINTENANCE OF THE PROJECT

DWR's first and foremost consideration when operating the Project is the safety of the public, DWR employees, and DWR contractors. DWR's next consideration is the safety of its facilities and downstream facilities.

13.1 OPERATIONS DURING FLOOD CONDITIONS

The Project is not operated for flood control protection: the Project storage and afterbay reservoirs do not include dedicated flood control space and Project spillways are not constrained for flood control periods. However, Project facilities are designed to minimize the impacts during high flow periods. For example, the Cedar Springs Dam Spillway is designed to handle high flows.

13.2 WARNING DEVICES FOR PUBLIC SAFETY

As described in its Project Public Safety Plan (DWR 2014), DWR has implemented many practices to ensure the safety of its employees and the public. DWR uses many warning devices, such as signs, buoy lines, and alarms to warn the public of any dangers or hazards. Many signs tell the public that the said area is dangerous and that their access is prohibited; some will tell the public that they can enter but only on foot, with no bicycles or vehicles; and some inform the public of extreme dangers such as high voltage power lines.

In addition, DWR uses many miles of restraining devices such as fences, gates, and boat barriers to keep the public out of unsafe areas. Almost all the facilities are surrounded by six-foot-high chain link fence with three-strand barbed wire tops. Manually operated gates are locked with chains and special locks made solely for DWR staff. Electric gates require a specific key, or authorized security badge to get through, and each powerplant has a security camera watching the front gate with an operator and security guard monitoring it 24 hours a day 7 days a week.

13.3 EMERGENCY ACTION PLAN

Annually, DWR performs reviews and updates to the Emergency Action Plan for the Cedar Springs Dam. In addition to the EAP updates, DWR conducts annual orientations, tabletop exercises, annual drills, and emergency equipment testing for the facility. There are no proposed changes to the operation of the Project that would affect the existing EAP for the Project.

13.4 MONITORING DEVICES

DWR currently has many safety standards set forth in its dam-specific FERC EAP, internal regulations, and daily Project operations. Daily patrols are conducted, and all safety procedures and implementations are checked. If anything is damaged or needs replacement, a Trouble Report is generated immediately and action is taken to isolate

the danger and to make the needed repair/replacement. All DWR buildings are locked at all times and all exterior doors to these facilities will alarm the plant operator and Area Control Center (ACC) if opened.

Cedar Springs Dam and its facilities are visibly inspected daily for anomalies of its hydraulic structures. Any observed damage or failures of these structures are immediately conveyed to the Southern Field Division (SFD) ACC. Detection of a dam safety emergency or incident at Cedar Springs Dam will generally fall under one of three categories: visual observations, a Supervisory Control and Data Acquisition (SCADA) instrumentation alarm, and dam safety instrumentation.

Examples of visual observations that can serve as detection of a potential dam safety incident include:

- Observed damage or failure of hydraulic structures, such as the spillway or outlet works and associated valves
- Observed distress to the dam embankment or its abutments in the form of slumping, cracking, excessive settlement, bulging, or other forms of instability
- Observation of a whirlpool or vortex within the reservoir
- Occurrence of a significant seismic event near the dam or seiche within the reservoir
- Observation of new seepage area, unexplained increase in seepage at historical seepage areas, or observation of turbid (cloudy) seepage
- Observations of significant displacements or misalignments in structures or flatwork (e.g., pavement and concrete curbs) constructed on the dam or its abutments
- Observation of an unintended, uncontrolled release of a significant volume of water from the reservoir due to human error, mechanical failure, or other cause
- Any other damage to the dam embankment or appurtenances that could lead to dam failure or an uncontrolled release, whether it be caused naturally or man-made

These observations and reports can come from DWR personnel, other State or local agency personnel that work at the dam, or the general public. If observations are reported by the general public, the SFD ACC will investigate and contact the most appropriate and local DWR personnel for verification.

Examples of SCADA alarms that can serve as detection of a potential dam safety incident by DWR Operators within the SFD ACC include:

- Reservoir Level:
    - Unexplained changes in surface water elevation
    - Exceedance of normal maximum and minimum operating surface elevations
    - Unexplained changes in tailwater levels
- Outlet Works:
    - Various SCADA alarms that indicate loss of control or communication with mechanical equipment
    - Unexplained changes in flow rates, including exceedance of normal maximum and minimum flow rates
    - Unexplained changes in valve or gate positions
- Rain and Stream Gages:
    - Greater than anticipated precipitation and inflow to the reservoir
    - Unexplained changes in tailwater levels (Mojave River)
- Seepage Alarm:
    - Greater than expected seepage at the dam's toe drain

Examples of dam safety instrumentation (and its data) that can provide detection of a potential dam safety incident include:

- Unexplained rise or drop in piezometric (groundwater) readings from dam instrumentation (piezometers, observation wells, etc.)
- Unexplained sudden rise or drop in seepage rates from drains and collection systems
- Settlement monuments that experience sudden settlement or displacements between annual surveys
- Seismic instruments that capture ground motions experienced at the dam

DWR operates and maintains stream gaging stations upstream of Silverwood Lake. These stations are closely monitored during heavy rainstorms for increases in flow from the watershed. This information is used to maintain water elevation in the lake.

13.5 EMPLOYEE SAFETY AND PUBLIC RECORDS

Based on California Division of Occupational Safety and Health Form 300 annual reports, in the past five years, there have been six lost-time accidents for a total of two days away for work involving on-site DWR Project operations employees).

In the past five years, there were no fatalities related to Project activities, and three non-Project related public safety incidents that occurred within the Project boundary. These incidents have been reported to FERC.

14.0 CURRENT OPERATIONS AND CONSTRAINTS

Current Project operations and constraints are described in Section 4.0 of Exhibit B.

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15.0 HISTORY OF THE PROJECT

A description of the Project history is included in Section 5.8, Cultural Resources, in Exhibit E.

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16.0 GENERATION LOST OVER THE LAST FIVE YEARS

DWR typically takes scheduled outages for two to three weeks in the fall for annual maintenance. Work includes equipment maintenance, testing and inspecting, and cleaning and repair of water conduits.

Unscheduled outages that impact the Project's power production may be caused by a variety of factors, many of which are beyond DWR's control. "Momentary" outages may be caused by transmission trouble; DWR is usually able to quickly restore the Project to service shortly after these occur. Unscheduled outages also may occur so that DWR can respond to emergency conditions (e.g., response to equipment failure).

Table 16.0-1 lists unscheduled outages that extended for more than 24 hours and that have impacted power production in the past five years.

Table 16.0-1. Dates When Devil Canyon Powerplant Was Shut Down for Unscheduled (Forced) Outages for More Than 24 Hours from Calendar Year 2012 Through 2017 and the Reason for Each Outage

Period	Duration of Shut Down	Estimated Lost Power (MWh)	Reason for Shut Down
9/27/13 - 11/7/13	979 Hours	78,320 MWh	Unit 4 - Cooling Water leak in Upper Guide Bearing
12/17/13 - 12/19/13	47.4 Hours	3,792 MWh	Unit 3 - Loose wires on Potential Transformer
3/29/14 - 3/31/14	47 Hours	3,760 MWh	Unit 3 - Communication error between Ground Detection device 64F and the Protection/ Control System
6/5/14 - 6/30/14	590 Hours	35,400 MWh	Unit 1 - Loss of Plant Battery System caused damage to the Unit Excitation System
9/9/14 - 9/22/14	307 Hours	18,420 MWh	Unit 2 - Brake System failure
4/17/15 - 4/29/15	317 Hours	19,020 MWh	Unit 1 - Penstock leak & Drain Valve repair
4/17/15 - 4/23/15	148 Hours	8,880 MWh	Unit 2 - Penstock leak
8/13/17 - 8/14/17	26 Hours	2,080 MWh	Unit 4 - SCE Line trip caused an Exciter System Fan failure

Key:
MWh = megawatt hour
SCE = Southern California Edison

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17.0 DWR'S COMPLIANCE RECORD

DWR's record of non-compliance under the existing license consists of three reported events related to the Project.

The first two events were related to the late filing of Biennial Trout Stocking Reports in 2007 and 2014. The reports were filed and no penalties or corrective actions were required by FERC. All subsequent reports have been timely filed.

The third event occurred on November 1, 2017, when DWR started concrete spall repairs of the Cedar Springs Dam Spillway. FERC had not authorized this work and considered this action to be a matter of non-compliance. On November 6, 2017, FERC authorized the spillway maintenance repairs contingent upon DWR addressing its list of comments, providing an explanation of how work was directed to proceed without FERC authorization, and providing a description of the changes DWR will make to prevent similar instances from occurring again. FERC's comments were addressed. Root cause investigation revealed that a miscommunication had occurred between DWR and its contractor regarding the nature of the work and necessary approvals needed prior to carrying out the work. DWR subsequently updated the Project Management Plan to minimize future misunderstandings and miscommunications as described in the letter filed on December 6, 2017.

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18.0 ACTIONS TAKEN BY DWR AFFECTING THE PUBLIC

As discussed in Exhibit E, the Project provides recreational resources for the public at Silverwood Lake, and delivers water to local water rights users and SWP contractors for public use.

The continued operation of the Project for electric power generation alleviates the need for new power resources that would otherwise be required to replace the power capacity and generation that is vital to the State of California, such that it provides a sizable portion of the electricity needed to pump water throughout the SWP service area at a lower cost than potential replacement power sources.

By generating hydroelectric power, the Project helps reduce the amount of generation that is needed from fossil fuel powerplants, thereby avoiding the emission of such pollutants as hydrocarbons, nitrogen oxides, carbon monoxide, and particulate matter. Hydroelectric generation at the Project possibly avoids the construction of new powerplant facilities, thus avoiding other adverse environmental effects. Power from the Project contributes to a diversified generation mix and helps meet power needs within and beyond the immediate region. Regional power benefits from the Project include those often referred to as ancillary system benefits, including spinning reserves, nonspinning reserves, peaking capacity, regulation, and grid stability.

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19.0 OWNERSHIP AND OPERATING EXPENSES IF THE LICENSE IS TRANSFERRED

Estimates of the Project O&M, administration, capital improvements, and proposed mitigation costs are described in Exhibit D. If the license were transferred, the costs for future operations estimated would not be necessary, although some costs of operating the facilities for irrigation and consumptive water supply would remain. Other costs that would not be incurred include future capital improvements and the costs of proposed mitigation measures described in this Application for New License. However, DWR would incur the costs of replacing Project power with other sources of pumping power for SWP operations.

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20.0 ANNUAL FEES FOR FEDERAL OR INDIAN LANDS

18 CFR § 11.6(a)(3) allows a State or municipal licensee to claim total or partial exemption from the assessment of annual charges to the extent that power generated, transmitted, or distributed by the Project was used by the licensee for State or municipal purposes. Since February 22, 2008, DWR has filed an application for full exemption from payment of annual land use and administrative charges. Since that time, DWR has been a net consumer of energy and did not profit from the energy generated by the Project. Any revenue resulting from the generation of energy from the Project was used to offset the power purchases required to meet the pumping load demand of the SWP. The power purchases required to meet the pumping load demand of the SWP exceeded the energy generated and sold by all facilities operated by the DWR, including the facilities under the Project.

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21.0 REFERENCES CITED

California Department of Water Resources (DWR). 2014. Response to May 27, 2014 Letter regarding Environmental Inspection for the South SWP Hydropower, Revised Public Safety Plan. August 26, 2014. Availability: CEII.

California Energy Commission (CEC). 2015. Estimated Cost of New Renewable and Fossil Generation in California (Final Staff Report). March. Accessed June 19, 2018. http://www.energy.ca.gov/2014publications/CEC-200-2014-003/CEC-200-2014-003-SF.pdf

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