SOUTH SWP HYDROPOWER
FERC PROJECT NO. 2426-227

DRAFT LICENSE APPLICATION
VOLUME I OF IV

September 2019

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

Los Angeles
DEPARTMENT OF WATER AND POWER

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SOUTH SWP HYDROPOWER
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DRAFT LICENSE APPLICATION
INITIAL STATEMENT

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COMMONLY USED TERMS, ACRONYMS & ABBREVIATIONS

§	Section
§§	Sections
Application for New License	Application for New License for Major Project – Existing Dam
CFR	Code of Federal Regulations
DSOD	California Division of Safety of Dams
DWR	California Department of Water Resources
FERC	Federal Energy Regulatory Commission
FPA	Federal Power Act
LADWP	Los Angeles Department of Water and Power
Licensees	California Department of Water Resources and Los Angeles Department of Water and Power
Project	South SWP Hydropower, FERC Project Number 2426
SWRCB	State Water Resources Control Board

BEFORE THE FEDERAL REGULATORY COMMISSION

Application for New License for Major Project – Existing Dam

1.0 INITIAL STATEMENT PER 18 CFR § 4.51 AND ADDITIONAL INFORMATION REQUIRED BY 18 CFR § 5.18(a)

1.1 INTRODUCTION

The California Department of Water Resources (DWR) and the Los Angeles Department of Water and Power (LADWP) apply to the Federal Energy Regulatory Commission (FERC) for a new license for South SWP Hydropower, FERC Project Number 2426 (Project), as described in the attached exhibits. This Initial Statement is provided per Code of Federal Regulations (CFR) Section (§) 4.51 and additional information required under 18 CFR § 5.18(a).

1.2 LOCATION OF THE PROJECT

The location of the Project is:

State:	California
County:	Los Angeles
Township or nearby town:	City of Santa Clarita
Stream or other body of water:	Piru Creek and Castaic Creek, Tributaries to the Santa Clara River

1.3 LICENSEES' NAMES, BUSINESS ADDRESSES, AND TELEPHONE NUMBERS

DWR and LADWP (Licensees) are the applicants for the Project license. Their physical addresses, mailing addresses, and telephone numbers are as follows:

DWR's Physical Address:
California Department of Water Resources
2033 Howe Avenue, Suite 220
Sacramento, CA 95825
Tel: (916) 557-4550

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

LADWP's Physical and Mailing Addresses:
Los Angeles Department of Water and Power
Power System Regulatory Compliance and Specifications
111 North Hope Street, Room 1255
Los Angeles, CA 90012
Tel: (213) 367-2525

Below is the exact name, business address, and telephone number of each person authorized to act for DWR and for LADWP, respectively, as an agent for this application for a new license:

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

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

Physical and Mailing Address for LADWP's Agent:
Simon Zewdu, Manager of Regulatory Compliance and Specifications
Power System
Los Angeles Department of Water and Power
111 North Hope Street, Room 1255
Los Angeles, CA 90012
Tel: (213) 367-2525
Simon.Zewdu@ladwp.com

1.4 LICENSEES' 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 § 796(7) of the Federal Power Act (FPA).

The City of Los Angeles is a municipal corporation and charter city organized under the provisions of the California Constitution, California Constitution Article Sections (§§) 2, 3 and 5, Los Angeles City Charter § 101. LADWP is a municipal and a proprietary department of the City of Los Angeles that supplies water and power to Los Angeles' inhabitants, pursuant to the Los Angeles City Charter, Los Angeles Charter §§ 600(a), 601, and 670. LADWP is a vertically integrated utility that owns generation, transmission, and distribution facilities. LADWP is a municipality within the meaning of § 796(7) of the FPA.

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 FPA, are:

- California Water Code §§ 1200-1851 – Specifies requirements and procedures for appropriation and use of water, including for power purposes.

- California Water Code § 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, §§ 3855-3861 specify requirements and procedures for applications for water quality certificates required under federal law.

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

- California Constitution Article XI, §§ 9 – Authorizes LADWP to operate public utilities for the benefit of its inhabitants.

- Los Angeles City Charter §§ 672, 674, 675, and 677 – Enable LADWP to possess, manage, and control water and power assets, and provide the Board of Water and Power Commissioners with the power and duty over the construction, maintenance, and operation of water and power assets.

The steps which the Licensees have taken or plan to take to comply with each of the laws and regulations cited above are described below:

- DWR and LADWP have been in continuous compliance with, and have properly sought and obtained all consents, approvals, and other authorizations required to be obtained from time to time by DWR and LADWP pursuant to the California laws described above.

- Licensees already have the water rights necessary to operate the Project.

- Licensees will file an application for water quality certification with the SWRCB within 60 days after FERC issues a notice that the Licensees' application for a new license is ready for environmental analysis.

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

1.6 OWNERSHIP OF EXISTING PROJECT FACILITIES

The Licensees own all existing Project facilities, with the exception of Pyramid Lake Project recreation facilities, which are owned by the U.S. Department of Agriculture, Forest Service, and operated and maintained by DWR. There are no federal dams associated with the Project.

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

The Licensees have 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 Los Angeles
Board of Supervisors
B-K Kenneth Hahn Hall of Administration
500 W. Temple Street
Los Angeles, CA 90012

The Project does not use any federal water or power facilities.

The Project is not located within the boundary of any incorporated city.

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

City of Santa Clarita
City Manager
23920 Valencia Boulevard, Suite 300
Santa Clarita, CA 91355

Stevenson Ranch Home Owners Association
President, Board of Directors
24737 Pico Canyon Road
Stevenson Ranch, CA 91381-1702

Unincorporated Community of Castaic
President of Town Council
28201 Franklin Way
Santa Clarita, CA 91383

The Project is not located within the service area of any irrigation district, drainage district, or similar special purpose political subdivision, nor do any irrigation districts, drainage districts, or similar special purpose political subdivisions own, operate, maintain, or use any facilities used by the Project.

In addition to the parties noted above, the Licensees have reason to believe the following county agencies, cities, and water agencies and districts would likely be interested in, or affected by, this new license:

County of Los Angeles,
Department of Regional Planning
Director
320 West Temple Street
Los Angeles, CA 90012

County of Los Angeles,
Department of Parks and Recreation
Director
433 South Vermont Avenue
Los Angeles, CA 90020

County of Los Angeles,
Sheriff's Department
Captain
23740 Magic Mountain Parkway
Santa Clarita, CA 91355

County of Los Angeles
Fire Department
Fire Chief
1320 N. Eastern Avenue
Los Angeles, CA 90063

County of Ventura – Resource Management Agency Planning Division
Planning Director
800 South Victoria Avenue,
Location 1740
Ventura, CA 93009-1700

City of Santa Paula
City Manager
970 Ventura Street
Santa Paula, CA 93060

City of Fillmore
City Manager
250 Central Avenue
Fillmore, CA 93015

City of Lancaster
City Manager
44933 Fern Avenue
Lancaster, CA 93534

City of Los Angeles
Mayor
200 North Spring Street, Room 303
Los Angeles, CA 90012

City of Palmdale - Department of Development Services - Planning Division
Manager
38250 Sierra Highway
Palmdale, CA 93550

City of San Fernando
City Manager
117 Macneil Street
San Fernando, CA 91340

Santa Clarita Valley Water Agency
General Manager
27234 Bouquet Canyon Road
Santa Clarita, CA 91350-2173

The Metropolitan Water District
of Southern California
General Manager
P.O. Box 54153
Los Angeles, CA 90054-0153

United Water Conservation District
General Manager
106 North 8th Street
Santa Paula, CA 93060

Antelope Valley-East Kern
Water Agency
General Manager
6500 West Avenue N
Palmdale, CA 93551-2855

Local Agency Formation Commission
of Los Angeles County
Commission Clerk
80 South Lake Avenue, Suite 870
Pasadena, CA 91101

The following Native American tribes may be affected by the Project:

Fernandeño Tataviam Band of Mission
Indians
Rudy Ortega Jr., President
1019 2nd Street
San Fernando, CA 91403

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

Fernandeño Tataviam Band of Mission
Indians
Jairo F. Avila, Tribal Historic and Cultural
Preservation Officer
1019 2nd Street, Suite 1
San Fernando, CA 91340

Fernandeño Tataviam Band of Mission
Indians
Beverly Salazar Folkes, Elders Council
1931 Shady Brooks Drive
Thousand Oaks, CA 91362

Gabrielino Tongva Indians of California
Tribal Council
Robert F. Dorame, Tribal Chair/Cultural
Resources
P.O. Box 490
Bellflower, CA 90707

Fernandeño Tataviam Band of Mission
Indians
Alan Salazar, Chairperson, Elders
Council
1019 Second Street, Suite 1
San Fernando, CA 91340

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

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

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

Randy Guzman-Folkes
4676 Walnut Avenue
Simi Valley, CA 93063

Gabrielino-Tongva Tribe
Linda Candelana, Co-Chairperson
80839 Camino Santa Juliana
Indio, CA 92203

Morongo Band of Mission Indians
Robert Martin, Chairperson
12700 Pumarra Rroad
Banning, CA 92220

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

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

Tejon Indian Tribe
Octavio Escobedo, Tribal Chair
1731 Hasti Drive, #108
Bakersfield, CA 93309

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

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

Kitanemuk & Yowlumne Tejon Indians
Delia Dominguez, Chairperson
115 Radio Street
Bakersfield, CA 93305

1.9 EXHIBITS

The exhibits that are filed as part of this Application for New License for Major Project – Existing Dam (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 the Licensees' Application for New License for the South SWP Hydropower.

SOUTH SWP HYDROPOWER
FERC PROJECT NO. 2426-227

DRAFT LICENSE APPLICATION
EXHIBIT A – PROJECT DESCRIPTION

September 2019

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

Los Angeles
DEPARTMENT OF WATER AND POWER

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COMMONLY USED TERMS, ACRONYMS & ABBREVIATIONS

§	Section
¶	Paragraph
AF	acre-feet
ANF	Angeles National Forest
Application for New License	Application for a New License Major Project – Existing Dam for the South SWP Hydropower, FERC Project Number 2426
BLM	U.S. Department of the Interior, Bureau of Land Management
CEII	Critical Energy Infrastructure Information
CFR	Code of Federal Regulations
cfs	cubic feet per second
DWR	California Department of Water Resources
FERC	Federal Energy Regulatory Commission
FPA	Federal Power Act
fps	feet per second
hp	horsepower
Hz	hertz
kV	kilovolt
kVA	kilovolt-amperes
kW	kilowatt
LADWP	Los Angeles Department of Water and Power
Licensees	California Department of Water Resources and Los Angeles Department of Water and Power
LPNF	Los Padres National Forest
MWh	megawatt hours
MWh/year	megawatt hours per year
NMWSE	normal maximum water surface elevation
No.	Number
O&M	operation and maintenance
Project	South SWP Hydropower, FERC Project Number 2426

rpm	revolutions per minute
SCE	Southern California Edison
SWP	State Water Project
U.S.	United States
USFS	U.S. Department of Agriculture, Forest Service
Warne Powerplant	William E. Warne Powerplant

1.0 INTRODUCTION

The California Department of Water Resources (DWR) and the Los Angeles Department of Water and Power (LADWP) (Licensees) have prepared this Exhibit A, Project Description, as part of their Application for a New License Major Project – Existing Dam (Application for New License) from the Federal Energy Regulatory Commission (FERC) for the South SWP Hydropower, FERC Project Number (No.) 2426 (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 [FPA]), Part 5 (Application for License for Major Project – Existing Dam) (Integrated Licensing Process). In particular, this exhibit complies with the regulations in 18 CFR Section (§) 5.18(a)(5)(iii). For reference, 18 CFR § 5.18(a)(5)(iii) states:

> License for a major project—existing dam: § 4.51 of this chapter (General instructions, initial statement, Exhibits A, B, C, D, F, and G)

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 the Licensees' proposed changes to existing Project facilities and features. Section 6.0 discusses the Licensees' proposed changes to the Project boundary, including changes to total acreage of land within the 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 Licensees' 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 Administration, 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 affordable water supply, reliable regional clean energy, opportunities to integrate green energy, accessible public recreation, and environmental benefits.

The Project is located in Los Angeles County of southern California, on the West Branch of the SWP. Figure 2.0-1 shows the Project vicinity. Figure 2.0-2 shows the Project facilities, including land ownership. The existing Project boundary and the proposed Project boundary are shown in Figure 2.0-2 for reference purposes.

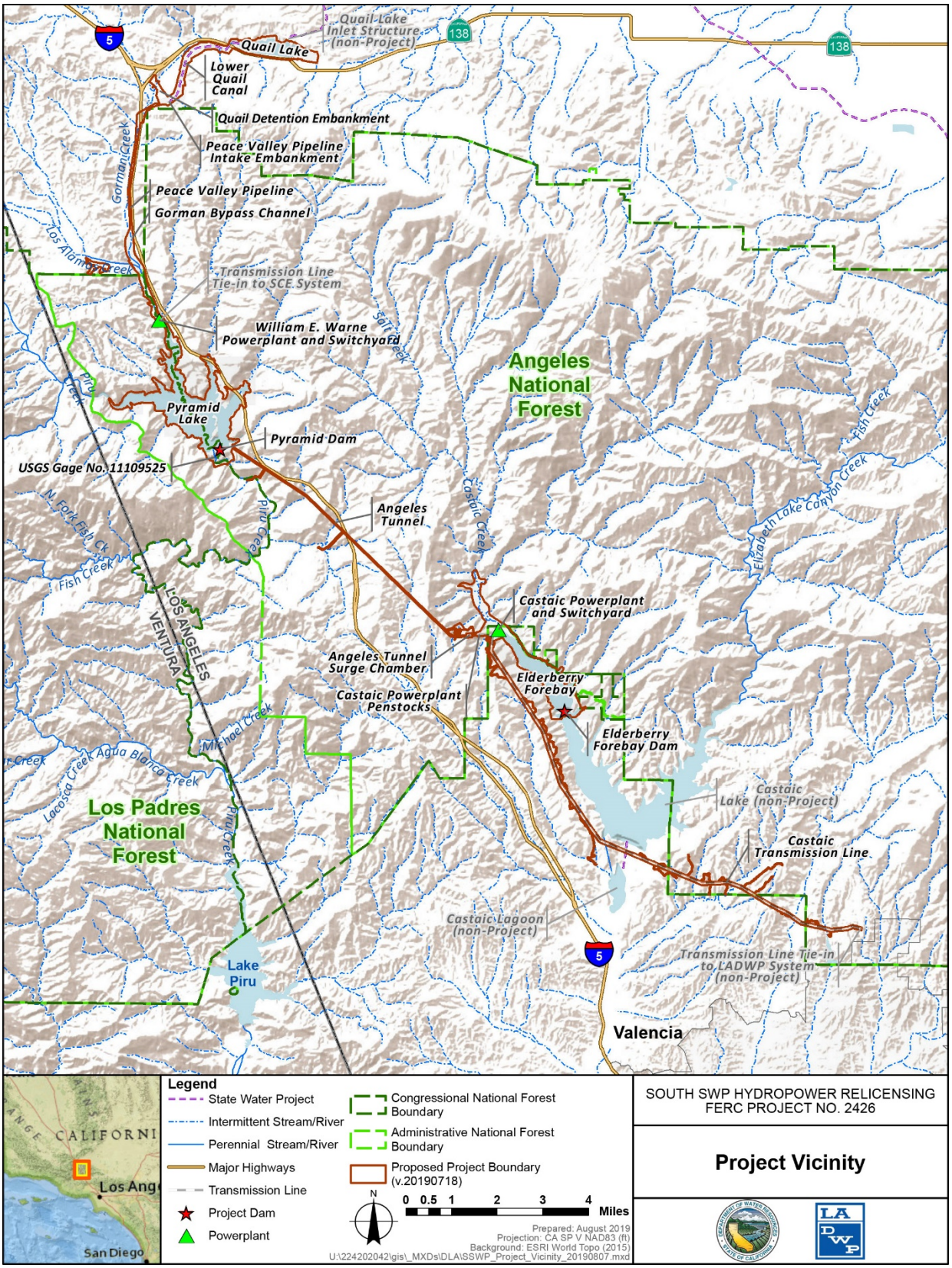

Figure 2.0-1. South SWP Hydropower Vicinity Map

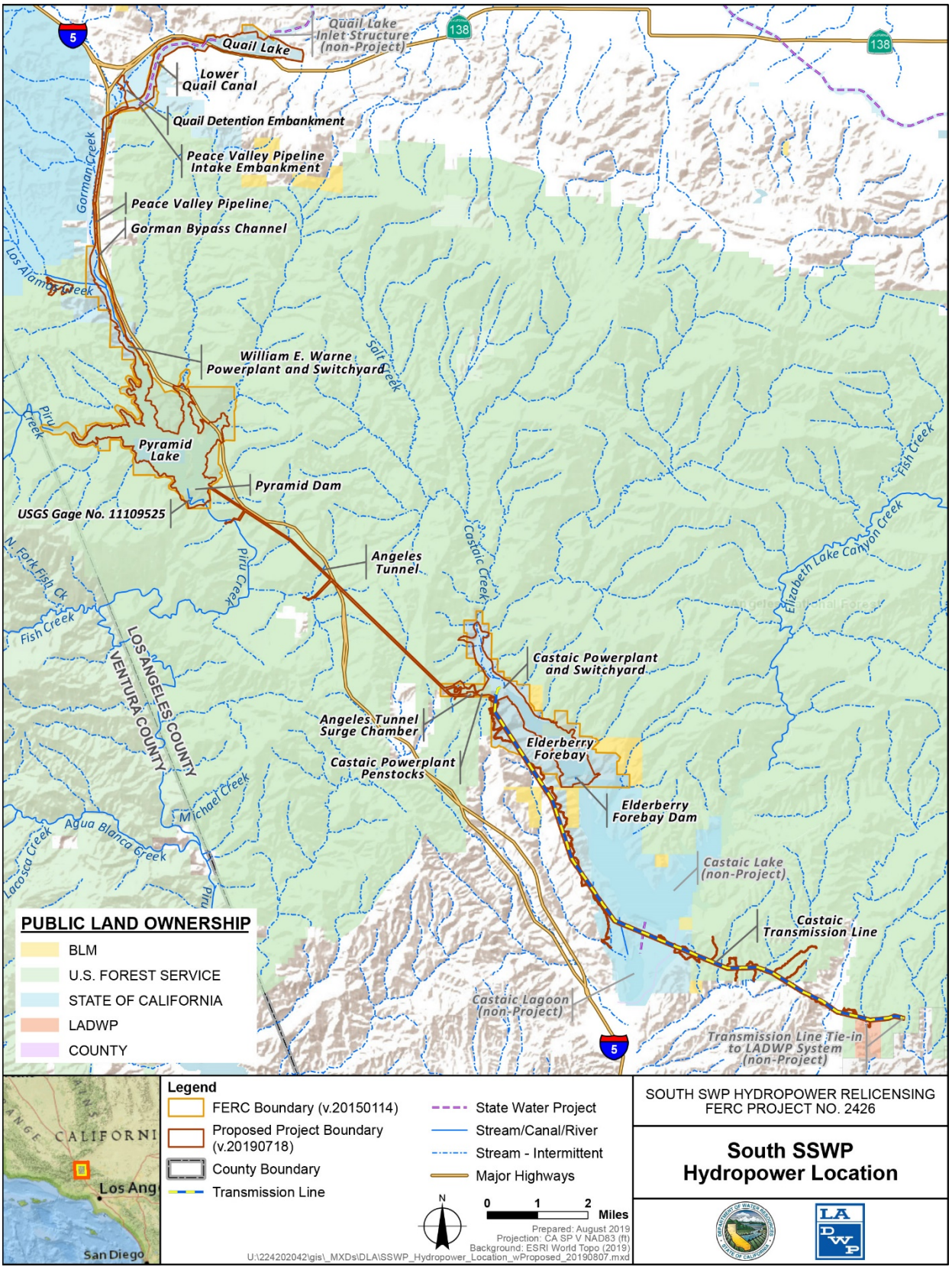

Figure 2.0-2. South SWP Hydropower Facilities

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3.0 EXISTING PROJECT FACILITIES AND FEATURES

The existing Project can store 196,937 acre-feet (AF) of SWP water and generate an average of 930 gigawatt hours of power annually, not considering pump-back energy requirements. The existing Project's FERC installed capacity, excluding one pump-starting unit at the Castaic Powerplant, is 1,349,290 kilowatts (kW) and the Project's calculated dependable capacity is 262,000 kW. Castaic Powerplant's Unit 7 is a small generation unit that is housed in a separate building and used solely to start the six main units when they are used as pumps. In addition, Unit 7 is not used for power generation. Therefore, Unit 7 has been excluded from the installed capacity. Table 3.0-1 and Table 3.0-2 summarize key information for Project powerplants and for reservoirs and impoundments, respectively.

The Project includes two developments: Warne Power and Castaic Power. The Project does not include any works maintained and operated by the U.S. Army Corps of Engineers, the U.S. Department of the Interior, Bureau of Land Management (BLM), or any other department or agency of the United States, other than the Project recreation facilities that, with two exceptions, are owned by the U.S. Department of Agriculture, Forest Service (USFS) and operated by DWR and its concessionaire. The exceptions are the Quail Lake Fishing Access Path and the Vista Del Lago Visitor Center, which are owned and operated by DWR. The Project does not include the following features located within the South SWP Hydropower proposed Project boundary or its vicinity:

- A portion of the Quail Lake Inlet Structure
- Three short segments of Interstate 5 with California Department of Transportation maintenance facilities near Liebre Creek
- A segment of Hardluck Road
- The Goodell Fire Road/Castaic Canyon Road (USFS Road 6N13) on the east side of the Elderberry Forebay
- A segment of Pyramid Lake Road
- A portion of Templin Highway west Old Ridge Route (private street)

A description of Project facilities by development is provided below.

Table 3.0-1. South SWP Hydropower Powerplants: Key Information

Powerhouse	Unit	Turbine Type	Rated Head (feet)	Hydraulic Capacity (cfs)		Generation (kW)		Average Annual Generation (MWh/year)
				Minimum	Maximum	Installed Capacity	Dependable Capacity	
Warne	1	Pelton	650	90	782	37,145	60,400	304,364
	2	Pelton	650	90	782	37,145		
	Subtotal			180	1,564	74,290		
Castaic	1	Francis	1,000	Synchronize Condensing = 0 Generating = 550	3,500	212,500	201,600	378,945
	2	Francis	1,000	Synchronize Condensing = 0 Generating = 550	3,500	212,500		
	3	Francis	1,000	Synchronize Condensing = 0 Generating = 550	3,500	212,500		
	4	Francis	1,000	Synchronize Condensing = 0 Generating = 550	3,500	212,500		
	5	Francis	1,000	Synchronize Condensing = 0 Generating = 550	3,500	212,500		378,945

Table 3.0-1. South SWP Hydropower Powerplants: Key Information (continued)

Powerhouse	Unit	Turbine Type	Rated Head (feet)	Hydraulic Capacity (cfs)		Generation (kW)		Average Annual Generation (MWh/year)
				Minimum	Maximum	Installed Capacity	Dependable Capacity	
	5	Francis	1,000	Synchronize Condensing = 0 Generating = 550	3,500	212,500		378,945
	6	Francis	1,000	Synchronize Condensing = 0 Generating = 550	3,500	212,500		
	Subtotal			Synchronize Condensing = 0 Generating = 550	21,000	1,275,000[1]		
Total	**8 Units**			(LADWP = Synchronize Condensing = 0 Generating = 3,330)	**--**	**1,349,290**	**262,000**	**683,309**
Castaic (Pump-Start Unit)	7	Pelton	950	0	752	51,750	**--**	**--**

Sources:
Turbine type, rated head, and maximum hydraulic capacity are based on a December 4, 2017, letter from LADWP to FERC. Installed capacity is based on an October 19, 2018, letter from the Licensees to FERC. Dependable capacity is the sum of the Warne Powerplant dependable capacity and the Castaic Powerplant dependable capacity, which is based on the average generation data and available hours from calendar year 2013 through 2018. DWR and LADWP's average annual generation is for the period from calendar years 2007 through 2017.
Note:
[1]When all main units of Castaic Powerplant are operating at full load generation, they are de-rated by friction losses from the water flow in the Angeles Tunnel; it is not the sum of the nameplate rating for the seven units.
Key:
cfs = cubic feet per second *kW = kilowatt* *MWh/year = megawatt hours per year*

Table 3.0-2. South SWP Hydropower Reservoirs and Impoundments: Key Information

Project Reservoir	NMWSE (feet)	Gross Storage (AF)[1]	Usable Storage (AF)[2]	Surface Area (acres)[3]	Maximum Depth (feet)[3]	Shoreline Length (miles)[3]	Drainage Area (square miles)[4]
Quail Lake	3,325.0	7,583.0	4,189.0	288.0	47.0	3	4
Pyramid Lake	2,579.0	161,375.0	20,844.0	1,269.0	265.4	21	295
Elderberry Forebay	1,540.0	31,196.0	23,096.0	496.00	132.0	7	38
Total	**--**	**200,154**	**48,129**	**2,053**	**--**	**31**	**337**

Sources:
For Quail Lake, information provided is from DWR Project Operations Center MAPPER data program dated June 4, 2019; shoreline length is from DWR Data Handbook 2009. For Pyramid Lake, information provided is from Pyramid Lake Capacity Table Report dated September 11, 2018; shoreline length is based on 3D terrain model. For Elderberry Forebay, information provided is from LADWP Elderberry Forebay Reservoir Storage Water Tables January 2018 Survey; maximum depth is LADWP's best estimate, and shoreline length is from DWR Data Handbook 2009.
Notes:
[1]Storage between specified elevation and bottom of impoundment.
[2]Storage between operating maximum and operating minimum pool.
[3]At NMWSE.
[4]At the dam; drainage areas are not additive.
Key:
AF = acre-feet
DWR = California Department of Water Resources
FERC = Federal Energy Regulatory Commission
LADWP = Los Angeles Department of Water and Power
NMWSE = normal maximum water surface elevation
The following data corresponds to the operating maximum elevation of the facility:
Quail Lake Operating Maximum Elevation – 3,324.5 feet, gross storage – 7439.0 AF, surface area – 286 acres.
Pyramid Lake: Operating Maximum Elevation – 2,578.0 feet, gross storage – 1260.0 AF, surface area – 160,110.0 acres
Elderberry Forebay: Operating Maximum Elevation – 1,540.0 feet, gross storage capacity – 31,196 AF, surface area – 496 acres

3.1 WARNE POWER DEVELOPMENT

The major existing features of the Warne Power Development include: (1) Quail Lake, Quail Lake Embankment and Quail Lake Outlet; (2) Lower Quail Canal; (3) Peace Valley Pipeline Intake, Peace Valley Pipeline Intake Embankment, and Peace Valley Pipeline; (4) Gorman Bypass Channel; (5) William E. Warne Powerplant (Warne Powerplant) and Switchyard; (6) Warne Transmission Line; (7) Primary Project Roads and Trails; (8) recreation facilities and (9) streamflow and reservoir stage gages. These facilities are described below. DWR operates all of the Warne Power Development facilities, with the exception of the Warne Transmission Line. While the Warne Transmission Line is included as part of the Warne Power Development under the existing FERC license, it is a facility owned and operated by Southern California Edison (SCE). See Section 5.3 of this Exhibit A for additional information.

3.1.1 Quail Lake, Quail Lake Embankment, and Quail Lake Outlet

Quail Lake (Figure 3.1-1) is the uppermost facility of the Project and is an off-stream impoundment located 5 miles southwest of the bifurcation of the East and West branches of the SWP, and about 23 miles northwest of the City of Santa Clarita. The impoundment consists of a sag pond formed by the San Andreas fault with a built-up embankment (part of State Highway 138) to obtain the required capacity. The Quail Lake Embankment (also known as State Highway 138, Primary Operating Road, and Secondary Operating Road Embankments) provides an operating road for Quail Lake and has a maximum height of about 15 feet above ground surface. At a normal maximum water surface elevation (NMWSE) of 3,325 feet, Quail Lake has a maximum capacity of 7,583 AF and a surface area of 288 acres.

The facility includes Quail Lake Outlet, which consists of an inlet transition, a 12-foot by 12-foot reinforced concrete double box with four 6-foot by 12-foot remotely controlled slide gates, which are normally in an open position; a service bay; and outlet transition. Stop log grooves are provided upstream of the slide gate slots and at the downstream end of the service bay. The Quail Lake Outlet structure passes beneath State Highway 138. Quail Lake, with the Lower Quail Canal described below, serve as a forebay to the Warne Powerplant.

Figure 3.1-1. Quail Lake from the West Shore Looking East

3.1.2 Lower Quail Canal

Water released from Quail Lake through the Quail Lake Outlet flows into Lower Quail Canal (Figure 3.1-2). The 2-mile-long, concrete-lined canal serves as a conveyance to the Peace Valley Pipeline Intake and acts as a surge pond during startup of the Warne Powerplant until steady state flow is established from Quail Lake. The canal has a bottom width of 24 feet, northern embankment height of approximately 50 feet, and southern embankment height of about 40 feet; a maximum flow capacity of 3,129 cubic feet per second (cfs); and normally operates between an elevation of 3,310 feet and 3,324.5 feet. The Lower Quail Canal volume is 1,150 AF at an elevation of 3,325 feet. An ungated emergency overflow weir is located on the north side of Lower Quail Canal. If an unplanned release occurs, water can be discharged over the ungated weir into a detention basin located to the west and adjacent to the southernmost section of Lower Quail Canal.

Figure 3.1-2. Lower Quail Canal Looking Downstream to Upstream

3.1.3 Peace Valley Pipeline Intake, Peace Valley Pipeline Intake Embankment, and Peace Valley Pipeline

The Peace Valley Pipeline begins at the earth and rockfill Peace Valley Pipeline Intake Embankment, and extends about 5.5 miles to the Warne Powerplant penstock. The Peace Valley Pipeline Intake is formed by the Peace Valley Pipeline Intake Embankment, which is 50 feet tall, with a crest length of 350 feet and crest elevation of 3,330 feet, located at the downstream end of the Lower Quail Canal (Figure 3.1-3).

Lower Quail Canal ends at the Peace Valley Pipeline Intake structure, around which is constructed the Peace Valley Intake Embankment. The intake structure has four 9-foot-wide by 54-foot-high entrances, which transition to two 9-foot by 12-foot conduits at the gate structure. The left conduit, which flows into the Peace Valley Pipeline, contains a 9-foot 9-inch by 13-foot 2-inch bulkhead gate, and a 12-foot by 12-foot emergency slide gate. The unused right conduit contains a bulkhead gate. A 78-inch diameter bypass (Gorman Creek Diversion) has a 78-inch butterfly valve and a 7-foot 3-inch by 9-foot 3.75-inch bulkhead gate located upstream of the valve vault.

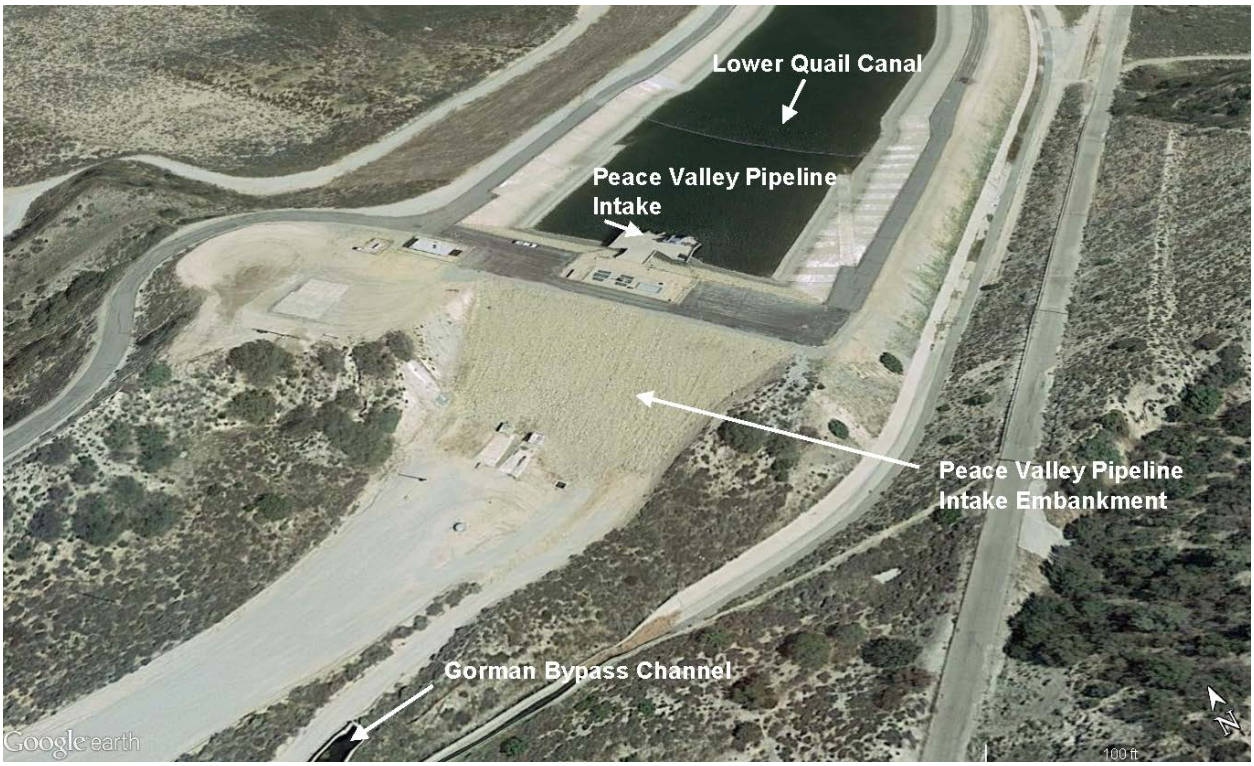

Figure 3.1-3. Peace Valley Pipeline Intake Embankment

The 5.5-mile-long Peace Valley Pipeline is a 12-foot diameter pre-stressed concrete structure entirely underground extending to the Warne Penstock. At the powerplant, the penstock bifurcates into two 8-foot diameter steel branches. The two 8-foot diameter branches have a combined maximum capacity of 1,564 cfs.

3.1.4 Gorman Bypass Channel

In the event of a Peace Valley Pipeline outage or should scheduled SWP water flow exceed the Peace Valley Pipeline's capacity, the water is routed through the 5.9-mile-long Gorman Bypass Channel (Figure 3.1-4), which connects the Lower Quail Canal to Pyramid Lake, bypassing the Peace Valley Pipeline and Warne Powerplant. The Gorman Bypass Channel was designed to convey 900 cfs. The 5-inch-thick concrete-lined channel is reinforced with wire mesh fabric. It is a trapezoidal-shaped channel with an 8-foot-wide invert, 5-foot depth, and 1.5 to 1 side slopes. The longitudinal slope of the channel ranges from approximately 1 percent to greater than 5 percent. In addition to the open channel, the Gorman Bypass Channel includes three culverts and one inverted siphon. The culverts and siphons are typically 8-foot diameter reinforced concrete pipe. Due to the slope of the channel, flow velocities are supercritical and typically range from 15 to 25 feet per second (fps). However, velocities can reach up to 32 fps in one section depending on flow volume. Local drainage, if any, drains into the Bypass Channel near Interstate 5.

About 3.2 miles downstream from the Peace Valley Pipeline Intake Embankment, the Gorman Bypass Channel and Peace Valley Pipeline alignments change. The Peace Valley Pipeline continues on the east side of Gorman Creek along Pyramid Lake Road, until it crosses Gorman Creek again to the west and connects to the Warne Powerplant. Between Interstate 5 and Orwin Road, the Gorman Bypass Channel does not receive local drainage. The Gorman Bypass Channel continues from Orwin Road to Pyramid Lake on the west side of Gorman Creek to Pyramid Lake, bypassing local drainage inflow with an encased section crossing Gorman Creek and a siphon crossing Los Alamos Creek (i.e., Cañada de Los Alamos), a tributary to Gorman Creek. The channel is generally flushed by DWR on a quarterly basis when approximately 500 cfs is released from Lower Quail Canal solely for the purpose of flushing sediment and debris that has collected in the channel since its last use.

Figure 3.1-4. Gorman Bypass Channel Looking Upstream at Hardluck Road Crossing

3.1.5 Warne Powerplant and Switchyard

Warne Powerplant (Figure 3.1-5), an aboveground, steel-reinforced, concrete powerhouse, is located at the northern (upstream) end of Pyramid Lake, at the terminus of the Peace Valley Pipeline. The powerplant has two 38,250 kW Fuji Electric Pelton-type turbines, each connected to a Toshiba generator. Each turbine has a rated head of 650 feet, runner speed of 200 revolutions per minute (rpm), rated output of 51,000

horsepower (hp), and a rated discharge of 782 cfs. The total combined flow capacity for the powerplant is 1,564 cfs (Table 3.0-1). The two, three-phase Toshiba electric generators each have a capacity of 39,100 kilovolt-amperes (kVA), at a power factor of 0.95 and a frequency of 60 hertz (Hz), producing a voltage of 13,800 volts. The powerplant has an installed capacity of 74,290 kW, with an average annual generation of 346,000 megawatt hours (MWh) and an average monthly generation of 29,000 MWh during the period of 2000 through 2014. The powerplant has a dependable capacity of 60,400 kW, which is based on the average powerplant generation during 2014, a critically dry year (Table 3.0-1).

Figure 3.1-5. Warne Powerplant and Switchyard

The Warne Switchyard (Figure 3.1-6) is located west and immediately adjacent to the Warne Powerplant and contains two generator step-up transformers (primary voltage of 230 kilovolts [kV] and secondary voltage of 13.6 kV). The single-line diagram showing the transfer of electricity from the Project to the power grid is considered Critical Energy Infrastructure Information (CEII) and is provided separately in Exhibit F of this Application for New License.

Figure 3.1-6. Warne Switchyard

3.1.6 Warne Transmission Line

The Warne Transmission Line is a 2.95-mile-long, single-circuit, 220-kV transmission line that connects the Warne Switchyard to SCE's Pardee-Pastoria transmission line (Figure 3.1-7). The line is built on steel lattice towers along a 150-foot-wide right-of-way. The line is owned and operated by SCE. SCE's transmission line segment has never been a Project work and was included in the original Project license in error – an inaccuracy that has been perpetuated through the term of the current license. See Section 5.3 of this Exhibit A for additional information.

Figure 3.1-7. Warne Transmission Line

3.1.7 Primary Project Roads and Trails

For the purpose of this Exhibit A, a Primary Project Road or Trail is 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 proposed Project boundary, and is operated and maintained exclusively by the Licensees as a Project feature. This includes roads and trails associated with Project recreation facilities, but does not include designated parking areas. For the Warne Power Development, the existing license does not include any Primary Project Roads or Trails.

3.1.8 Recreation Facilities

Recreational amenities at the Quail Lake Day Use Area include a shoreline access path, gravel parking area, and three portable restrooms. Only non-waterbody contact recreation is allowed at the Quail Lake Day Use Area. No other recreation facilities are associated with the Warne Power Development.

3.1.9 Streamflow and Reservoir Stage Gages

The Warne Power Development does not include any streamflow or reservoir stage gages for the purposes of complying with license requirements: the existing license does not include any streamflow or reservoir stage requirements associated with the Warne Power Development in the license.

3.2 CASTAIC POWER DEVELOPMENT

The major features of the Castaic Power Development include: (1) Pyramid Dam and Lake; (2) Angeles Tunnel and Surge Chamber; (3) Castaic Penstocks; (4) Castaic Powerplant and Switchyard; (5) Elderberry Forebay Dam, Forebay, and Outlet; (6) Storm Bypass Channel and Check Dams; (7) Castaic Transmission Line; (8) Primary Project Roads and Trails; and (9) Pyramid Lake recreation facilities. LADWP operates and manages all existing Project facilities downstream of the Angeles Tunnel, including the Angeles Tunnel Surge Chamber. DWR operates and manages all existing Project facilities upstream of the Angeles Tunnel Surge Chamber including the Pyramid Lake recreation facilities. The facilities include: (1) Los Alamos Campground; (2) Los Alamos Group Campground; (3) Emigrant Landing; (4) Yellow Bar, Bear Trap, Serrano, and Spanish Point Boat-in Picnic Areas; (5) two floating toilets; (6) Vaquero Day Use Area; (7) entrance stations at Emigrant Landing and Vaquero Day Use Area; (8) potable water supply to Emigrant Landing, Los Alamos Campground and Los Alamos Group Campground; (9) Vaquero Day Use Area; (10) two offices in the administrative building at Emigrant Landing; and (11) two administrative trailer pads at Los Alamos Campgrounds. These facilities are described below.

3.2.1 Pyramid Dam and Lake

Pyramid Dam (Figure 3.2-1), at the southern end of Pyramid Lake, is a 1,090-foot-long zoned earth and rockfill dam. The dam is 400 feet high, the dam crest is 35 feet wide, and the dam crest elevation is 2,606 feet. Water can be released from Pyramid Lake into Pyramid reach through two spillways and a low-level outlet. The spillways are located on the right abutment of Pyramid Dam. One is a controlled service spillway, which includes a single 40-foot-wide by 31-foot-tall radial gate, and a concrete-lined chute, which terminates in a flip bucket, used for passing normal flows through the reservoir. The gated chute was designed to discharge small floods and emergency releases up to 17,000 cfs. The second is an emergency spillway, which is an uncontrolled, unlined channel provided with a 365-foot-long overpour weir, with the crest set at an elevation of 2,606 feet. The emergency spillway is designed for discharging

very large inflows. The combined spillways have a designed capacity of 165,900 cfs with 5 feet of freeboard. The low-level outlet works utilize the stream bypass tunnel (diversion tunnel) used during construction of the dam. This stream release facility is a 15-foot diameter, concrete-lined tunnel approximately 1,350 feet long through the right abutment of the dam and is used for downstream releases to Pyramid reach. The maximum safe, designed release from the low-level outlet and the service spillway of Pyramid Dam to Pyramid reach is 18,000 cfs. Seepage through the dam is collected at the toe of the dam, where it is gaged before being released into Pyramid reach. Figure 3.2-1 shows Pyramid Dam and spillways.

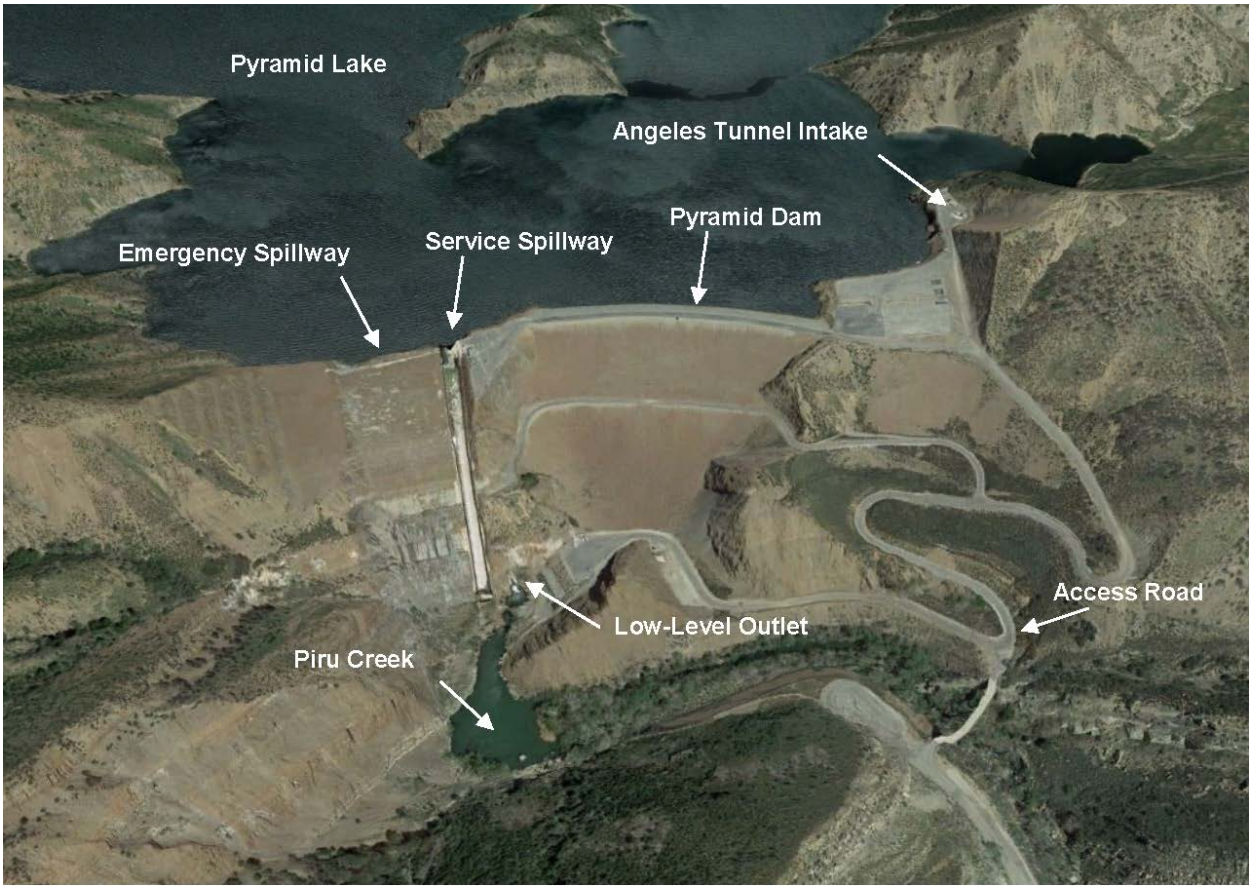

Figure 3.2-1. Pyramid Dam, Spillway, and Low-Level Outlet

Pyramid Lake serves as regulated storage for the Castaic Powerplant. At an NMWSE of 2,579 feet, Pyramid Lake has a storage capacity of 161,375 AF and a usable storage capacity of 20,944.0 AF. The reservoir has a normal maximum surface area of 1,269.0 acres, a shoreline length of 21 miles, and a maximum depth of approximately 265.4 feet (Table 3.0-2). The Licensees typically maintain Pyramid Lake 1 foot below NMWSE at a surface elevation of 2,578.0 feet, and consider 2,560.0 feet to be the minimum working elevation. Approximately 3 percent of the total inflow to Pyramid Lake is from natural inflow; the majority of the inflow to the reservoir is SWP water. Pyramid Lake receives natural inflow into the west arm of the reservoir from Pyramid reach, and a combination of natural and SWP water inflows into the north arm of the reservoir from Gorman Bypass Channel and Gorman Creek. Figure 3.2-2 shows Pyramid Lake.

Figure 3.2-2. Pyramid Lake from the Vista Del Lago Visitor Center Looking South

3.2.2 Angeles Tunnel and Surge Chamber

The Angeles Tunnel supplies Pyramid Lake water to the Castaic Penstocks that provide water to Castaic Powerplant in the generating mode and return water to the reservoir from Elderberry Forebay when the powerplant is operating in the pumping mode. Angeles Tunnel is 7.2 miles long, has a diameter of 30 feet, has a maximum flow capacity of 18,400 cfs, and includes two adits (Figure 3.2-3).

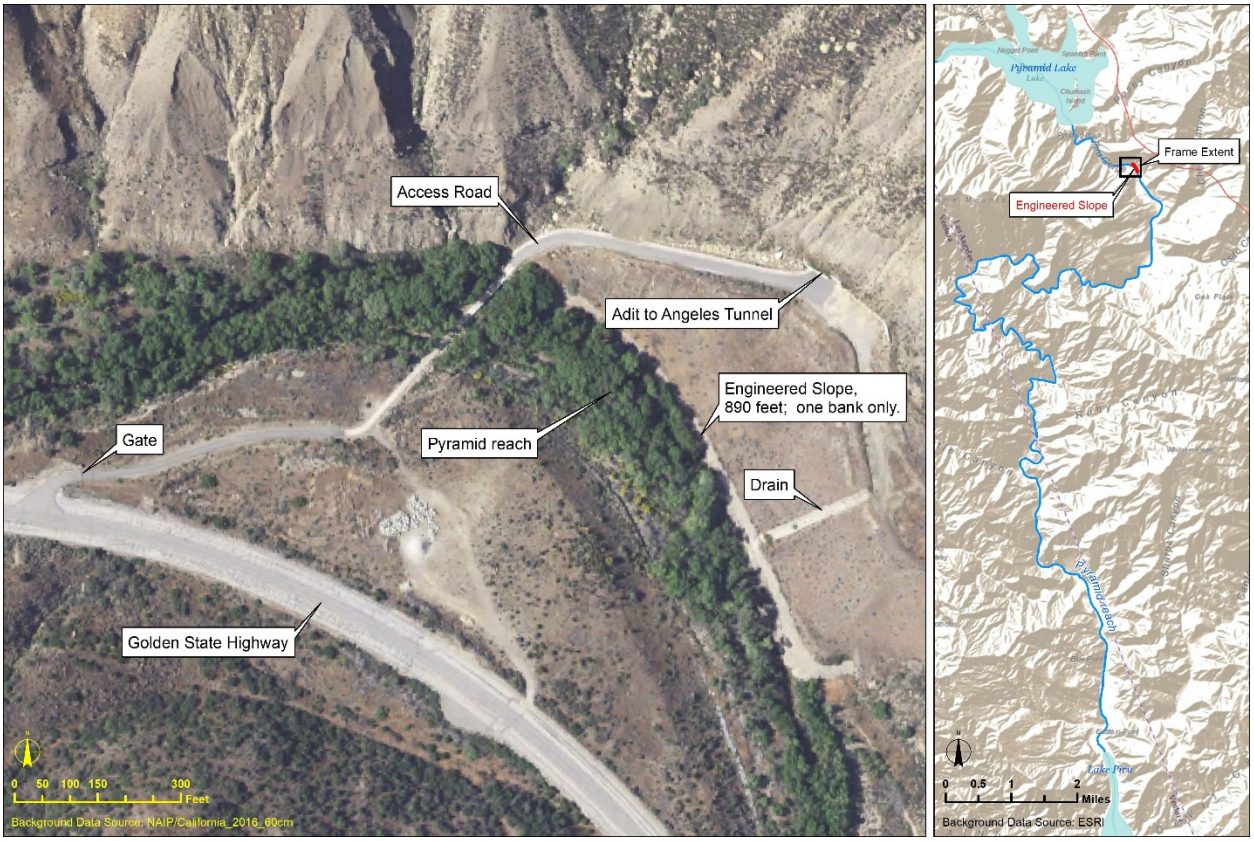

Figure 3.2-3. One of Two Adits to the Angeles Tunnel

The associated 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 above ground 158-foot portion of the surge chamber. A 108-foot-long juncture structure connects the surge chamber to the Angeles Tunnel through a 28-foot diameter riser.

3.2.3 Castaic Penstocks

The Castaic Penstock assembly for the six units in Castaic Powerplant consists of a double trifurcation immediately downstream of the south portal of Angeles Tunnel, a penstock shutoff valve on each branch of the trifurcations, and six 2,400-foot-long steel penstocks ranging in diameter from 9 feet to 13.5 feet serving the six powerhouse units (Units 1 through 6). Unit 7 in the powerplant is served by a 1,900-foot-long steel

penstock ranging in diameter from 7 feet to 9 feet, branching from a Y-connection between the tunnel portal and the main trifurcation.

3.2.4 Castaic Powerplant and Switchyard

The Castaic Powerplant, an aboveground/underground, steel-reinforced, concrete powerhouse, is located on the northern (upstream) end of Elderberry Forebay and is a pumping-generating plant with the ability to pump water back to Pyramid Lake using off-peak energy when it is economical to do so. Elderberry Forebay serves as an afterbay for Castaic Powerplant while in generating mode and as a forebay while in pumping mode. Pyramid Lake serves as the upper reservoir of the powerplant.

Castaic Powerplant has six Voith Siemens Hydro, reversible pump/turbines and motor/generators, Francis-type pump-turbine units, each with a rated head of 1,000 feet, a runner speed of 257 rpm, a rated output of 363,000 hp, and an approximated rated discharge of 3,500 cfs (the Voith Siemens three-phase generator capacity is 250,000 kVA with a power factor of 0.85, a frequency of 60 Hz and voltage of 18,000 volts). The six Francis units have a combined authorized installed generating capacity of 1,275,000 kW, with a plant capacity of 21,000 cfs (Table 3.0-1). The powerplant's average dependable capacity for calendar year 2013 through 2018 was 201.6 MW.

In addition, the Castaic Powerplant includes one Alstom Pelton-type pump starting turbine unit (Unit 7) with a rated head of 950 feet, a runner speed of 225 rpm, rated output of 69,000 hp, and an approximate rated discharge of 752 cfs (the Alstom three-phase generator capacity is 70,000 kVA, with a 0.80 power factor, frequency of 60 Hz, and voltage of 11,000 volts). Castaic Powerplant's Unit 7 is a small generation unit housed in a separate building and used solely to start the six main units when they are used as pumps. In addition, Unit 7 is not used for power generation. Therefore, Unit 7 is excluded from the installed capacity calculation.

LADWP uses Castaic Powerplant to generate and to store electricity when it determines it is the most economical and beneficial to the citizens of Los Angeles. Castaic Powerplant generates electricity during on-peak periods, typically weekday daylight hours, when extra power is needed in the Los Angeles area. In addition, water is pumped from Elderberry Forebay to Pyramid Lake to store excess power, normally to support system stability and reliability when there is excess intermittent generation. During off-peak periods, typically nights and Sundays, the powerplant pumps water from Elderberry Forebay back into Pyramid Lake for storage until it is needed for power generation. Pumping capability at normal static head ranges from 2,200 cfs, with one unit operating to about 12,000 cfs with six units pumping. This water can be routed through the turbine generators in a very short time to meet peak and/or unanticipated demands on LADWP's electric system. The pumping function at Castaic Powerplant improves the availability of water for peak power generation, which enhances the power generation benefits to the Los Angeles service territory.

The Castaic Switchyard is a fenced switchyard located adjacent to the powerhouse and uses a double-breaker, double-bus scheme. There are six three-phase step-up-transformers for Units 1 through 6 (primary voltage of 230 kV and secondary voltage of 18 kV). Unit 7 has a three-phase step-up transformer with a primary voltage of 230 kV and secondary voltage of 11 kV. The single-line diagram showing the transfer of electricity from the Project to the transmission grid is considered CEII and is provided separately in Exhibit F of this Application for New License.

3.2.5 Elderberry Forebay Dam, Forebay, and Outlet

Elderberry Forebay Dam, completed in 1974, is a 1,990-foot-long zoned earthfill dam with a height of 200 feet. The crest of the dam is 25 feet wide with an elevation of 1,550 feet.

Elderberry Forebay Dam forms Elderberry Forebay, which is located directly below Castaic Powerplant and serves as an afterbay when Castaic Powerplant is generating power and as a forebay when the plant is pumping water back to Pyramid Lake. The forebay also receives a very small amount of local inflow from Castaic Creek, which enters at the northern end of the reservoir. Of the total inflow to Elderberry Forebay, only 1 percent is from Castaic Creek. The remaining inflow to Elderberry Forebay is SWP water from Pyramid Lake conveyed via the Angeles Tunnel. At an NMWSE of 1,540 feet, Elderberry Forebay has a gross storage capacity of 31,196 AF, a usable storage capacity of 20,258 AF, a surface area of 496 acres, and a shoreline length of 7 miles (Table 3.0-2). With the stop gates (storm gates) in, the Licensees typically maintain Elderberry Forebay 2 feet below NMWSE at a surface elevation of 1,538 feet. With the gates removed, the Licensees maintain the forebay at a working elevation of 1,530 feet, a gross storage capacity of 26,418 AF, a usable capacity of 15,480 AF, and a surface area 459 acres. The Licensees consider the minimum working elevation of Elderberry Forebay to be 1,490 feet. The anti-vortex plates only allow for safe pumping at 1,480 feet.

Besides pump-back water to Pyramid Lake, water from Elderberry Forebay passes downstream into Castaic Lake, a non-Project facility via a spillway and an outlet. The spillway comprises an overflow weir built into a natural topographic saddle located approximately 300 feet east of the left abutment of the Elderberry Forebay Dam and serves as an uncontrolled emergency spillway. The crest elevation of the overflow weir is 1,540 feet, with a capacity of at least 12,000 cfs.

The Elderberry Forebay Outlet works at Elderberry Forebay Dam consist of both high-level and low-level facilities in a tower on the right bank upstream of the dam. The high-level outlet is provided with slide gates on the service spillway shaft. There are two 8-foot-wide by 9-foot-high slide gates at an elevation of 1,498 feet, and six 8-foot-wide by 12-foot-high slide gates at an elevation of 1,477 feet on the spillway shaft. The low-level outlet control works consist of a single set of two 5-foot-wide by 6-foot-high, high-pressure slide gates in tandem within a gate chamber at the base of the tower. The low-level conduit is 7 feet in diameter; has an intake, an uncontrolled box structure with a

stop-log emergency bulkhead; and an outlet connection discharging into the 21-foot diameter service spillway conduit just downstream of the tower. The combined capacity of the high- and low-outlet facilities is 17,000 cfs at a forebay NMWSE of 1,540 feet.

The high- and low-outlet facilities connect to a 21-foot diameter conduit that runs under Elderberry Forebay Dam and releases water into the non-Project Castaic Lake (i.e., is not used or useful for Project power generation), which has a capacity of 325,000 AF.

3.2.6 Storm Bypass Channel and Check Dams

The Storm Bypass Channel is on Castaic Creek above Elderberry Forebay and includes a series of three check-dam basins with a total area of approximately 21 acres. The check-dam basins capture sediment runoff during high flow events to reduce the continued accumulation of sediment near the powerplant and ensure the sustained efficiency of the Castaic Powerplant operation. The check dams have no storage capacity. Sediment and debris are removed from the check-dam basins as needed, and spoils are disposed of onsite on State-owned lands.

3.2.7 Castaic Transmission Line

The existing Project includes the 11.4-mile, 230-kV Castaic Transmission Line that delivers energy from the Castaic Switchyard to the Haskell Junction substation, and transmits energy to the Castaic Powerplant when the reversible turbine generating equipment is in the pump-back operating mode. The line consists of four circuits that are carried on two parallel double-circuit steel towers. The southern towers carry the Castaic – Northridge Line 1 and Castaic – Haskell Line 1 (previously Castaic – Sylmar Line 1) 230-kV circuits. The northern towers carry the Castaic-Haskell Line 2 (previously Castaic – Olive Line 1) 230-kV circuit, and the second position is currently vacant. LADWP filed a non-capacity license amendment with FERC on March 10, 2016, to construct the fourth circuit to the Haskell Junction substation and anticipates the fourth circuit will be in service by October 2019.

3.2.8 Primary Project Roads and Trails

For the Castaic Power Development, the existing license does not include any Primary Project Roads or Trails.

3.2.9 Recreation Facilities

Table 3.2-1 lists Project recreation facilities associated with the Castaic Power Development. All of the facilities are located at Pyramid Lake. Public access to Elderberry Forebay is not permitted due to safety concerns.

3.2.10 Streamflow and Reservoir Stage Gages

The existing license does not identify any streamflow of reservoir stage gages associated with the Castaic Power Development for the purpose of complying with

streamflow and reservoir elevation requirements associated with the Castaic Power Development in the license.

Table 3.2-1. Castaic Power Development Recreation Facilities

Recreation Area	Developed Facilities
Emigrant Landing Entrance Area	2 entrance station kiosks; boat inspection station; and approximately 24 parking spaces
Emigrant Landing Boat Launch	8-lane boat launch ramp; 2 boat docks; 1 signed accessible unisex restroom with flush toilets; 2 floating restrooms that are deployed on the lake as needed; and parking for approximately 73 vehicles with boat trailers, with 3 other standard parking spaces and 5 additional accessible parking spaces (2 van accessible)
Emigrant Landing, Picnic and Fishing Area One	22 picnic sites (2 are labeled accessible sites), with approximately 22 grills, 21 shade ramadas, and 34 standard tables; shoreline accessible fishing platform/walkways; 2 unisex restrooms with flush toilets; 1 drinking fountain; parking for approximately 90 vehicles (5 signed accessible parking spaces); 1 fish cleaning station
Emigrant Landing Swim and Picnic Area	Swim beach with lifeguard tower; approximately 31 picnic sites with 52 standard tables (8 are accessible), 34 grills, 31 shade ramadas, 5 water spigots, and 2 drinking fountains; 2 unisex restrooms with flush toilets; parking for approximately 135 vehicles (2 signed accessible parking spaces)
Emigrant Landing, Picnic and Fishing Area Two	Approximately 5 picnic sites with tables, 5 shade ramadas (1 has 3 combined shade ramadas counted as 1), 14 standard tables, 7 grills; pedestrian overlook structure connected to accessible walkway; 1 unisex restroom with flush toilets; water spigots and 3 drinking fountains; parking for approximately 80 vehicles (2 signed accessible parking spaces)
Vista Del Lago Visitor Center	18,500-square-foot visitor building with interpretive exhibits, auditorium, potable water and accessible restrooms; parking for 159 vehicles (6 signed accessible parking spaces, 2 designated for vans); 1 FERC informational sign, 2 other informational signs; approximately 11 trash receptacles, 2 telescopes, 1 overview lookout structure (1 bench, 1 information sign), and multiple standard parking lot lights
Vaquero Day Use Area	Swim beach with lifeguard tower; 2-lane non-motorized watercraft launch ramp with courtesy dock; approximately 14 picnic sites with 13 standard tables, 14 grills, and shade ramadas (1 site is accessible); 2 accessible unisex restrooms with flush toilets; approximately 5 water spigots and 1 drinking fountain, 1 fire pit, parking for approximately 146 vehicles (8 signed accessible parking spaces, with 3 designated for vans); 2 restroom buildings (unisex, accessible)
Spanish Point Boat-in Picnic Area	Boat-in or walk-in area with approximately 12 picnic sites, each with shade structure; approximately 9 grills and 1 group barbeque site with 3 grills; 1 restroom with vault toilet; 4 portable restrooms with portable sinks
Serrano Boat-in Picnic Area	6 picnic sites with tables, grills, and shade ramadas; 1 unisex restroom with vault toilets; boat dock
Bear Trap Boat-in Picnic Area	Approximately 2 picnic sites with 3 tables, 2 grills, and 3 shade ramadas; 2 unisex restrooms with vault toilets; boat dock

Table 3.2-1. Castaic Power Development Recreation Facilities (continued)

Recreation Area	Developed Facilities
Yellow Bar Boat-in Picnic Area	Approximately 10 picnic sites with tables and shade ramadas (3 sites are accessible); 2 accessible restrooms with vault toilets; accessible boat dock and paths with shoreline fishing
Los Alamos Group Campground	Approximately 3 group camping sites with maximum occupancy of 40 people and parking for typically 8 to 10 vehicles per site; each site includes a large shade ramada containing barbeque grills, fire pits, approximately 5 picnic tables, and water spigot; 1 unisex restroom with flush toilets, water spigot and outdoor sink
Los Alamos Campground	Approximately 93 campsites with typically 1 or 2 picnic tables, parking spur, and 1 fire ring per site (3 sites are labeled accessible); 4 signed accessible restrooms with flush toilets; trailer dump station; potable water spigots, 4 of which have sinks; approximately 5 shade ramadas; 2 lane recreational vehicle/trailer dump station

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4.0 EXISTING PROJECT BOUNDARY

The existing Project boundary covers 6,928.0 acres of land (Figure 2.0-2). Within the total acreage, 3,287.3 acres are federal lands, with 3,265.6 acres of National Forest System (NFS) lands managed by USFS as part of the Angeles National Forest (ANF) or Los Padres National Forest (LPNF), and 21.7 acres of land administered by BLM (Table 4.0-1).

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

Development	Federal Lands			Non-Federal Lands				Total	
	ANF (acres)	LPNF (acres)	BLM (acres)	State of California (acres)	Private (acres)	LADWP (acres)	County (acres)	Area (acres)	Percent of Total
Warne Power	1.5	11.2	0.0	1,290.3	3.4	0.0	0.6	1,307.0	18.9
Castaic Power	2,248.0	1,004.9	21.7	2,337.1	9.3	0.0	0.0	5,621.0	81.1
Subtotal	**2,249.5**	**1,016.1**	**21.7**	**3,627.4**	**12.7**	**0.0**	**0.6**	**6,928.0**	**100**
Total	**3,287.3**			**3,640.7**				**6,928.0**	**100**
Percent	**47.5 percent**			**52.5 percent**					

Source: DWR 2019
Key:
ANF = Angeles National Forest
LPNF = Los Padres National Forest
BLM = U.S. Department of the Interior, Bureau of Land Management
State of California = Lands owned by California Department of Water Resources, California Department of Parks and Recreation, and California Department of Transportation

Table 4.0-2 identifies each section, or portion thereof, within the existing FERC Project boundary that is federal land, per the Public Land Survey System.

Table 4.0-2. Federal Lands Within the Existing FERC Project Boundary

Managed by	Township	Range	Section	Acres
USFS	6N	16W	31	8.5
		17W	7	27.2
			15	4.7
			17	28.4
			18	17.3
			20	3.7
			21	31.7
			22	9.0
			23	6.6
			25	161.2
			26	6.6
			27	150.5
			28	1.2
			30	0.0
			36	8.1
		18W	1	16.6
			2	249.1
			3	82.5
			4	0.0
			12	12.8

Table 4.0-2. Federal Lands Within the Existing FERC Project Boundary (continued)

Managed by	Township	Range	Section	Acres
USFS	7N	18W	9	0.0
			16	5.3
			21	11.8
			22	50.9
			23	3.1
			26	501.4
			27	568.5
			28	122.8
			29	1.0
			32	105.5
			33	258.7
			34	332.0
			35	477.6
	8N	18W	28	1.4
BLM	6N	16W	30	0.0
			31	13.9
		17W	23	0.0
			25	0.0
			26	7.8
Total			**3,287.3**	

Source: BLM 2019
Key:
USFS = U.S. Department of Agriculture, Forest Service
BLM = U.S. Department of the Interior, Bureau of Land Management

5.0 PROPOSED CHANGES TO PROJECT FACILITIES AND FEATURES

5.1 GENERATING FACILITIES

The Licensees do not propose to add to the Project's licensed facilities any previously constructed, unlicensed water power structures or facilities, or new generating facilities, or to modify any existing generating facility.

5.2 QUAIL DETENTION EMBANKMENT

The Licensees propose to add to the Warne Power Development licensed facilities the existing Quail Detention Embankment (Figure 5.2-1), which lies along the northwest portion of the Lower Quail Canal between Interstate 5 and the Peace Valley Pipeline Intake Embankment. The Quail Detention Embankment serves as a flood-management structure to attenuate waters from Quail Lake or the Lower Quail Canal, and to protect Interstate 5 if an unplanned release of water occurs from these facilities.

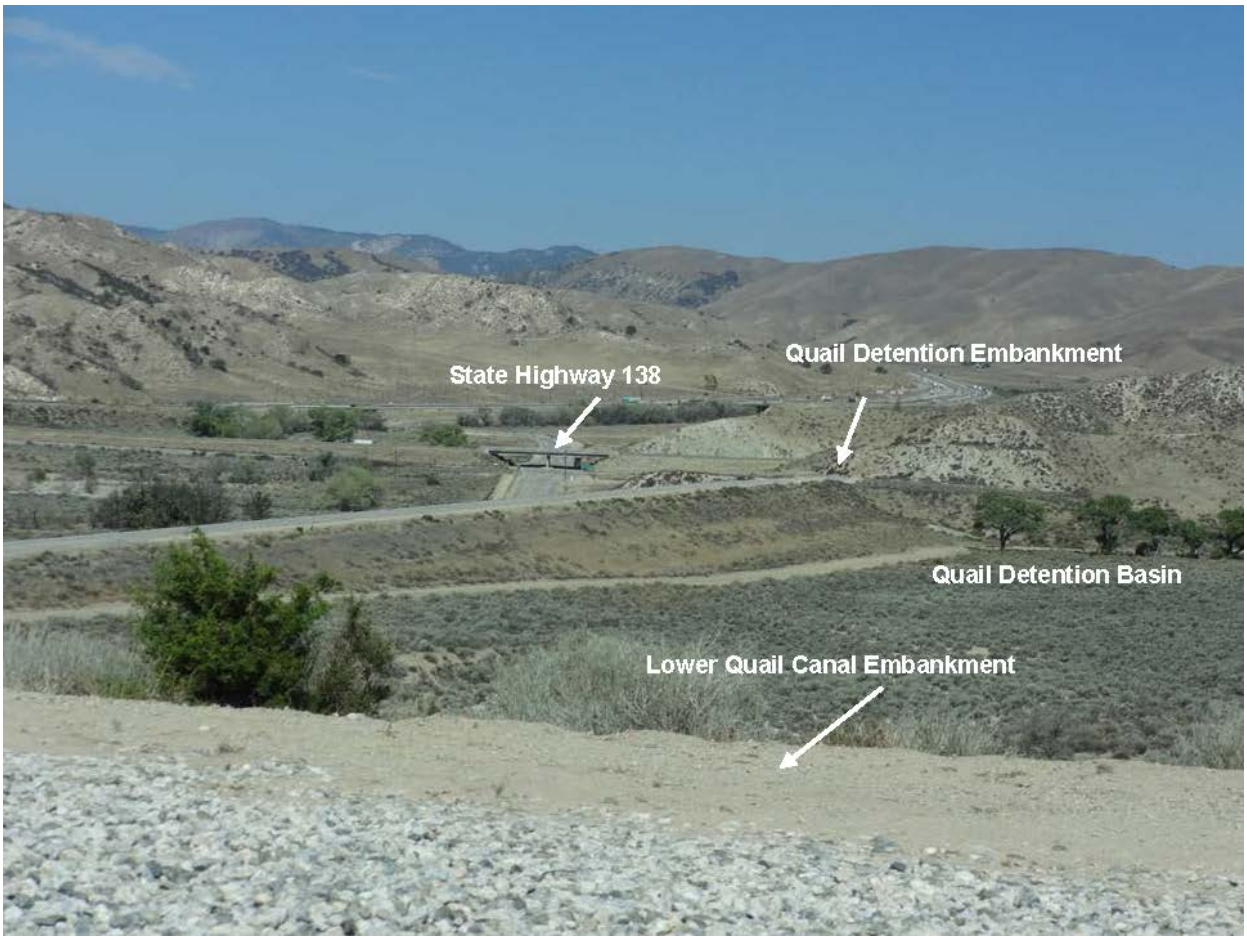

Figure 5.2-1. Quail Detention Embankment, Looking Northwest from the Lower Quail Canal Embankment

The Quail Detention Embankment has a crest length of 1,840 feet, a maximum height of 50 feet above original ground surface. The nominal crest elevation is 3,255 feet and the crest width is 40 feet. The detention basin behind the Quail Detention Embankment has a volume of 1,100 AF at an elevation of 3,250 feet. Excavation into bedrock on the right abutment of the Quail Detention Embankment created a 300-foot-wide unlined, uncontrolled spillway with a capacity of at least 5,100 cfs. The invert elevation of the spillway is 3,250 feet, 5 feet below the crest elevation of the embankment. The Quail Detention Embankment Outlet underneath the embankment and near the right abutment is an uncontrolled 12-foot by 12-foot reinforced concrete double-box culvert and has a maximum capacity of 10,000 cfs. In the event of an uncontrolled release of water from Lower Quail Canal or Quail Lake, release from the Quail Detention Embankment Outlet passes under the Gorman Creek Bridge of Interstate 5 and flows down Gorman Creek to Pyramid Lake.

5.3 WARNE TRANSMISSION LINE

The FPA defines "project" to include "the primary line or lines transmitting power therefrom to the point of junction with the distribution system or with the interconnected primary transmission system."[1] FERC has further refined the definition of a "primary" line to include lines used solely to transmit power from the licensed project to load center. Transmission lines that serve distribution or other electrical system purposes are not "primary" lines and thus are not within FERC's licensing jurisdiction. Under this test, the line leading from the project ceases to be a "primary" line at the point it is no longer used solely to transmit power from the project to the interconnected grid, i.e., at the point of junction with the interconnected grid.

The 1978 order issuing the Project license described "3 miles of 220-KV transmission line" as a project work in connection with the Pyramid Power Drop.[2] However, the Project boundary has never been drawn to include the 3-mile-long transmission line segment. Inclusion of the transmission line in the Project description has been carried forward in several license amendments, most recently in FERC's order approving deletion of transmission line segments built, owned, and operated by SCE associated with the Devil Canyon Power Drop.[3] Similar to the transmission line segments associated with the Devil Canyon Power Drop that were recently removed from the Project license, the 3-mile-long transmission line segment associated with the Warne Power Drop was constructed by SCE and has always been owned, operated, and maintained by SCE.

The SCE 3-mile-long, 220-kV transmission line segment[4] has never been a Project work and was included in the original Project description by mistake, an error that has been perpetuated throughout the term of the current license. As illustrated in the single

[1] 16 United States Code § 796 (11).
[2] *Dept. of Water Res. Of Cal*., 2 FERC Paragraph (¶) 61,258 at p. 61,605 (1978).
[3] *Dept. of Water Res. Of Cal*., 164 FERC ¶ 62,127 (2018) (order approving revised Exhibit A), 159 FERC ¶ 62,018 (2017) (order amending license).
[4] The line segment is actually 2.95 miles.

line diagram in Exhibit F of this DLA, power from the two Warne Powerplant generators is conveyed through the powerplant in 13.8 kV bus ducts out to two 230kV-13.6/6.8kV step-up/step-down transformers in the Warne Switchyard adjacent to the powerplant. Power continues through the switchgear up to a 230 kV bus with metering and relay equipment. The SCE 220-kV line connects to the bus at the take-off tower, located within the switchyard.[5] This is the point of junction between the Project and SCE's system.

The SCE line leaving the switchyard connects to the Pardee-Pastoria line segment at an SCE owned transmission tower three miles east of the Warne Powerplant, and it is electrically indistinguishable from SCE's Pardee-Pastoria-Warne Transmission Line, which is part of the bulk electric system and controlled by the California Independent System Operator. The Pardee-Pastoria-Warne 220 kV Transmission Line is used to serve other SCE customers through the Pardee Substation to the Pastoria Substation path by a General Electric Positive Sequence Load Flow power flow simulation. The 220-kV Pardee-Pastoria-Warne line connects with SCE's line at its Pardee Substation. The 3-mile-long Warne segment of the Pardee-Pastoria-Warne line cannot be electrically isolated from the other portions of the Pardee-Pastoria-Warne Transmission Line. The only way to de-energize the Warne Transmission Line is open the circuit breakers protecting the Pardee-Pastoria-Warne 220 kV Transmission Line at Pardee Substation, Pastoria Substation, and Warne Switchyard; however, this would also interrupt the path of power flow serving other SCE customers. Although the Warne switchyard and facility can be de-energized by opening the main 220 kV circuit breaker at the Warne switchyard, the Pardee-Pastoria-Warne 220 kV Transmission Line would remain energized; thus, SCE treats the entire system as a single transmission line. The 3-mile-long 220-kV Warne transmission line segment is also subject to North American Electric Reliability Corporation and Western Electricity Coordinating Council reliability standards, as part of the Pardee-Pastoria-Warne line system.

The 3-mile segment of the Pardee-Pastoria-Warne Transmission Line, which is currently identified in the Project license, is, in fact, part of the interconnected grid, and is not a Project primary line subject to FERC licensing jurisdiction under the FPA. The point of junction between the Project and the interconnected grid is in the Warne Switchyard. Therefore, the Licensees have not included any part of the SCE transmission line in the Project description or proposed Project boundary for the new license.

5.4 PRIMARY PROJECT ROADS AND TRAILS

Table 5.4-1 describes 99 road segments that the Licensees propose to add to the Project's licensed facilities as Primary Project Roads, as defined in Section 3.1.7. The Licensees do not propose to add to the Project any trails as Primary Project Trails. Each of the roads is within the Licensees' proposed Project boundary.

[5] DWR and SCE have an Interconnection Facilities Agreement by which SCE provides transmission and distribution service to DWR.

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Table 5.4-1. List of Primary Project Roads the Licensees Propose to Add to the Project

Designation in Exhibit A	Begins	Ends	Land Ownership	Gated or Otherwise Restricted to Public	Length (miles)	Project Use
Castaic Penstock Road	Gate next to Templin Highway	Top of Castaic Penstocks	USFS	yes	0.8	South Portal Access
Angeles Tunnel Surge Tank Road	Templin Highway	Angeles Tunnel Surge Tank	USFS	yes	0.1	Angeles Tunnel Surge Tank Access
Angeles Tunnel South Adit Road	Castaic Penstock Road	Angeles Tunnel South Adit	USFS	yes	0.3	Angeles Tunnel South Adit Access
Elderberry Forebay Dam Access	Gate/FERC Boundary	Bottom of spillway	State of California	yes	0.1	Elderberry Forebay Dam Access
Elderberry Forebay Dam Spillway Access	West end of Elderberry Forebay Dam	Bottom of Spillway	State of California	yes	0.4	Elderberry Forebay Dam Access
Los Angeles Water and Power Road	Gate on Los Angeles Water and Power Road	Elderberry Forebay Dam	State of California	yes	2.9	Dam Patrol Road
LADWP Tower 1-4, 1-5, 2-1 Access	USFS Boundary	LADWP Tower 2-1	State of California	yes	1.5	LADWP Tower 1-4, 1-5, 2-1 Access
Water Tank Access	LADWP Tower 1-2 Access Road	Water Tank	State of California	yes	0.1	LADWP Tower 1-2 Access
Vista Ridge Fire Road	Cutler Canyon Fire Road/Vista Ridge Connector	Ridge Route Road	State of California, BLM, LADWP, Private	yes	4.4	Castaic-Haskell TL Access
LADWP Tower 2-2, 2-3 Access	Vista Ridge Fire Road	LADWP Tower 2-3	State of California	yes	0.3	LADWP Tower 2-2, 2-3 Access
LADWP Tower 3-3 Access	Cutler Canyon Fire Road	LADWP Tower 3-3	State of California	yes	0.1	LADWP Tower 3-3 Access
LADWP Tower 3-4 Access	Cutler Canyon Fire Road	LADWP Tower 3-4	State of California	yes	0.0	LADWP Tower 3-4 Access
LADWP Tower 4-2 Access	Cutler Canyon Fire Road	LADWP Tower 4-2	State of California, LADWP, Private	yes	0.2	LADWP Tower 4-2 Access
LADWP Tower 4-3 Access	Cutler Canyon Fire Road	LADWP Tower 4-3	LADWP, Private	yes	0.1	LADWP Tower 4-3 Access
LADWP Tower 5-1 Access	Cutler Canyon Fire Road	LADWP Tower 5-1	LADWP	yes	0.1	LADWP Tower 5-1 Access
LADWP Tower 5-2, 5-3 Access	Cutler Canyon Fire Road	LADWP Tower 5-3	State of California, LADWP	yes	0.3	LADWP Tower 5-3 Access
LADWP Tower 5-2 Access	LADWP Tower 5-3 Access Road	LADWP Tower 5-2	State of California, LADWP	yes	0.1	LADWP Tower 5-2 Access
LADWP Tower 7-2 Access	Castaic Dam parking area	LADWP Tower 7-2	State of California	yes	0.3	LADWP Tower 7-2 Access
LADWP Tower 7-3 Access	Castaic Dam parking area	LADWP Tower 7-3	State of California	yes	0.1	LADWP Tower 7-3 Access
LADWP Tower 7-4, 7-5, 8-1 Access	Lake Hughes Road	LADWP Tower 7-5	State of California	no	0.6	LADWP Tower Access
LADWP Tower 8-1 Access	USFS Boundary	LADWP Tower 8-1	USFS	no	0.5	LADWP Tower 8-1 Access
LADWP Tower 8-2 Access	Lake Hughes Road	LADWP Tower 8-2	USFS	yes	0.6	LADWP Tower 8-2 Access
LADWP Tower 9-1,2 Access (Charlie Canyon Road)	End of Pavement	LADWP Tower 9-1	USFS	yes	0.7	LADWP Tower 9-1,2 Access
LADWP Tower 10-2 Access	unnamed road	LADWP Tower 10-2	LADWP, Private	yes	0.1	LADWP Tower 10-2 Access
LADWP Tower 10-3 Access	unnamed road	LADWP Tower 10-3	LADWP	yes	0.1	LADWP Tower 10-3 Access
LADWP Tower 11-2 Access	LADWP Tower 11-1, 2, 3 Access	LADWP Tower 11-2	USFS	yes	0.2	LADWP Tower 11-2 Access

Table 5.4-1. List of Primary Project Roads the Licensees Propose to Add to the Project (continued)

Designation in Exhibit A	Begins	Ends	Land Ownership	Gated or Otherwise Restricted to Public	Length (miles)	Project Use
LADWP Tower 11-4 Access	unnamed road junction with Dry Canyon Road (Forest Service Road 5N29)	LADWP Tower 11-4	USFS, LADWP	yes	0.2	LADWP Tower 11-4 Access
LADWP Tower 9-3 Access	San Francisquito Motorway	LADWP Tower 9-3	USFS	yes	1.2	LADWP Tower 9-3 Access
LADWP Tower 9-4 Access	San Francisquito Motorway	LADWP Tower 9-4	USFS	yes	0.7	LADWP Tower 9-4 Access
Angeles Tunnel Intake Gate Road	Pyramid Dam Crest Road	Angeles Tunnel Intake Gate	USFS	yes	0.2	Angeles Tunnel Intake Gate Access
Pyramid Dam Toe Road	Pyramid Dam Crest Road	Pyramid Dam Toe	USFS	yes	0.4	Pyramid Dam Toe Access
Osito Adit Road (Adit 2 Access)	Highway 99 Segment B	Adit 2	USFS	yes	0.3	Adit 2 Access
Adit 1 Access	Highway 99 Segment B	Adit 1	USFS	yes	0.3	Adit 1 Access
Pyramid Dam Adit Road	Pyramid Dam Crest Road	Pyramid Dam Adit	USFS	yes	0.4	Pyramid Dam Adit Access
Pyramid Dam Adit Road Spur	Pyramid Dam Adit Road	Pyramid Dam Adit	USFS	yes	0.1	Pyramid Dam Adit Road
Pyramid Dam Crest Road	End of Highway 99 Segment C	West end of Pyramid Dam crest	USFS	yes	1.0	Pyramid Dam Crest Access
Quail Detention Embankment Road	Gate on north side of Quail Lake Road	Quail Dam Road	State of California, Los Angeles County	yes	0.7	Quail Detention Embankment Access
Warne Powerplant Access	Pyramid Lake Road (Emigrant Landing Access)	Warne Powerplant	State of California	yes	0.3	Warne Powerplant Access
Emigrant Landing Access	Emigrant Landing Entrance Area	Emigrant Landing Boat Ramp	State of California, USFS	no	0.6	Emigrant Landing Access
Pyramid Lake Road (Emigrant Landing Access)	North parking lot	South parking lot	USFS	yes	0.3	Emigrant Landing Access
Emigrant Landing Parking Loop 1	Emigrant Landing Access	Emigrant Landing Access	USFS	yes	0.2	Emigrant Landing Parking Loop
Emigrant Landing Parking Loop 2	Emigrant Landing Access	Emigrant Landing Access	USFS	yes	0.1	Emigrant Landing Parking Loop
Emigrant Landing Parking Loop 3	Pyramid Lake Road (Emigrant Landing Access)	Pyramid Lake Road (Emigrant Landing Access)	USFS	yes	0.2	Emigrant Landing Parking Loop
Emigrant Landing Parking Loop 4	Pyramid Lake Road (Emigrant Landing Access)	Pyramid Lake Road (Emigrant Landing Access)	USFS	yes	0.1	Emigrant Landing Parking Loop
Vista Del Lago Road	Interstate 5 off-ramp	Vista del Lago Visitor Center	USFS	yes	0.4	Vista del Lago Visitor Center Access
Vaqueros Parking Loop	Vaquero Road	Vaquero Road	USFS	yes	0.2	Vaqueros Parking Access
Spanish Point Road	Vista del Lago Visitor Center	Start of dirt road to Spanish Point	USFS	yes	0.2	Spanish Point Road
Vista del Lago Parking Loop	Vista del Lago Road	Vista del Lago Road	USFS	yes	0.3	Vista del Lago Parking Access
Quail Lake Road	Gate on north side of Highway 138	Quail Lake at Upper Canal	State of California	yes	1.5	Quail Lake Access
Lower Quail Canal North Road	Lower Quail Canal Bypass	Gate at Highway 138	State of California	yes	2.1	Lower Quail Canal North Access
Quail Dam Road	FERC boundary west of Lower Quail Canal Bypass	Lower Quail Canal Bypass	State of California	yes	0.3	Quail Dam Access

Table 5.4-1. List of Primary Project Roads the Licensees Propose to Add to the Project (continued)

Designation in Exhibit A	Begins	Ends	Land Ownership	Gated or Otherwise Restricted to Public	Length (miles)	Project Use
Lower Quail Canal South Road	Lower Quail Canal Bypass	Gate at Highway 138	State of California	yes	2.2	Lower Quail Canal Access
Lower Quail Canal North Western Toe Road	South extension of Lower Quail Canal North Access	North extension of Lower Quail Canal North Access	State of California	yes	1.0	Lower Quail Canal North Western Toe Access
Lower Quail Canal South Western Toe Road	Lower Quail Canal South Western Toe Road	Quail Detention Embankment Toe	State of California	yes	0.1	Lower Quail Canal South Western Toe Access
Lower Quail Canal South Western Toe Road	Lower Quail Canal Bypass	Lower Quail Canal North Access Road	State of California	yes	0.6	Lower Quail Canal South Western Toe Access
Quail Detention Embankment Toe Road	Gate at east end of Quail Lake Road	East end of Quail Lake Embankment	State of California	yes	0.5	Quail Detention Embankment Toe Access
Bypass Channel Road	Lower Quail Canal Bypass	500 feet east of Interstate 5	State of California	yes	0.5	Bypass Channel Access
Gorman Creek Bypass Channel Access Road Segment A West	200 feet south of Gorman Creek Interstate 5 underpass	Gorman Creek Bypass Channel Access Road Segment B	State of California	yes	2.4	Gorman Bypass Channel Access
Gorman Creek Bypass Channel Access Road Segment A East	200 feet south of Gorman Creek Interstate 5 underpass	Gorman Creek Bypass Channel Access Road Segment B	State of California	yes	2.3	Gorman Bypass Channel Access
Gorman Creek Bypass Channel Access Road Segment B	Gorman Creek Bypass Channel Access Road Segment A	Los Alamos Creek - North Siphon Access	State of California	yes	0.7	Gorman Bypass Channel Access
Quail Lake Road	Gate at Quail Lake Recreation Area	Quail Lake at Upper Canal	State of California	no	2.0	Quail Lake Access
Edison Spring Road	500 feet east of Interstate 5	East side of Interstate 5 underpass	State of California, USFS, Private	yes	0.4	Edison Spring Road
Los Alamos Creek - North Siphon Access	Gorman Creek Bypass Channel Access Road	North end of siphon	State of California	yes	0.1	Gorman Bypass Channel Access
Los Alamos Creek - South	Hardluck Road (Los Alamos Road)	South end of siphon	State of California	yes	0.1	Gorman Bypass Channel Access
Los Alamos Campground Group Standard Loop	Hardluck Road (Los Alamos Road)	Hardluck Road (Los Alamos Road)	USFS	yes	0.2	Los Alamos Campground Access
Los Alamos Campground Loop 3	Los Alamos Campground Entrance	Los Alamos Campground Entrance	USFS	yes	0.3	Los Alamos Campground Access
Los Alamos Campground Loop 4	Los Alamos Campground Loop 3	Los Alamos Campground Loop 3	USFS	yes	0.5	Los Alamos Campground Access
Los Alamos Campground Loop 2	Los Alamos Campground Entrance	Los Alamos Campground Entrance	USFS	yes	0.4	Los Alamos Campground Access
Los Alamos Campground Loop 1	Los Alamos Campground Entrance	Los Alamos Campground Entrance	USFS	yes	0.3	Los Alamos Campground Access
Los Alamos Campground Entrance	Hardluck Road (Los Alamos Road)	Camping loop junctions	USFS	yes	0.1	Los Alamos Campground Entrance
Los Alamos Campground Dump Station Access	Hardluck Road (Los Alamos Road)	Hardluck Road (Los Alamos Road)	USFS	yes	0.1	Los Alamos Campground Dump Station Access
Los Alamos Campground Dump Station Access	Hardluck Road (Los Alamos Road)	Hardluck Road (Los Alamos Road)	USFS	yes	0.1	Los Alamos Campground Dump Station Access
Gorman Creek Channel Liner W. Road	Warne Powerplant Access Road	Hardluck Road (Los Alamos Road)	State of California	yes	0.3	Gorman Channel Liner Access
Warne Powerplant Access	Warne Powerplant	End of road along waterway	State of California	yes	0.1	Warne Powerplant Access

Table 5.4-1. List of Primary Project Roads the Licensees Propose to Add to the Project (continued)

Designation in Exhibit A	Begins	Ends	Land Ownership	Gated or Otherwise Restricted to Public	Length (miles)	Project Use
Gorman Creek Bypass Channel - West	Hardluck Road (Los Alamos Road)	Gorman Creek Bypass Channel	State of California	yes	0.2	Gorman Bypass Channel Access – West
Gorman Creek E. Road	Pyramid Lake Road	Pyramid Lake Emigrant Landing	State of California, USFS	yes	0.6	Gorman Creek E. Access
Vaquero Road	Vista del Lago Visitor Center	Boat Ramp and Beach	USFS	yes	0.2	Boat Ramp and Beach Access
Spanish Point Road	End of pavement	Spanish Point Day Use Area	USFS	yes	0.2	Spanish Point Road
LADWP Tower 2-4 Access	Cutler Canyon Fire Road	LADWP Tower 2-4	LADWP, Private	yes	0.1	LADWP Tower 2-4 Access
LADWP Tower 6-2 Access	7 Acres Parking Lot Access Road	LADWP Tower 6-2	State of California	no	0.0	LADWP Tower 6-2 Access
LADWP Tower 7-4 Access	LADWP Tower 7-4, 7-5, 8-1 Access Road	LADWP Tower 7-4	State of California	no	0.1	LADWP Tower 7-4 Access
LADWP Tower 8-3,4 Access (Charlie Canyon Road)	USFS Boundary	LADWP Tower 8-3	USFS	yes	0.9	LADWP Tower 8-3, 4 Access
LADWP Tower 11-1, 2, 3 Access	USFS Boundary	LADWP Tower 11-3	USFS	yes	0.5	LADWP Tower 11-1, 2, 3 Access
Los Angeles Water and Power Road Dam Crest	West end of Elderberry Forebay Dam	East end of Elderberry Forebay Dam	State of California	yes	0.4	Elderberry Forebay Dam Access
Los Angeles Water and Power Road	Templin Highway	USFS Boundary	USFS	no	0.2	Castaic Power Entrance Road
LADWP Tower 1-2, 3, 4, 5, 2-1 Access	Los Angeles Water and Power Road	USFS Boundary	State of California	yes	0.4	LADWP Tower 1-2, 3, 4, 5, 2-1 Access
LADWP Tower 1-3, 4, 5, 2-1 Access	USFS Boundary	USFS Boundary	USFS	yes	0.1	LADWP Tower 1-3, 4, 5, 2-1 Access
LADWP Tower 1-3, 4, 5, 2-1 Access	USFS Boundary	USFS Boundary	State of California	yes	0.4	LADWP Tower 1-3, 4, 5, 2-1 Access
LADWP Tower 1-4, 5 2-1 Access	USFS Boundary	USFS Boundary	USFS	yes	0.2	LADWP Tower 1-4, 5 2-1 Access
LADWP Tower 8-1 Access	LADWP Tower 7-4, 7-5, 8-1 Access Road	USFS Boundary	State of California, Private	no	0.3	LADWP Tower 8-1 Access
Los Angeles Water and Power Road	USFS Boundary	Security gate at LADWP Powerplant	State of California, USFS	no	1.0	Castaic Power Entrance Road
Cutler Canyon Fire Road	West Ramp Road	Cutler Canyon/Vista Ridge Connector	State of California	yes	1.6	Castaic-Haskell TL Access
Cutler Canyon/Vista Ridge Connector	Cutler Ridge Fire Road	Vista Ridge Fire Road	State of California, LADWP, Private	yes	0.3	Castaic-Haskell TL Access
LADWP Tower 11-1 Access (Private)	FERC Boundary	LADWP Tower 11-1	LADWP	yes	0.1	LADWP Tower 11-1 Access
LADWP Tower 10-2, 10-3 Access	Gate on unnamed road off of San Francisquito Canyon Road	Tower 10-1	LADWP	yes	0.7	LADWP Tower Access
LADWP Tower 5-3 Access	Vista Ridge Fire Road	LADWP Tower 5-3	State of California, LADWP	yes	0.3	LADWP Tower 5-3 Access
LADWP Tower 5-4 Access	Pine Ridge Fire Road	LADWP Tower 5-4	State of California	yes	0.2	LADWP Tower 5-4 Access
Vista Ridge Fire Road	Cutler Canyon/Vista Ridge Connector	Ridge Route Road	State of California	yes	4.4	Castaic-Haskell TL Access

Table 5.4-1. List of Primary Project Roads the Licensees Propose to Add to the Project (continued)

Designation in Exhibit A	Begins	Ends	Land Ownership	Gated or Otherwise Restricted to Public	Length (miles)	Project Use
Charlie Canyon Road	USFS Boundary	End of Pavement	USFS	yes	0.1	Charlie Canyon Road
Total	**99 Segments**				**55.4**	**--**

Source: DWR 2019
Key:
FERC = Federal Energy Regulatory Commission
LADWP = Los Angeles Department of Water and Power
TL = transmission line
USFS = U.S. Department of Agriculture, Forest Service

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5.5 RECREATION FACILITIES

The Licensees do not propose to add any additional recreation facilities to the Project's licensed facilities.

5.6 GAGES

The Licensees propose to add to the Castaic Power Development licensed facilities one existing streamflow gage for the purpose of documenting compliance with conditions in the new license. The gage is described in Table 5.6-1. The Licensees do not propose to add to the Project any other streamflow gages or reservoir stage gages, since the Licensees do not propose any other measures related to streamflow or reservoir stage.

Table 5.6-1. Existing Gage Licensees Propose 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
11109525	Piru Creek Below Pyramid Lake near Gorman, CA	Record releases from Pyramid Lake into Pyramid reach

Key:
CA = California
No. = number
USGS = United States Geological Survey

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6.0 PROPOSED CHANGES TO THE PROJECT BOUNDARY

The Licensees propose 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 Project O&M, and proposed removal of lands from the Project boundary that do not have Project facilities and are not used or necessary for Project O&M. 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 6,928.0 acres to 4,563.8 acres. This change would reduce the 3,287.3 acres of federal land (47.5 percent of the total area within the existing Project boundary) to 2,007.0 acres of federal land (approximately 44.0 percent of the total area within the proposed Project boundary). Table 6.0-1 shows the Licensees' 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 FERC Project Boundary

Development	Federal Lands			Non-Federal Lands				Total
	ANF (acres)	LPNF (acres)	BLM (acres)	State of California (acres)	Private (acres)	LADWP (acres)	County (acres)	Area (acres)
Existing	2,249.5	1,016.1	21.7	3,627.4	12.7	0.0	0.6	6,928.0
Proposed	1,334.6	665.9	6.5	2,366.7	15.5	171.8	2.8	4,563.8
Change to Boundary	**-914.9**	**-350.2**	**-15.2**	**-1,260.7**	**+2.8**	**+171.8**	**+2.2**	**-2,364.2**

Source: DWR 2019
Key:
ANF = Angeles National Forest
LPNF = Los Padres National Forest
BLM = U.S. Department of the Interior, Bureau of Land Management
State of California = Lands owned by California Department of Water Resources, California Department of Parks and Recreation, and California Department of Transportation

The proposed changes are based on the Licensees' current and historic use of land for the Project; the Licensees' comprehensive review of facilities, operations, and land information to date; and additional new information and data available for facilitating a more refined boundary delineation. The most significant change in the delineation is the use of a 100-foot buffer from Pyramid Lake's NMWSE to define the proposed Project boundary around portions of the lake, which reduces the land area considerably.

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. Summary of Proposed Changes to Federal Lands Within the Project Boundary

Administered by	Township	Range	Section	Acres
PROPOSED PROJECT BOUNDARY				
USFS	5N	16W	15	3.9
			17	7.2
			18	0.0
			19	0.0
			20	51.3
			21	47.2
			22	3.5
			25	9.3
			26	42.4
	6N	17W	7	27.2
			15	2.1
			17	28.4
			18	19.2
			20	3.7
			21	31.7
			22	16.5
			23	3.7
			25	73.9
			26	0.9
			27	71.7
			28	1.1
			36	0.5

Table 6.0-2. Summary of Proposed Changes to Federal Lands Within the Project Boundary (continued)

Administered by	Township	Range	Section	Acres
USFS		18W	1	16.6
			2	210.2
			3	61.2
			12	12.8
	7N	18W	16	6.0
			17	47.6
			21	2.1
			22	48.5
			26	99.8
			27	240.9
			28	42.8
			32	15.8
			33	177.4
			34	240.0
			35	332.4
	8N	18W	28	0.9
BLM	5N	17W	2	4.9
	6N	17W	26	1.4
			36	0.1
Total				**2,007.0**
DIFFERENCE BETWEEN EXISTING (TABLE 4.4-1) AND PROPOSED PROJECT BOUNDARY				
USFS				1,265.2
BLM				15.2
Difference				1,249.9

Source: BLM 2019
Key:
USFS = U.S. Department of Agriculture, Forest Service
BLM = U.S. Department of the Interior, Bureau of Land Management

7.0 REFERENCES CITED

California Department of Water Resources (DWR). 2019. Title: i003_Proposed_Project_Boundary_SouthSWP_20181210. Prepared by Nathan Buchholz, DWR – Geodetic Branch – Property Management, Land Surveyor. Published January 4, 2018.

_____. 2018. Pyramid Lake Capacity Table Report. Final Survey Report. California Department of Water Resources, Division of Engineering – Geodetic Branch – Mapping Section. August 31, 2018.

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

U.S Department of the Interior, Bureau of Land Management (BLM). 2019. Public Land Survey System (PLSS) Database. Accessed July 24, 2019.

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Appendix A

Area by Area Assessment of Existing and Proposed Project Boundary

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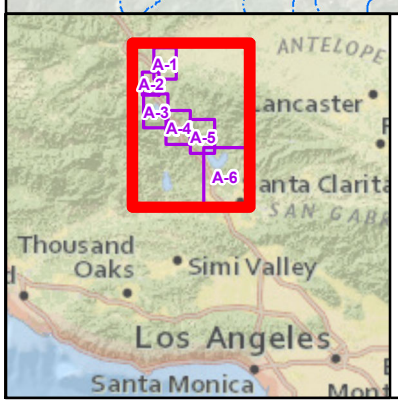
KERN COUNTY
LOS ANGELES COUNTY
Quail Lake Day Use Area
Quail Lake Inlet Structure (non-Project)
Lower Quail Canal
Quail Lake
A-1
Quail Detention Embankment
Peace Valley Pipeline Intake Embankment
A-2
Peace Valley Pipeline
Los Alamos Campground
William E Warne Powerplant and Switchyard
A-3
Pyramid Lake
Pyramid Dam
USGS Gage No. 11109525
Angeles Tunnel
A-4
LOS ANGELES COUNTY
VENTURA COUNTY
Castaic Powerplant Penstocks
A-5
Castaic Powerplant and Switchyard
Angeles Tunnel Surge Chamber
Elderberry Forebay
Elderberry Forebay Dam
Castaic Transmission Line
A-6
Castaic Lake (non-Project)
Castaic Dam (non-Project)
Castaic Lagoon (non-Project)

The Licensees proposed changes to the existing Project boundary will:

(1) Include existing Project facilities and roads that are necessary for current and future operation and maintenance activities, and recreation development;
(2) Remove land and roads currently within the existing Project boundary that are not required for project purposes; and
(3) Reduce the shoreline buffer along Project impoundments where Project infrastructure and recreation facilities are in proximity to the shoreline.



Legend

- Licensed Facility
- Other (non-Licensed) Facility
- Proposed Project Boundary (v.20190718)
- Map Index Panels
- FERC Boundary (v.20150114)
- Project Roads
- Transmission Line
- Major Highways
- Stream/Canal/River
- Stream - Intermittent

LAND OWNERSHIP

- BLM
- U.S. FOREST SERVICE
- STATE OF CALIFORNIA
- LADWP
- COUNTY
- PRIVATE

N
0 1.5 3 Miles

Prepared: August 2019
Projection: CA SP V NAD83 (ft)
Background: bing (2019)
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SOUTH SWP HYDROPOWER RELICENSING
FERC PROJECT NO. 2426

Area by Area Assessment of Existing and Proposed Project Boundary Index Map

Additions to the Project Boundary:

Include lands along Quail Lake shoreline near the non-Project Quail Lake Inlet Structure to full encompass the service road and all lake side lands.

Lands encompassing and surrounding the Quail Detention Embankment facility being proposed including the maintenance buffer and access routes.

Addition of a strip of land along northwest side of Lower Quail Canal to ensure all buffer areas and potential maintenance routes are enclosed within the boundary.

Quail Lake Day Use Area

Quail Lake Inlet Structure (non-Project)

Quail Lake

Lower Quail Canal

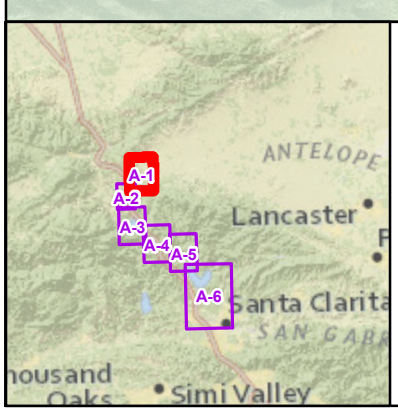
Quail Detention Embankment

Peace Valley Pipeline Intake Embankment

Removals from the Project Boundary

Strips of excess lands on the north side of Quial Lake and east and west side of Lower Quail Canal that have no Project facilities and are not used or needed for operations and maintenance activities.

bing



Legend

- Proposed Project Boundary (v.20190718)
- FERC Boundary (v.20150114)
- Project Roads
- Major Highways
- Stream/Canal/River
- Stream - Intermittent

LAND OWNERSHIP

- BLM
- U.S. FOREST SERVICE
- STATE OF CALIFORNIA
- COUNTY
- PRIVATE

N

0 0.25 0.5 Miles

Prepared: August 2019
Projection: CA SP V NAD83 (ft)
Background: bing (2019)
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SOUTH SWP HYDROPOWER RELICENSING
FERC PROJECT NO. 2426

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

Removals from the Project Boundary:

Strips of excess undeveloped lands on east and west side of Peace Valley Pipeline and east side of the Peace Valley Pipeline Intake Embankment and Gorman Creek By-Pass Channel that are not used or needed for operations and maintenance activities.

Additions to the Project Boundary:

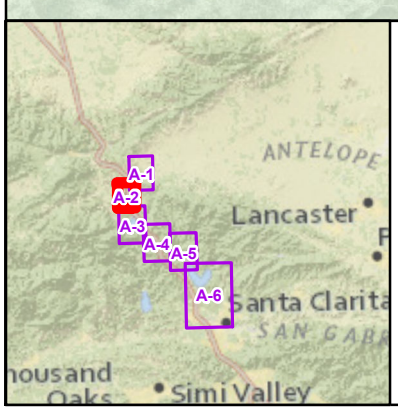
Lands within the Los Alamos Campground and Los Alamos Group Campground.

Peace Valley Pipeline

Los Alamos Group Campground

Los Alamos Campground

bing



Legend

- Proposed Project Boundary (v.20190718)
- FERC Boundary (v.20150114)
- Project Roads
- Major Highways
- Stream/Canal/River
- Stream - Intermittent

LAND OWNERSHIP

- U.S. FOREST SERVICE
- STATE OF CALIFORNIA
- COUNTY
- PRIVATE

N

0 0.2 0.4 Miles

Prepared: August 2019
Projection: CA SP V NAD83 (ft)
Background: bing (2019)
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SOUTH SWP HYDROPOWER RELICENSING
FERC PROJECT NO. 2426

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

Emigrant Landing Entrance Area

Removals from the Project Boundary:

Strips of excess undeveloped lands on east side of Warne Powerplant that are not used or needed for operations and maintenance activities.

Warne Switchyard

William E Warne Powerplant

Emigrant Landing Picnic and Fishing Area One

Emigrant Landing Visitor Center/Administrative Use Area

Emigrant Landing Boat Launch

Emigrant Landing Picnic and Fishing Area Two

Emigrant Landing Swim and Picnic Area

Additions to the Project Boundary

Include shorelands on Pyramid Lake under Interstate 5 bridge to fully encompasses lands at and just above normal maximum surface elevation (NMWSE). Also include some lands on the right abutment Pyramid Dam (West side) to fully encompass all potential operation and maintenance and monitoring areas around Pyramid Dam.

Yellowbar Day Use/Picnic Area

Vista del Lago Visitors Center

Vaquero Day Use Area

Spanish Point Boat-in Picnic Area

Pyramid Lake

Serrano Boat-in Picnic Area

Bear Trap Boat-in Picnic Area

Angeles Tunnel Intake

Pyramid Dam

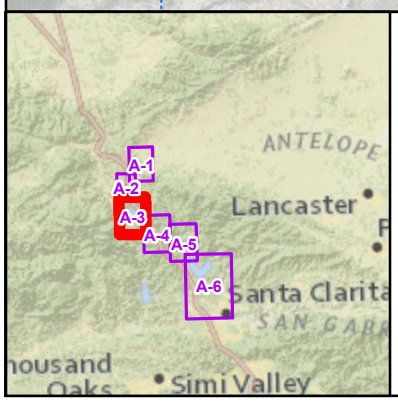
USGS Gage No. 11109525

LOS ANGELES COUNTY
VENTURA COUNTY

Removals from the Project Boundary

Lands well beyond a 200 feet (horizontal measurement) buffer from the exterior margin of Pyramid Lake, defined by the normal maximum water surface elevation (NMWSE). The proposed boundary generally follows the 3,200 -foot-elevation contour or slightly higher, these areas are generally fairly steep, and have no recreation or other need for Project operation, flood control, recreation, the protection of fish and wildlife, or other developmental or non-developmental interests of the Project. All eleven Project shoreline recreation facilities at Pyramid Lake and shoreline buffer areas are fully encompassed within the proposed Project boundary.

bing



Legend

- Proposed Project Boundary (v.20190718)
- FERC Boundary (v.20150114)
- Project Roads
- Major Highways
- Stream/Canal/River
- Stream - Intermittent

LAND OWNERSHIP

- U.S. FOREST SERVICE
- STATE OF CALIFORNIA
- PRIVATE

N

0 0.3 0.6 Miles

Prepared: August 2019
Projection: CA SP V NAD83 (ft)
Background: bing (2019)
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SOUTH SWP HYDROPOWER RELICENSING
FERC PROJECT NO. 2426

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

Angeles Tunnel

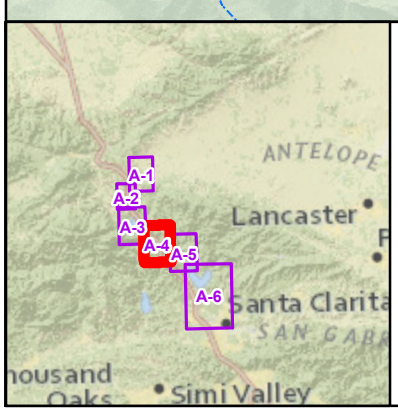
Additions to the Project Boundary:

Include lands associated with primary Project roads leading to the North and Osito Canyon Angeles Tunnel adits.

Removals from the Project Boundary:

None.

bing



Legend

- Proposed Project Boundary (v.20190718)
- FERC Boundary (v.20150114)
- Project Roads
- Major Highways
- Stream/Canal/River
- Stream - Intermittent

LAND OWNERSHIP

- U.S. FOREST SERVICE
- PRIVATE

N

0 0.3 0.6 Miles

Prepared: August 2019
Projection: CA SP V NAD83 (ft)
Background: bing (2019)
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SOUTH SWP HYDROPOWER RELICENSING
FERC PROJECT NO. 2426

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

Additions to the Project Boundary:

Include lands necessary for operations and maintenance and additional buffer along road entrance to the Castaic Powerplant facilities off the Templin Highway as well as lands near the Angeles Tunnel Surge Chamber.

Removals from the Project Boundary:

Excess undeveloped lands on east and west valley slopes above the Castaic Creek Valley that are not used or needed for operations and maintenance activities. Lands well beyond a 200 feet (horizontal measurement buffer) from the exterior margin of Elderberry Forebay defined by the normal maximum water surface elevation (NMWSE) that also previously followed ownership tract boundaries but have no purpose for Project operation, flood control, recreation, the protection of fish and wildlife, or other developmental and non-developmental interests of the Project.

Castaic Powerplant and Switchyard

Angeles Tunnel Surge Chamber

Castaic Powerplant Penstocks

Elderberry Forebay

Elderberry Forebay Dam

bing

A-1
A-2
A-3
A-4
A-5
A-6
ANTELOPE
Lancaster
Santa Clarita
SAN GABR
Simi Valley

Legend

- Proposed Project Boundary (v.20190718)
- FERC Boundary (v.20150114)
- Project Roads
- Transmission Line
- Major Highways
- Stream - Intermittent

LAND OWNERSHIP

- BLM
- U.S. FOREST SERVICE
- STATE OF CALIFORNIA
- LADWP
- PRIVATE

N

0 0.3 0.6 Miles

Prepared: August 2019
Projection: CA SP V NAD83 (ft)
Background: bing (2019)
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SOUTH SWP HYDROPOWER RELICENSING
FERC PROJECT NO. 2426

Area by Area Assessment of Existing and Proposed Project Boundary
Figure: A-5

DEPARTMENT OF WATER RESOURCES · STATE OF CALIFORNIA

LA DWP

Elderberry Forebay Dam

Castaic Transmission Line

Castaic Lake (non-Project)

Castaic Dam (non-Project)

Castaic Lagoon (non-Project)

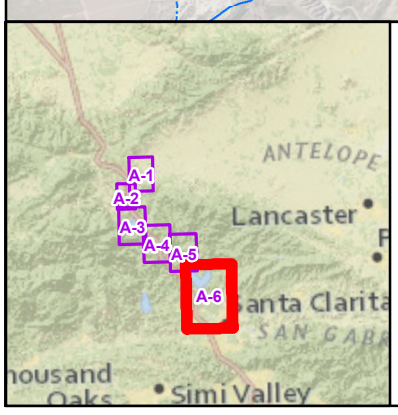
Additions to the Project Boundary:

Lands associated with roads leading to the Castaic Transmission line that are considered primary Project roads necessary for operation and maintenance needs of the transmission facilities.

Removals from the Project Boundary:

None.

bing



Legend

- Proposed Project Boundary (v.20190718)
- FERC Boundary (v.20150114)
- Project Roads
- Transmission Line
- Major Highways
- Stream/Canal/River
- Stream - Intermittent

LAND OWNERSHIP

- BLM
- U.S. FOREST SERVICE
- STATE OF CALIFORNIA
- LADWP
- COUNTY
- PRIVATE

N

0 0.5 1 Miles

Prepared: August 2019
Projection: CA SP V NAD83 (ft)
Background: bing (2019)
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SOUTH SWP HYDROPOWER RELICENSING
FERC PROJECT NO. 2426

Area by Area Assessment of Existing and Proposed Project Boundary
Figure: A-6

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SOUTH SWP HYDROPOWER
FERC PROJECT NO. 2426-227

DRAFT LICENSE APPLICATION
EXHIBIT B – PROJECT OPERATIONS AND RESOURCE UTILIZATION

September 2019

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

Los Angeles
DEPARTMENT OF
WATER AND POWER

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

COMMONLY USED TERMS, ACRONYMS & ABBREVIATIONS

§	Section
°F	degrees Fahrenheit
AF	acre-feet
AF/year	acre-feet per year
aMW	annual megawatt
Application for New License	Licensees' Application for a New License for Major Project – Existing Dam for the South SWP Hydropower, FERC Project Number 2426-227
CAISO	California Independent System Operator
CFR	Code of Federal Regulations
cfs	cubic feet per second
DWR	California Department of Water Resources
FERC	Federal Energy Regulatory Commission
hp	horsepower
Hz	hertz
IHP Study	Indicators of Hydrologic Alteration Study
kVA	kilovolt-amperes
kWh	kilowatt hours
LADWP	Los Angeles Department of Water and Power
Licensees	California Department of Water Resources and Los Angeles Department of Water and Power
MW	megawatt
MWh	megawatt hour
NMWSE	normal maximum water surface elevation
O&M	operation and maintenance
OHT	Overhead Transmission
PCA	Pest Control Advisor
POR	period of record
Project	South SWP Hydropower, FERC Project Number 2426
Pyramid reach	18.1-mile long section of Piru Creek, which extends from the spillway or low-level outlet from Pyramid Dam to the NMWSE of Lake Piru

rpm	revolutions per minute
SWP	State Water Project
U.S.	United States
USFS	U.S. Department of Agriculture, Forest Service
USGS	U.S. Geological Survey
UWCD	United Water Conservation District
VCWPD	Ventura County Watershed Protection District
Warne Powerplant	William E. Warne Powerplant
WY	Water Year

1.0 INTRODUCTION

The California Department of Water Resources (DWR) and the Los Angeles Department of Water and Power (LADWP) (Licensees) have prepared this Exhibit B, Project Operations and Resource Utilization, as part of their Application for a New License Major Project – Existing Dam (Application for New License) from the Federal Energy Regulatory Commission (FERC) for the South SWP Hydropower, FERC Project Number 2426 (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 5 (Application for License for Major Project – Existing Dam) (Integrated Licensing Process). In particular, this exhibit complies with the regulations in 18 CFR Section (§) 5.18(a)(5)(iii). For reference, 18 CFR § 5.18(a)(5)(iii) states:

> License for a major project—existing dam: §4.51 of this chapter (General instructions, initial statement, Exhibits A, B, C, D, F, and G)

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 power plant 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 power plant 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 power plant (maximum flow through the power plant) in cubic feet per second;

(iv) A tail water rating curve; and

(v) A curve showing power plant 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 seven 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 the Licensees' proposed Project operations. Section 6.0 describes the use of Project power. Section 7.0 discloses the Licensees' plans for future developments of the Project and Licensees' plans for water projects in the watershed. Section 8.0 includes a list of references cited in this exhibit.

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 the Licensees' 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 a power recovery project and 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 U.S. The SWP provides southern California with many benefits, including affordable water supply, reliable regional clean energy, opportunities to integrate green energy, accessible public recreation, and environmental enhancements.

The Project is located at the southern end of the West Branch of the SWP in Los Angeles County, California, between the towns of Castaic and Gorman, and has an installed capacity of 1,349,290 kilowatts. The Project, which ranges in elevation from 3,325 feet to 1,130 feet, includes two developments: Warne Power and Castaic Power. The major features of the existing Warne Power Development include: (1) Quail Lake, Quail Lake Embankment and Quail Lake Outlet; (2) Lower Quail Canal; (3) Peace Valley Pipeline Intake, Peace Valley Pipeline Intake Embankment, and Peace Valley Pipeline; (4) Gorman Bypass Channel; (5) William E. Warne Powerplant (Warne Powerplant) and Switchyard; (6) Warne Transmission Line; (7) Primary Project Roads and Trails; (8) Quail Lake recreation facilities and (9) streamflow and reservoir staff gages. The major features of the existing Castaic Power Development include: The major features of the existing Castaic Power Development include: (1) Pyramid Dam and Lake; (2) Angeles Tunnel and Surge Chamber; (3) Castaic Penstocks; (4) Castaic Powerplant and Switchyard; (5) Elderberry Forebay Dam, Forebay, and Outlet; (6) Storm Bypass Channel and Check Dams; (7) Castaic Transmission Line; (8) Primary Project Roads and Trails; and (9) Pyramid Lake recreation facilities. Facilities upstream of the Angeles Tunnel Surge Chamber are operated and managed by DWR. Facilities downstream of the Angeles Tunnel Surge Chamber, including the Surge Chamber, are operated and managed by LADWP.

The Project's existing FERC boundary includes 6,928.0 acres of land, of which 3,287.3 acres are federal lands, with 3,265.6 acres of National Forest System lands managed by the U.S. Department of Agriculture, Forest Service (USFS) as part of the Angeles National Forest and Los Padres National Forest, and 21.7 acres of land administered by the U.S. Department of the Interior, Bureau of Land Management.

As described in detail in Section 5.0 in Exhibit A of this Application for New License, under the new license, the Licensees propose five changes to the existing Project facilities: (1) addition of the existing Quail Detention Embankment; (2) removal of the Warne Transmission Line from the license; (3) addition of an existing stream flow gage; (4) addition of existing Primary Project Roads; and (5) modification to the existing Project boundary. The Licensees propose 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 or mitigate impacts from continued operation and maintenance (O&M) of the Project; and (2) enhance resources affected by continued Project O&M.

Figure 2.0-1 shows the Project vicinity. Figure 2.0-2 shows the Project facilities, including landownership; the existing and proposed Project boundaries are shown for reference purposes.

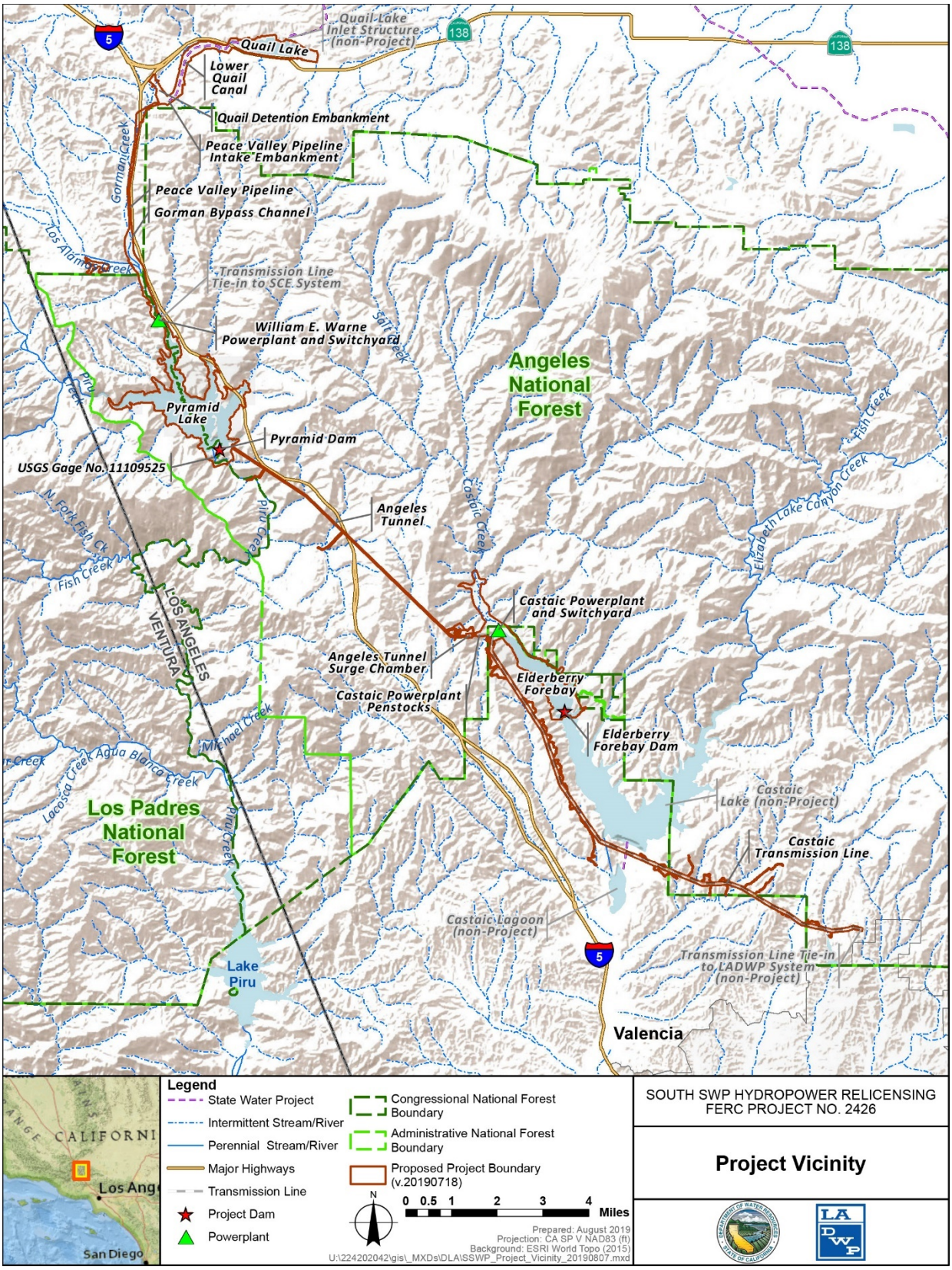


Figure 2.0-1. South SWP Hydropower Vicinity Map

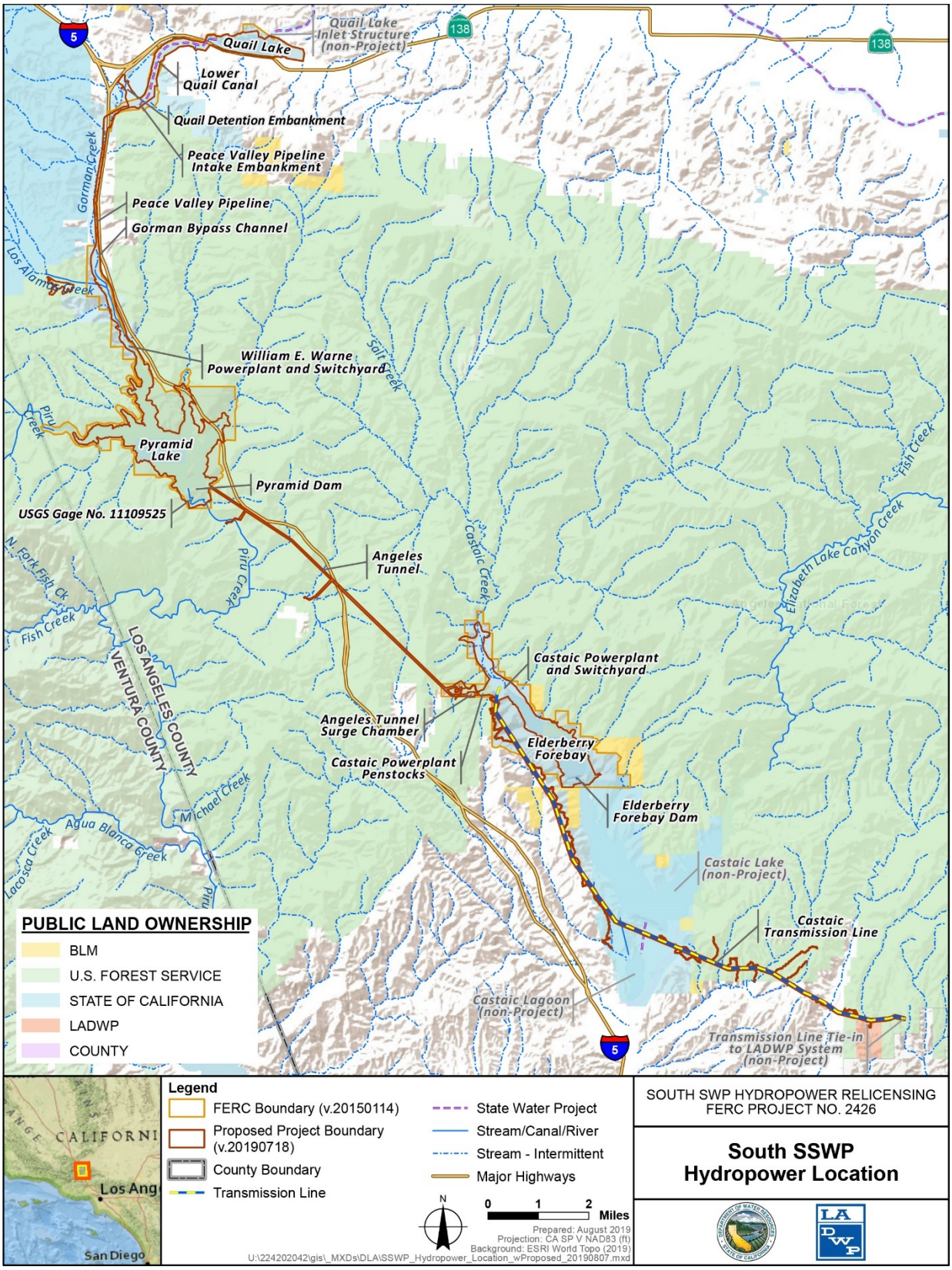


Figure 2.0-2. Licensees' Proposed South SWP Hydropower

3.0 RELICENSING SYSTEM HYDROLOGY

3.1 GAGES

As described in their Study 4.1.14, *Indicators of Hydrologic Alteration Study* (IHA Study), the Licensees developed an 11-year-long hydrology dataset for relicensing using publicly available data. Refer to the Project relicensing website (http://south-swp-hydropower-relicensing.com/) for the detailed study approach, study summary, and detailed study data, and to Appendix C of Exhibit E for the study summary and detailed study data. The relicensing period of record (POR) extends from Water Year (WY) 2007 through WY 2017 (i.e., October 1, 2006 through September 30, 2017), and is adequate to describe typical existing operations because the POR extends from when Article 52 in the existing license, which significantly changed streamflow releases into Pyramid reach (i.e., the 18.1-mile-long section of Piru Creek, which extends from the spillway or low-level outlet from Pyramid Dam to the normal maximum water surface elevation [NMWSE] of Lake Piru), was implemented in 2006, and includes normal, very dry and very wet periods. Reservoir data are end-of-day stage and storage for Quail Lake, Pyramid Lake, and Elderberry Forebay. Flow data are average daily flows, 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 Hydrologic Engineering Center Data Storage System file format.

Figure 3.1-1 shows pertinent drainage areas, and the location of reservoir stage and stream flow gages that are referenced in this exhibit. The gages and other information used to compile the relicensing hydrology dataset are described below.

3.1.1 Inflow into Quail Lake

Quail Lake is an engineered water body and collects negligible surface runoff; the local drainage basin is approximately 3.9 square miles. Quail Lake's inflow primarily comes from the West Branch of the SWP as measured at the Oso Pumping Plant and reported in DWR's SWP Operations Report (DWR 2017a), Table 24. SWP inflow flows into Quail Lake through the Upper Quail Canal check structure. SWP inflow to Quail Lake is controlled by three 13-foot-wide by 18.5-foot-high radial gates. The three bays provide a maximum inflow capacity of 3,129 cubic feet per second (cfs). Average daily flow data are available for the entire relicensing POR. The hydrology dataset is included in Appendix A.

3.1.2 Quail Lake Storage

Quail Lake has a gross storage capacity of 7,583.0 acre-feet (AF) at a NMWSE of 3,325. Storage in Quail Lake is generally held consistent; its storage is used to regulate generation from the Warne Powerplant. Quail Lake's storage is measured and recorded by DWR, but is not publicly available. DWR records include end-of-day stage, water surface area, and storage data for the 98 percent of the relicensing POR; there are 66 days out of 4,015 days with missing data within the relicensing POR. The hydrology dataset is included in Appendix A.

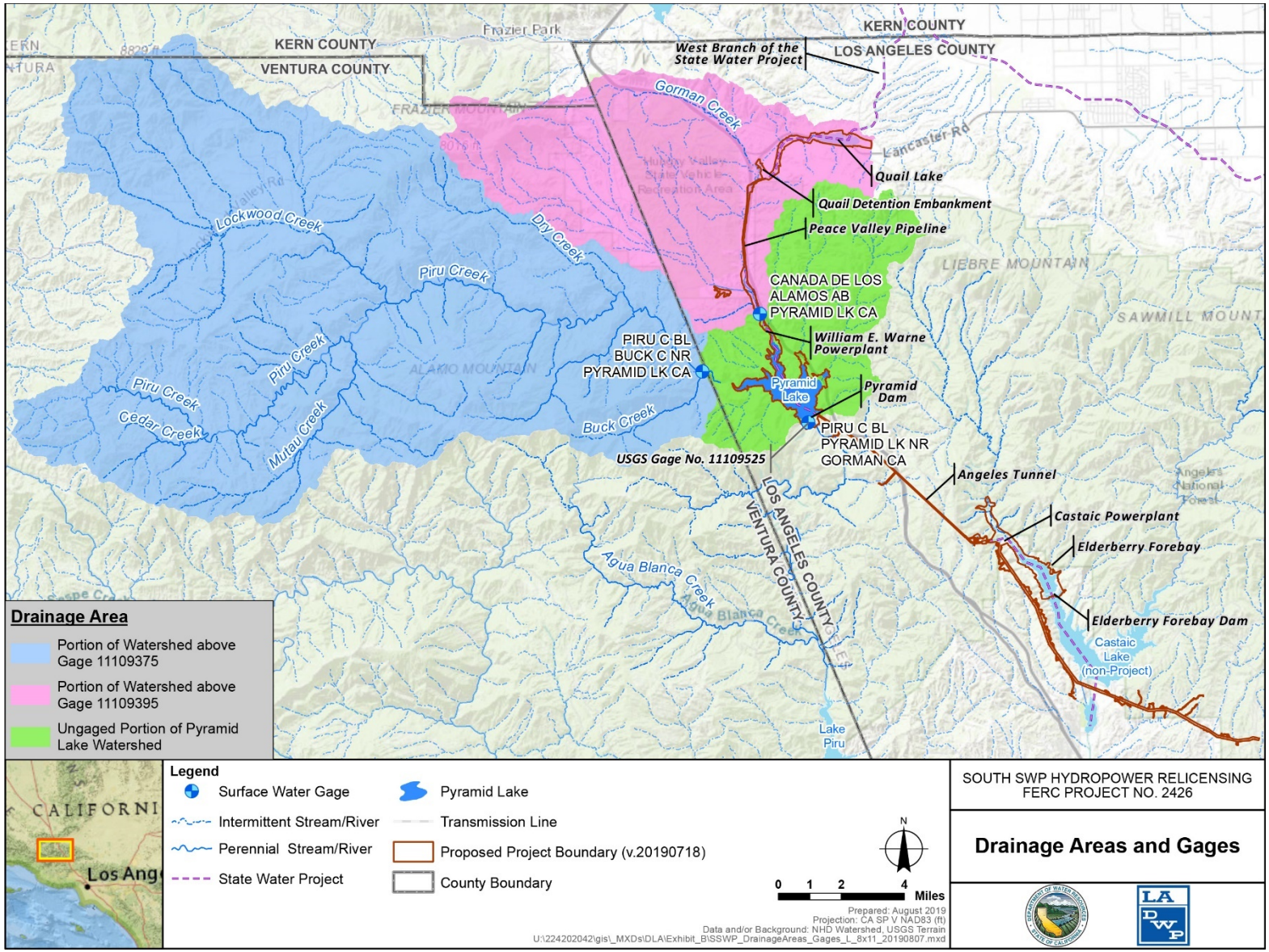


Figure 3.1-1. Pertinent Drainage Areas and Reservoir Stage and Streamflow Gages

3.1.3 Outflow from Quail Lake

Outflow from Quail Lake goes through the Quail Lake Outlet to the Lower Quail Canal. The Quail Lake Outlet structure, which consists of an inlet transition; a 12-foot by 12-foot reinforced concrete double box with four 6-foot by 12-foot remotely controlled slide gates, which are normally in an open position; a service bay; and outlet transition. Flow in the Lower Quail Canal travels approximately 2.1 miles between the Quail Lake Outlet and the headworks for the Peace Valley Pipeline to the Warne Powerplant. Outflow from the Lower Quail Canal either flows over a spillway into the Quail Lake Detention Basin or into the Peace Valley Pipeline. Flow in the Warne Powerplant is measured by DWR via an accusonic flow totalizer for the powerplant, and by using Oso Pumping Plant pumping volume and changes in storage at Pyramid Lake; this flow is reported in Table 25 of DWR's SWP Operations Report (DWR 2017a). Average daily flow data are available for the entire relicensing POR. The hydrology dataset is included in Appendix A. Flow over the spillway to the Quail Lake Detention Basin is not gaged; however, it only would occur under unplanned circumstances.

3.1.4 Inflow to Pyramid Lake

The Project does not use natural flow into Pyramid Lake for electricity generation. Electricity is generated using SWP water, and releases from Pyramid Dam into Piru Creek mimic the natural inflow into Pyramid Lake, as required by Article 52 in the existing FERC license, with the exception of releases of SWP water in November and December of some years for delivery to the United Water Conservation District (UWCD).

Inflow to Pyramid Lake comes from two sources, natural inflow in the local drainage and imported SWP water (Figure 3.1-1). Each of these is described below:

- Natural Inflow:
    - Piru Creek
    - Cañada de Los Alamos
    - Local ungaged drainages
- Imported SWP Water:
    - West Branch of the SWP through Warne Powerplant
    - West Branch of the SWP through Gorman Bypass Channel

3.1.4.1 Natural Inflow

The following section describes the natural inflow into Pyramid Lake.

Piru Creek

The primary source of data for inflow from Piru Creek is U.S. Geological Survey (USGS) Gage 11109375, *Piru Creek below Buck Creek near Pyramid Lake, CA* (Figure 3.1-1). The gage is a water stage recorder with a concrete control weir, located on the left bank of Piru Creek, 300 feet downstream from the confluence of Piru and Buck Creeks, 2 miles upstream from Pyramid Lake. There are no water storage or diversion projects on Piru Creek upstream from Pyramid Lake. Piru Creek below Buck Creek gage has a drainage area of 198 square miles. Average daily flow data are available for the entire relicensing POR, with the exception of WY 2007 through WY 2010 (i.e., October 1, 2006 through September 30, 2010), which were not published. The Licensees filled in average daily flow for the missing period directly from the DWR Hard Copy Reports[1], as described in the IHA Study, which were very similar to the USGS data when data were available from both sources. The hydrology dataset is included in Appendix A.

Cañada de Los Alamos

The primary source of data for inflow from Cañada de Los Alamos is USGS Gage 11109395, *Cañada de Los Alamos above Pyramid Lake, CA*. The gage is a water stage recorder with a concrete control weir, located on the right bank of Cañada de Los Alamos, 0.1 miles upstream from Pyramid Lake. There are no water storage or diversion facilities on Cañada de Los Alamos upstream from Pyramid Lake. The Cañada de Los Alamos gage has a drainage area of 61.8 square miles. As described in the IHA Study, the Licensees filled in average daily flow for any missing periods directly from the DWR Hard Copy Reports, which were very similar to the USGS data when data were available from both sources. After combining the two data sets, average daily flow data are available for the entire relicensing POR. The hydrology dataset is included in Appendix A.

Local Ungaged Drainage

Article 52 in the existing Project license stipulates that DWR will use a multiplier "to account for those portions of Pyramid Lake watershed that are not tributaries of upper Piru Creek and Cañada de Los Alamos upstream of their respective gaging stations." As described in a March 22, 1974 DWR memorandum (DWR 1974), DWR and UWCD agreed that the appropriate multiplier is 10.8 percent. Therefore, under the existing license, the average daily flow from the ungaged portion of runoff into Pyramid reach is calculated by multiplying the combined average daily flow of Gages 11109375 and 11109395 by 10.8 percent. Average daily flow data are available for the entire relicensing POR, and these data are included in Appendix A to this Exhibit B.

[1] The DWR Hard Copy Reports are DWR operations records, measured at the same locations as the USGS data, but have not been subject to USGS quality control.

3.1.4.2 Imported Water

Pyramid Lake receives imported water from the West Branch of the SWP, either through the Warne Powerplant or through the Gorman Bypass Channel.

West Branch of the SWP through Warne Powerplant

Imported water from the West Branch of the SWP passes through the Warne Powerplant and is gaged by USGS Gage 11109398, *West Branch California Aqueduct at Warne Powerplant Near Gorman, CA*. Data for USGS Gage 11109398 has included both generating flow through the Warne Powerplant and estimated bypass flow through the Gorman Bypass channel since 2010. Data from USGS Gage 1110938 is available for the full relicensing POR, except for WY 2007 through WY 2010. Since flows in the Warne Powerplant and flows in the Gorman Bypass Channel are combined in the USGS Gage 1110938 data set, DWR's SWP Operations Report (DWR 2017a), Table 25, included as part of the IHA Study, is used to present flow through the Warne Powerplant; data for the entire POR are included in Appendix A to this Exhibit B.

West Branch of the SWP through Gorman Bypass Channel

The Gorman Bypass Channel is a man-made channel that begins at the Peace Valley Pipeline Intake Embankment and extends downstream to Pyramid Lake, bypassing the Warne Powerplant. The Gorman Bypass Channel was originally the primary conveyance system between Quail Lake and Pyramid Lake, but was replaced by the Peace Valley Pipeline in 1980. The Gorman Bypass Channel is currently used to convey flow to Pyramid Lake from the Lower Quail Canal when the Warne Powerplant has insufficient capacity to move the full Lower Quail Canal flow. Flow in the Gorman Bypass Channel is calculated by DWR based on the percent opening of the 78-inch valve controlling release to the Gorman Bypass Channel and is published in Table 25 of DWR's SWP Operations Report. Flow data for the Gorman Bypass Channel is available for the complete relicensing POR and are included in Appendix A to this Exhibit B.

3.1.5 Pyramid Lake Storage

Pyramid Lake has a gross storage capacity of 161,375.0 AF at an NMWSE of 2,579. The primary source of data for Pyramid Lake stage and storage is USGS Gage 11109520, *Pyramid Lake near Gorman, CA* (Figure 3.1-2). The gage is a water stage recorder located on Pyramid Lake near Pyramid Dam. End-of-day stage and storage data are available from the USGS for the entire relicensing POR, except for WY 2008 and WY 2009. Data for missing dates is filled in from Table 25 of DWR's SWP Operations Report (DWR 2017a), and data for the complete POR are included in Appendix A to this Exhibit B.

3.1.6 Outflow from Pyramid Lake

Outflow from Pyramid Lake is released in the following four ways (Figure 3.1-2), each of which is further described below:

- Water supply for the Pyramid Lake Recreation Area
- Releases of natural flow to Pyramid reach
- Releases of SWP water to the Angeles Tunnel
- Releases of SWP water through the Pyramid Dam outlet to UWCD

3.1.6.1 Releases to Pyramid Lake Recreation Area

There are two recreation areas off of Pyramid Lake receiving surface water. The non-Project Emigrant Landing Water Treatment System receives raw water from a supply line from the Peace Valley Pipeline. This water is used at the Emigrant Landing Day Use Areas for irrigation and is treated for public use. The non-Project Vista Del Lago Water Treatment Plant receives water supply directly from Pyramid Lake; water is pumped out of the lake and either used for irrigation, or treated for public use and fire protection. Diversions from Pyramid Lake to the recreation area are gaged by DWR and are reported in Table 25 of DWR's SWP Operation Report. These data are available for the complete relicensing POR and are included in Appendix A to this Exhibit B.

3.1.6.2 Releases to Pyramid Reach

There are two types of outflow releases from Pyramid Lake to Pyramid reach: releases of the natural flow and releases of SWP water to UWCD. As described in the IHA Study, two data sources exist for Pyramid Dam releases into Pyramid reach. The first source is USGS 11109525, *Piru Creek below Pyramid Lake, near Gorman CA.* Piru Creek flow below Pyramid Lake is computed by adding flow through the low-level outlet (measured by a flow meter on the outlet) to flow through the spillway (computed based on gate opening and reservoir water surface elevation). The USGS reports that Gage 11109525 has a drainage area of 295 square miles. Average daily flow data are available for the entire relicensing POR, with the exception of WY 2008 and WY 2009 (i.e., October 1, 2007 through September 30, 2008), which were not published. Because the DWR Hard Copy Reports did not include this location, the Licensees filled in average daily flow for the missing period directly from the DWR Digital Flow Data, after confirming that the data were consistent between the two sources.

The second source of flow data was Table 25 of DWR's SWP Operations Report, which reports both DWR's releases of natural outflow from Pyramid Lake to Pyramid reach, as well as releases of SWP water to Pyramid reach specifically for delivery to UWCD. UWCD receives water as part of the Ventura County Watershed Protection District's (VCWPD) long term water supply contract with DWR. While the VCWPD's long term water supply contract Table A amount is 20,000 acre-feet per year (AF/year), UWCD is

contracted to receive a maximum of 5,000 AF/year of the 20,000 AF. UWCD receives up to 3,150 AF/year of SWP water through releases to Pyramid reach. The remaining amount of up to 1,850 AF/year is required to be delivered to the City of Port Hueneme through the VCWPD turnout at Castaic Lake. Releases for UWCD are made to Pyramid reach through the same low-level outlet in Pyramid Dam used to release the natural flow to Pyramid reach. UWCD's deliveries are typically in November, on a schedule set by UWCD. UWCD releases are included in the USGS data set as part of the Pyramid reach flow, but they are accounted for by DWR as a separate release. UWCD releases are included in Table 25 of DWR's SWP Operations Report, and are available for the entire relicensing POR. The combined hydrology dataset is included in Appendix A to this Exhibit B.

Consistent with Article 52, DWR takes several steps to determine Pyramid Lake outflow. Staff refer to the CDEC website to determine the flow at the upstream gages on Piru Creek and Cañada de Los Alamos. CDEC reports the stage at each gage and staff then use the stage reading and rating curve for the gage to determine the flow at each gage. Staff then sum the two flow readings and increase the value by 10.8 percent to account for the ungaged portion of the watershed. Once the total inflow is calculated, staff access the Pyramid stream release and make adjustments to the four valves (an 8-inch pressure reducing valve, a 16-inch fixed cone valve, and two 36-inch fixed cone valves) in the low-level outlet so that the Pyramid Lake outflow matches the calculated inflow. During large storm events, the spillway radial gate and the valves in the low-level outlet are adjusted, sometimes up to several times a day, to track inflows. As acknowledged in Article 52, "This may result in some deviations for individual storm events due to localized variations in storm water intensity."

Stream flow records for the upstream gages and Pyramid Lake outflow are reviewed and certified by USGS annually. In order to comply with USGS accuracy standards, DWR staff visit the upstream gages and use current meters to take stream flow measurements and verify the accuracy of the gage data. Staff visit the gage on Piru Creek twice per month and the gage on Cañada de Los Alamos once a week. SMAR™ differential pressure transmitters on each valve in the low-level outlet continuously measure outflow and transmit the data to a digital recorder. The SMAR differential pressure transmitters have an accuracy rating of 99 percent or greater.

3.1.6.3 Releases of SWP Water to the Angeles Tunnel

Flow through the Angeles Tunnel to the Castaic Powerplant and Elderberry Forebay is measured by LADWP by flow meters on the penstocks, and are reported on a daily basis as part of DWR's SWP Operations Report (DWR 2017a), Table 25. However, while Table 25 includes the net flow through the Angeles Tunnel each day, the tunnel is used to make releases from Pyramid Lake to Elderberry Forebay, and to pump back flows from Elderberry Forebay back to Pyramid Lake. The average daily flows for Angeles Tunnel flows is included in Appendix A to this Exhibit B Inflow into Elderberry Forebay

Elderberry Forebay receives the majority of its inflow from Pyramid Lake releases to the Castaic Powerplant. Elderberry Forebay provides for flow regulation between the Castaic Powerplant and Castaic Lake, and storage for pumpback through the Castaic Pumping-Generating Plant.

Elderberry Forebay also collects some natural runoff from Castaic Canyon Creek and its tributaries, including Fish Canyon Creek, Elderberry Canyon Creek, and multiple smaller tributaries. DWR has gaged Castaic Canyon Creek since mid-2010, and Fish Canyon Creek since early-2012, and has reported 15-minute flows to the California Data Exchange Center as station identifications "CSK" and "FCK," respectively. The Castaic Canyon Creek flows are measured by a stage recorder at a concrete weir, approximately 1.6 miles upstream from Elderberry Forebay, and reflect flows from a watershed of approximately 37.6 square miles. The Fish Canyon Creek flows are also measured by a stage recorder at a concrete weir approximately 1.5 miles upstream from Elderberry Forebay, and reflect flows from a watershed of approximately 27.1 square miles. Between these two gages, approximately 85 percent of Elderberry Forebay's watershed is gaged, based on the contributing area for each gage. Figure 3.1-2 shows the contributing watersheds for Elderberry Forebay.

While none of the other inflows to Elderberry Forebay is gaged, DWR estimates the total natural inflows as the sum of gaged flows on Fish Canyon Creek and Castaic Canyon Creek, and ungaged accretions, estimated as 20 percent of the combined flow for the two gages. The natural inflows are published in Table 26 of DWR's SWP Operations Report (DWR 2017a). The Table 26 flows are available for the entire relicensing POR and are included in Appendix A to this Exhibit B.

3.1.7 Elderberry Forebay Storage

The Elderberry Forebay outlet tower has storm gates that are removed each year in the fall in anticipation of the winter storm system and the need to release storm inflows. With the storm gates in, Elderberry Forebay has a gross storage capacity of 31,196 AF at an NMWSE of 1,540 feet.

Storage in Elderberry Forebay fluctuates according to the Castaic Powerplant operations. LADWP measures Elderberry Forebay elevation on a daily basis by a staff recorder in the outlet tower, converts the elevation to storage using an elevation-storage curve, and then reports the end-of-day storage to the USGS, where it is published as USGS Gage 11108092, *Elderberry Forebay near Castaic, CA*. Data for Elderberry Forebay storage is available from the USGS for the entire relicensing POR, except for WY 2008, WY 2009, and WY 2015. Where USGS data are not available, DWR reports Elderberry Forebay storage in Table 26 of DWR's SWP Operations Report (DWR 2017a). Between these two sources, Elderberry Forebay storage data are available for the entire relicensing POR and are included in Appendix A to this Exhibit B.

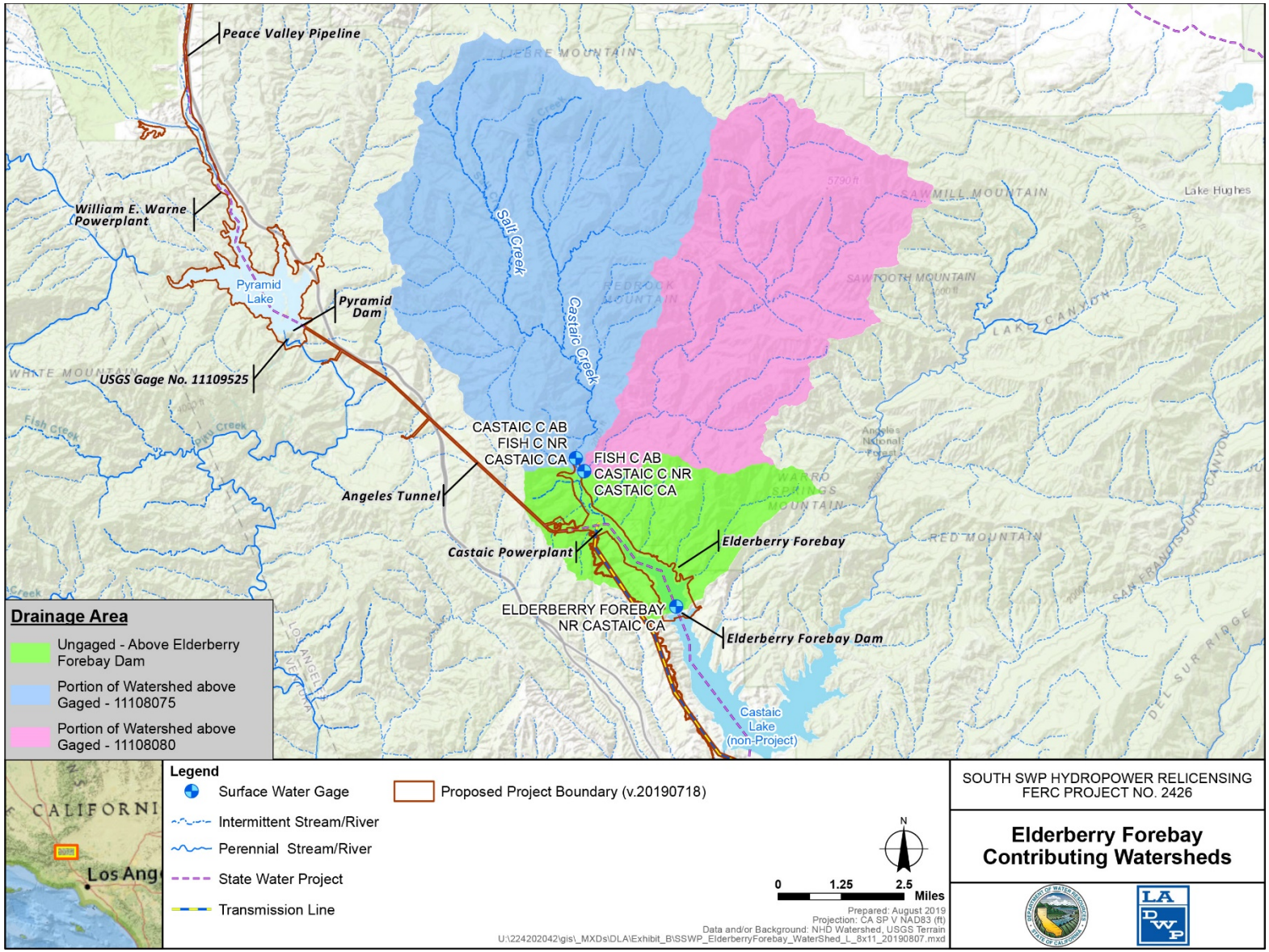


Figure 3.1-2. Elderberry Forebay Contributing Watersheds

3.1.8 Outflow from Elderberry Forebay

Outflow from Elderberry Forebay is made through one of three mechanisms: (1) pumpback to Pyramid Lake through the Castaic Powerplant; (2) releases to Castaic Lake through Elderberry Forebay outlet works; or (3) spill to Castaic Lake over the Elderberry Forebay spillway.

LADWP measures pumpback from Elderberry Forebay to Pyramid Lake through the Castaic Powerplant using flow meters on the penstock. DWR estimates the total release to Castaic Lake based on the change of Elderberry Forebay storage. Releases are computed based on change in Elderberry Forebay storage and measured inflows from Castaic Powerplant and computed local inflows. DWR reports both natural and SWP releases to Castaic Lake in Table 26 of its SWP Operations Report (DWR 2017a). Natural and SWP releases from the Elderberry Forebay are computed based on their relative proportions of inflow to the Elderberry Forebay. Elderberry Forebay releases to Castaic Lake are available for the entire relicensing POR and are included in Appendix A to this Exhibit B.

3.2 OVERVIEW OF BASIN HYDROLOGY

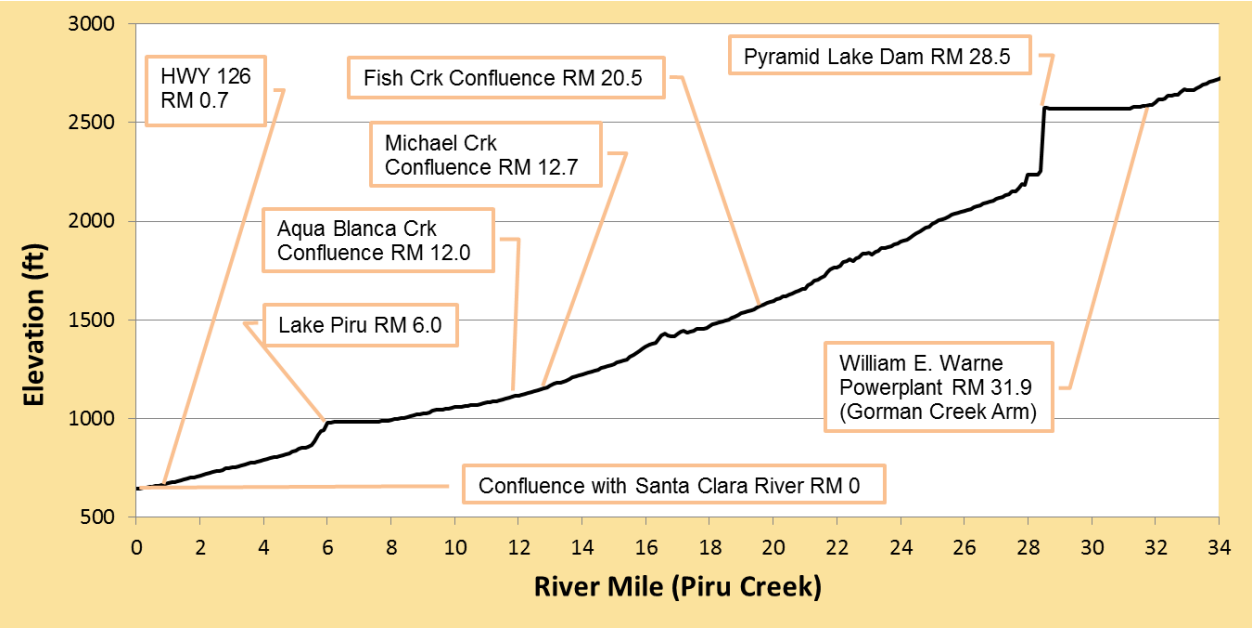
As shown in Figure 3.1-1, two drainage basins are incidentally intercepted by the Project: (1) Piru Creek, including its tributary, Gorman Creek; and (2) Castaic Creek and its tributaries. A general description of each of these basins is provided below. Quail Lake, the other Project impoundment, is an engineered water body that receives negligible inflow, and does not discharge into State surface waters.

3.2.1 Piru Creek

Piru Creek's headwaters collect water from about a dozen named tributaries and are located approximately 40 river miles upstream of Pyramid Dam, which is located approximately 29 miles upstream of the confluence of Piru Creek and the Santa Clara River. Piru Creek and its tributaries above Pyramid Lake flow relatively unimpaired; there are no diversions or dams located on any of the drainages. Pyramid Lake also incidentally intercepts water from Gorman Creek, West Fork Liebre Gulch, and Liebre Gulch to the north. USGS reports that the sub-basin drainage area upstream of Pyramid Dam is 295 square miles of steep mountainous terrain, with elevations that range from 2,600 feet to 8,900 feet (Figure 3.1-1).

Stream releases from Pyramid Dam are routed into the Pyramid reach, which is formed by Santa Felicia Dam, located 5.9 miles upstream of the confluence of Piru Creek and the Santa Clara River. Santa Felicia Dam was constructed in 1955 by UWCD for flood storage and seasonal groundwater recharge. Pyramid reach collects flows from three named tributaries before reaching Lake Piru: (1) Fish Creek, which enters Pyramid reach 8 miles downstream of Pyramid Dam; (2) Michael Creek, which enters 15.7 miles below the dam; and (3) Agua Blanca Creek, which enters 16.4 miles below Pyramid Dam.

From Santa Felicia Dam, Piru Creek flows 5.9 miles downstream into the Santa Clara River. USGS reports the sub-basin drainage area of Piru Creek is 142 square miles of steep mountainous terrain and rolling foothills, with elevations that range from 650 feet to 6,800 feet. Figure 3.2-1 shows the gradient in Piru Creek in the vicinity of the Project, with notable features identified.



Key:
Crk = Creek
ft = feet
HWY = Highway
RM = river mile

Figure 3.2-1. Piru Creek Profile

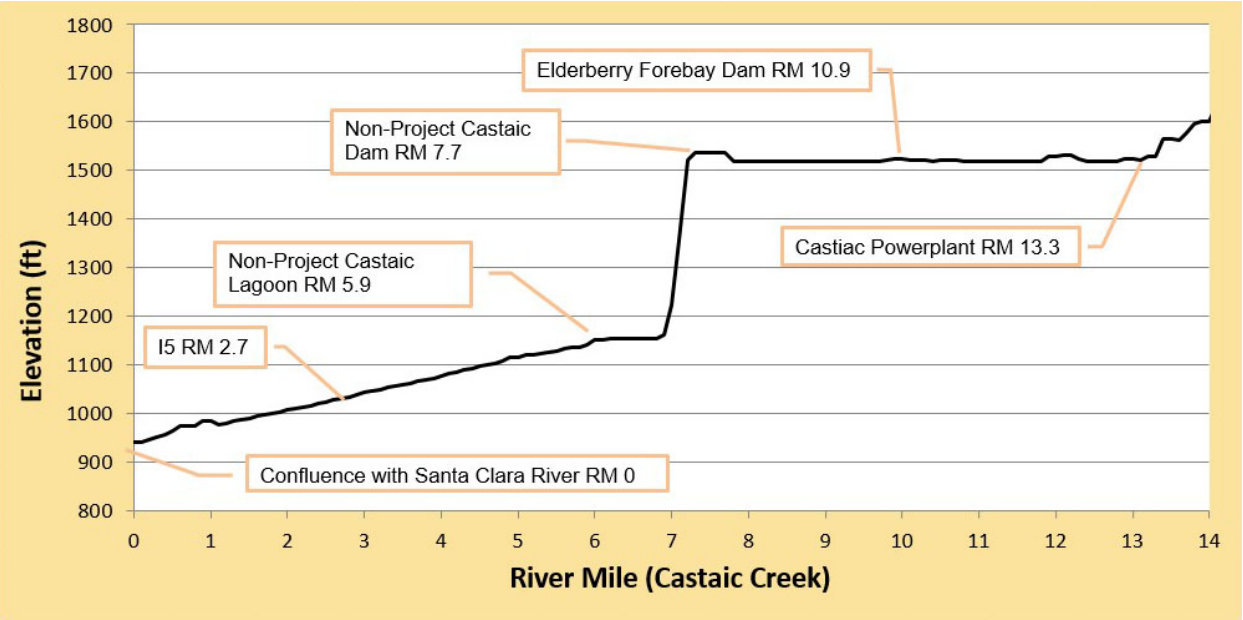
3.2.2 Castaic Creek

Castaic Creek headwaters are located 11 river miles upstream of Elderberry Forebay and collect water from Salt Creek before flowing into Elderberry Forebay. Castaic Creek flows along a natural channel until just above Elderberry Forebay, where it enters a series of three check-dam basins that drain into Elderberry Forebay, just downstream of the Castaic Powerplant tailrace.

Castaic Creek flows are passed through Elderberry Forebay Dam, which is 10.9 river miles upstream of the confluence of Castaic Creek and the Santa Clara River, near Valencia, California. The flows continue through Castaic Lake (non-Project facility) impounded by Castaic Dam, which is located 7.7 miles upstream of the Santa Clara River. Castaic Creek re-emerges after passing south through Castaic Lagoon and into the Santa Clara River. The sub-basin formed by Elderberry Forebay Dam is 38 square miles of steep mountainous terrain, with elevations that range from 1,500 feet to 5,700 feet. The remaining area of the Castaic Creek basin is 165 square miles of steep mountainous terrain and rolling foothills, with elevations that range from 950 feet to 5,400 feet.

Castaic Creek joins the Santa Clara River 40 river miles below the Santa Clara River headwaters in the San Gabriel Mountains, located east of the confluence. The Piru Creek confluence with the Santa Clara River is 10.4 river miles west of the Castaic Creek confluence. From the Piru Creek confluence, the Santa Clara River continues west 32 river miles to the Pacific Ocean. USFGS reports the Santa Clara River Basin is 1,626 square miles.

Figure 3.2-2 shows the gradient in Castaic Creek in the vicinity of the Project, with notable features identified.



Key:
RM = river mile
ft = feet

Figure 3.2-2. Castaic Creek Profile

3.2.3 Climate

The climate in the Project area is Mediterranean. It is generally hot in summer and mild and dry through most of the year. Air temperatures range from approximately 70 to 100 degrees Fahrenheit (°F) during the summer, and 40° to 65°F during the winter. Monthly precipitation ranges from 0 to 5 inches, depending on the month, with the wettest months occurring between December and March, and very little rain falling from April through August.

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, two of which affect operations. Article 52, which became effective in 2006, states, in part:

> Stream releases from Pyramid Dam into Pyramid reach shall match natural surface inflow into Pyramid Lake to the extent operationally feasible and consistent with safety requirements, as further described in the following guidelines:
>
> - Natural inflow to Pyramid Lake will be released into Pyramid reach at a rate of up to about 18,000 cfs, which is the maximum safe, designed release from Pyramid Dam. The exact maximum safe release depends on the lake surface water elevation at the time of the release.
>
> - Storm releases from Pyramid Dam into Pyramid reach may be held back at less than 18,000 cfs if higher releases are deemed a threat to life, safety, or property at Pyramid Dam or downstream of the dam.
>
> - The Licensees may elect to appropriate inflow to Pyramid Lake above the safe release flows under the provisions of its existing water rights.
>
> - Up to 3,150 acre-feet of State Water Project water would be delivered to United Water Conservation District via Pyramid reach (from Pyramid Dam) between November 1 and the end of February of each water year. During this period, water deliveries may be made over a period of a few days, ramping flows up and down to simulate the hydrograph of a typical storm event, or they may be released more gradually over a longer period.
>
> - Releases from Pyramid Dam could be increased by up to 50 cfs for short periods to exercise the Pyramid Dam radial gate and stream release valves; test emergency power sources; conduct tests mandated by the Commission; or meet other short-term operational or maintenance requirements. No such testing would take place between March 15 and June 15. Testing would also be avoided to the extent possible between June 16 and July 31. Tests may be

conducted at any time between August 1 and March 14, provided that flows do not increase by more than 50 cfs above current base flows during the event and that the event does not last longer than 15 minutes. Scheduled tests requiring larger releases or lasting longer than 15 minutes would require prior notification to the U.S. Fish and Wildlife Service (FWS). Unscheduled releases due to equipment failure or emergency situations must be reported to the FWS no later than three business days after the event.

- The gaging station on upper Piru Creek (located north of Pyramid Lake) provides 24 hour averages; therefore, instantaneous peak stream releases may be attenuated. Unlike the natural inflow hydrograph, which typically peaks sharply, the stream release hydrograph of Pyramid reach may be attenuated.

- A multiplier is used to account for those portions of Pyramid Lake watershed that are not tributaries of upper Piru Creek and Cañada de Los Alamos upstream of their respective gaging stations. This may result in some deviations for individual storm events due to localized variations in storm water intensity.

- Because of operational constraints, the stream release hydrograph of Pyramid reach would typically gage measured inflow. The valves at Pyramid Dam can be adjusted for release flows of less than 3 cfs; however, the precise measurement of released flows less than 3 cfs may not be possible due to operational constraints of the dam's gaging instrumentation.

Article 58 requires the Licensees to maintain Pyramid Lake surface elevations at the highest, most practicable level commensurate with other Project purposes during the summer recreation season.

4.1.2 Water Rights

The Licensees operate the Project consistent with their water rights. Table 4.1-1 lists the local water rights for Piru Creek and Castaic Creek.

Table 4.1-1. Local Water Rights in Piru Creek and Castaic Creek

Local Water Right Users	Priority (Date)	SWRCB Designation (Application)	SWRCB Designation (Permit)	SWRCB Designation (License)[1]	Source (Waterbody)	Amount and Place of Diversion or Storage (Amount and Place)	Season (Period)	Place of Beneficial Use	Purpose
California Department of Water Resources	5/3/1979	25988	18709	13897-	Piru Creek	55,000 AF/year (maximum diversion 3,128 cfs); storage in Pyramid Lake, and storage in and rediversion to Castaic Lake (non-Project facility)	1/1-12/31	Within the Service Area of the State Water Project as shown on Map 1878-3 Revised December 1964, including Ventura County	Irrigation, domestic, municipal, industrial, salinity control, recreation, fish and wildlife enhancement, and incidental power
	1/4/1983	26058	18710	-	Castaic Creek	85,000 AF/year storage in Castaic Lake (non-Project facility)	1/1-12/31	Within the Service Area of the State Water Project as shown on Map 1878-3 Revised December 1964, including Ventura County	Irrigation, domestic, municipal, industrial, salinity control, recreation, fish and wildlife enhancement, and incidental power
United Water Conservation District	9/18/1947	12092A	11181	10173	Piru Creek	75,000 AF/year in Lake Piru (non-Project facility)	10/1-6/30	Santa Felicia Reservoir (non-Project facility)	Irrigation, domestic, municipal, industrial, recreational, and salinity control uses
						11,800 AF/year (maximum diversion 80 cfs) collected to underground storage via Piru Spreading Ground	1/1-12/31	Piru Spreading Ground	
	3/25/1982	27264	19373	13445		80,361.5 AF/year (maximum diversion 111 cfs) at Santa Felicia Dam (Lake Piru, a non-Project facility)	1/1-12/31	San Felicia Dam Powerhouse (non- Project facility)	Power use

Source: State Water Resources Control Board 2016
Note:
[1]License information provided where applicable. If no license information is provided, this indicates that the local water right user has a permit for that water right, not a license.
Key:
AF/year = acre-feet per year
cfs = cubic feet per second
SWRCB = State Water Resources Control Board

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4.1.3 Measures in Other Licenses, Permits, Agreements, and Contracts that Affect Project Operations

Various agreements affect Project operations. The first is the 1969 Memorandum of Understanding between DWR and USFS. According to Amendment 1 to the agreement, during normal operation conditions, water surface level variations in Pyramid Lake may not exceed 14 feet during each 7-day period beginning midnight each Sunday, and may not exceed 8 feet each day. In addition, the water surface of Pyramid Lake may not be lowered below an elevation of 2,560 feet without taking additional safety precautions and making appropriate notifications.

The Project utilizes water that is conveyed through the West Branch of the SWP to serve various contractors in southern California who have long-term water supply contracts with DWR. Table 4.1-2 lists the SWP contractors that are served by SWP water conveyed through the Project and their associated maximum contractual annual water delivery amounts.

In addition, the SWP water contract DWR has with the VCWPD, provides an additional operational measure, under which UWCD receives a portion of VCWPD's contractual amount from Pyramid Lake via Piru Creek. UWCD is authorized to receive up to 3,150 AF of SWP water from Pyramid Lake. SWP water is delivered to UWCD via Piru Creek between November 1 and the end of February each year.

Table 4.1-2. SWP Contractors Served by the West Branch of the SWP

SWP Contractor	Annual Maximum SWP Water Delivery Amount (AF)[2,3]
Antelope Valley-East Kern Water Agency	144,844[4]
Santa Clarita Valley Water Agency	95,200
Metropolitan Water District of Southern California[1]	1,911,500[1]
Ventura County Watershed Protection District	20,000
Total	**2,254,300**

Source: DWR 2015
Notes:
[1]Metropolitan Water District of Southern California is served by both the East and West Branch of the SWP. The value in the table represents the total contract amount for the Metropolitan Water District of Southern California.
[2]As specified in each contractor's long-term water supply contract
[3]Downstream of Elderberry Forebay Dam
[4]Antelope Valley-East Kern Water Agency is served by both the East Branch and West Branch of the SWP. The value in the table represents the total contract amount for Antelope Valley-East Kern Water Agency (both East and West branches).
Key:
AF = acre-feet
SWP = State Water Project

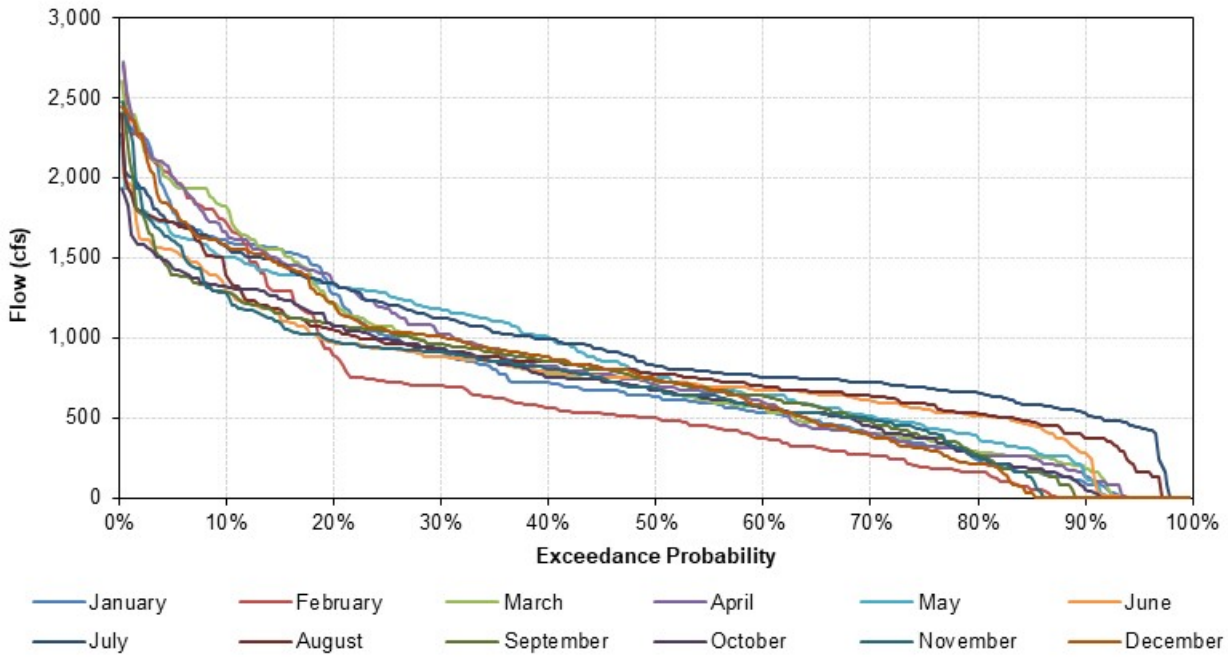
4.2 OPERATIONS IN TYPICAL DRY, NORMAL, AND WET WATER YEARS

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. In essence, the Project is operated in a run-of-river mode, generating power as SWP water is provided for downstream consumptive use, with the exception that Castaic Powerplant is a pumping–generating plant that reuses SWP water to generate electricity before it is delivered to downstream water users. Specific Project operations information is provided below by development.

4.2.1 Warne Power Development

4.2.1.1 Inflow into Quail Lake

Figure 4.2-1 provides monthly flow duration curves for inflow into Quail Lake from the SWP. As described in Section 3.1.1, Quail Lake does not receive any natural inflow. In the POR, the peak inflow was 2,723 cfs on April 18, 2007.



Source: DWR SWP Operations Report, Table 24
Key:
% = percent
cfs = cubic feet per second

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

4.2.1.2 Quail Lake Storage

Quail Lake has a gross storage capacity of 7,583.0 AF (i.e., storage at the NMWSE of 3,325 feet), with 4,189.0 AF of usable storage. The reservoir does not have a regulatory minimum pool requirement or any flood pool restrictions. Figure 4.2-2 shows average daily storage in Quail 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.

Figure 4.2-2 shows that for most times in the relicensing POR, storage is consistently kept in the range of 4,500 AF to 7,000 AF. Of the 4,015 days in the relicensing POR, 3,740 (93 percent of days) are within this range. However, there are a few instances of low storage. In 8 of the 11 WYs (i.e., 2007, 2008, 2009, 2010, 2012, 2013, 2015, and 2016), storage dropped below 4,500 AF. The lowest storage value of 3,962 AF occurred on December 18, 2009.

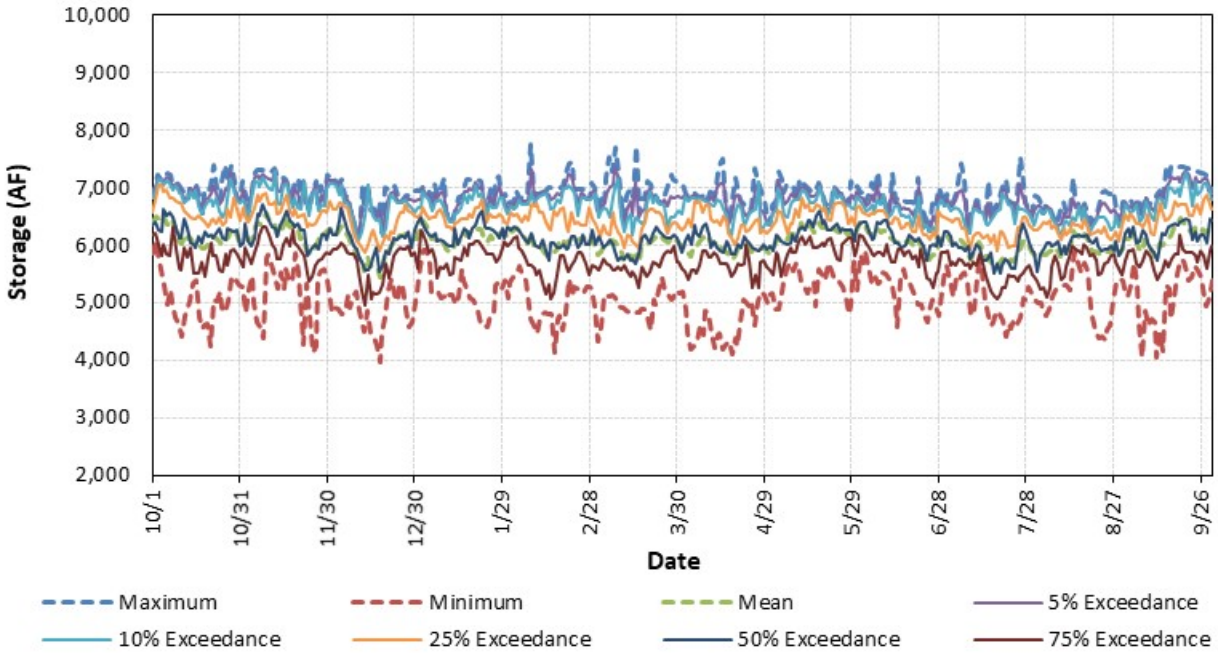


Figure 4.2-2. Daily Storage Statistics for Quail Lake for the Relicensing Period of Record

The storage-capacity curve showing the usable and gross storage capacities of Quail Lake is shown on Figure 4.2-3. The surface area at the maximum operating pool of 3,325 feet is 288 acres. The minimum operating pool for the Quail Lake is at 3,306.5 feet, corresponding to 195 acres of surface area, and 3,250.0 AF of storage.

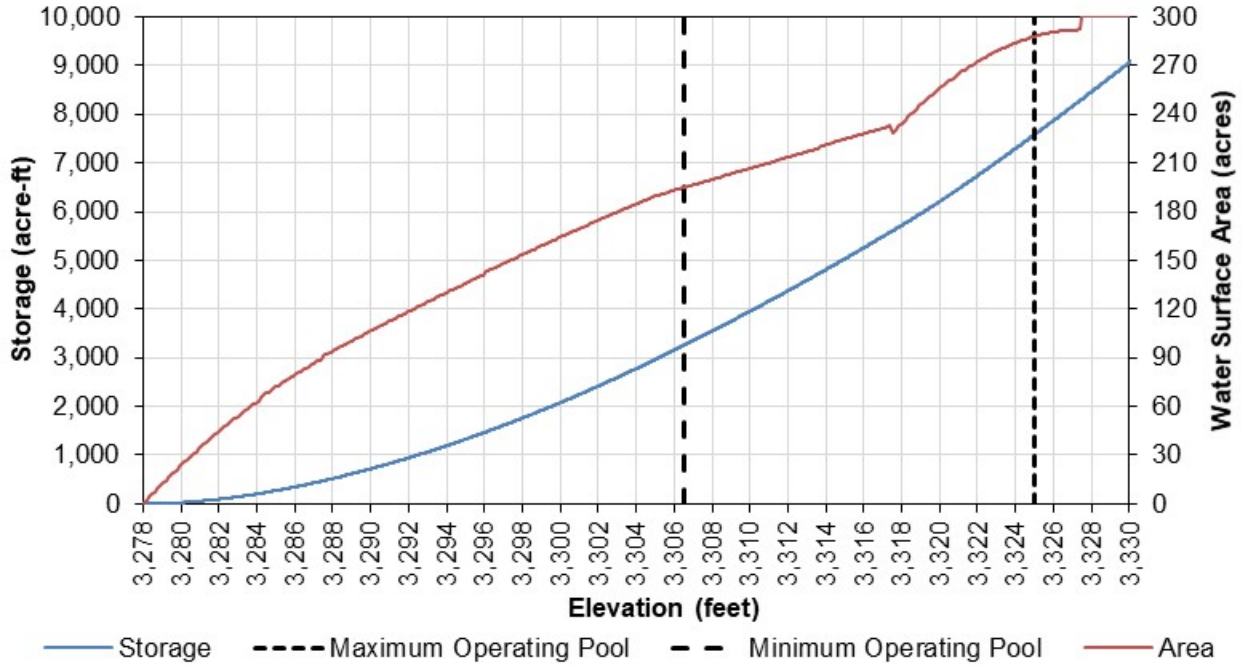


Figure 4.2-3. Quail Lake Storage-Capacity Curve

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

4.2.1.3 Outflow from Quail Lake

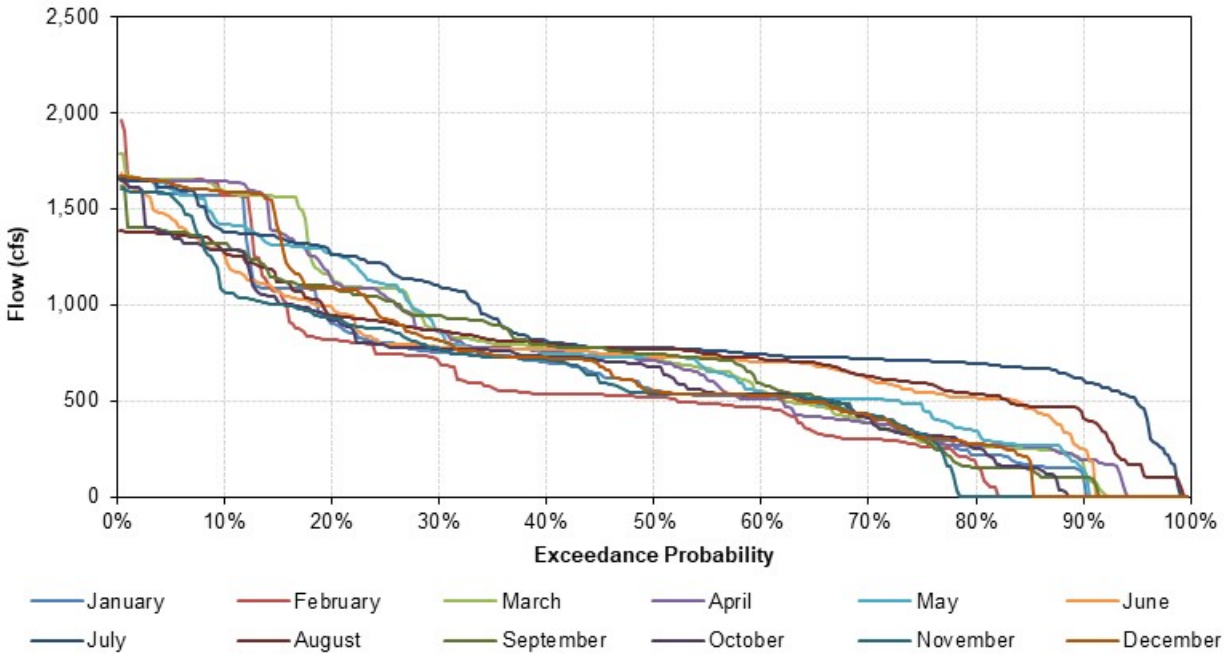
Quail Lake releases SWP water through the Lower Quail Canal and Peace Valley Pipeline into Warne Powerplant. The maximum capacities of the facilities are approximately 3,129 cfs and 1,564 cfs, respectively. These flows are described in Section 4.2.1.4. However, occasionally, SWP water is released into the Gorman Bypass Channel. These flows are described in Section 4.2.1.5.

4.2.1.4 Warne Powerplant

Quail Lake storage is minimally used to regulate flows into the Peace Valley Pipeline; accordingly, the Warne Powerplant is operated to generate all inflows using SWP water deliveries through the Peace Valley Pipeline. The powerplant is manually operated, with DWR staff on site or roving between Warne and Castaic 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, 1,564 cfs, and 704 cfs, respectively.

The Warne Powerplant contains two generating units with a centerline elevation of 2,586 feet. These include two 38.25-MW Fuji Electric Pelton-type turbines, each connected to a Toshiba generator. Each turbine has a rated head of 650 feet, runner speed of 200 revolutions per minute (rpm), rated output of 51,000 horsepower (hp), and a rated discharge of 782 cfs. The total combined flow capacity for the powerplant is 1,564 cfs.

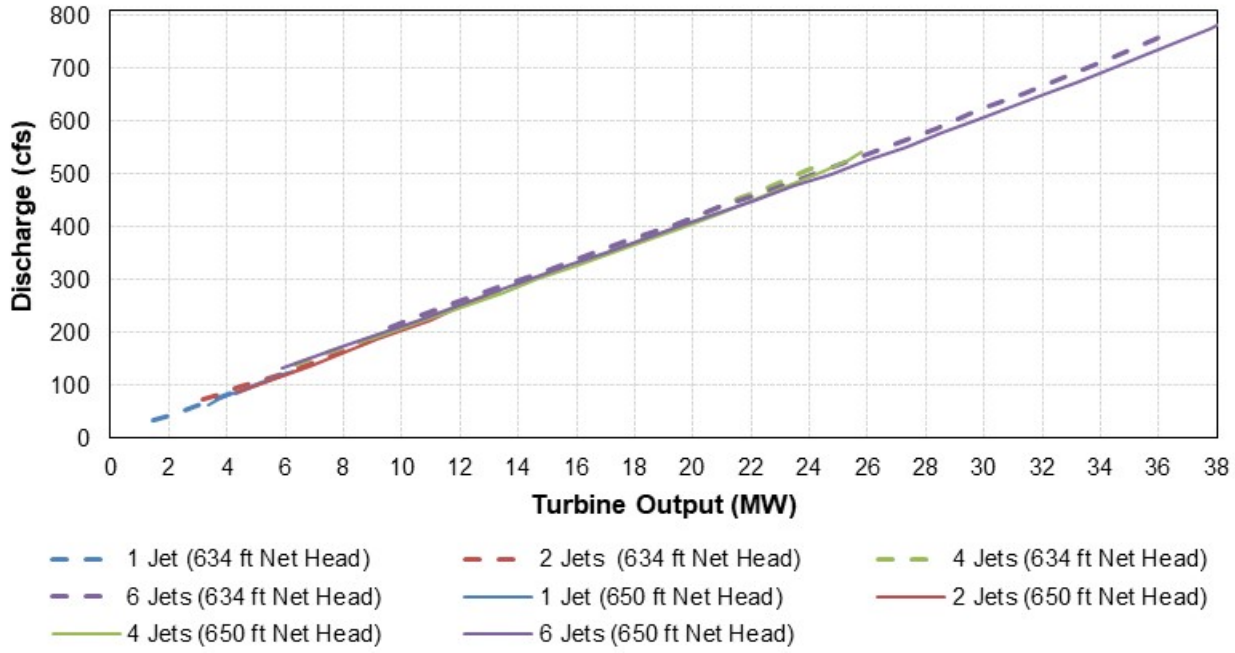
Monthly flow duration curves for releases from Warne Powerplant over the relicensing POR are provided on Figure 4.2-4.



Source: DWR SWP Operations Report, Table 25
Key:
% = percent
cfs = cubic feet per second

Figure 4.2-4. Monthly Flow Duration Curves for Warne Powerplant for the Relicensing Period of Record Using Gaged Data

Powerhouse capability versus flow for 634 and 650 feet of net head are shown on Figure 4.2-5 for a single unit. The relationship between flow and output is the same for each of the units at the Warne Powerplant. Normal, minimum, and maximum operating heads for Warne Powerplant are 650 feet, 634 feet, and 655 feet, respectively.



Source: Fuji Electric Company
Note: Curves for maximum net head of 655 feet are not shown; they would be indistinguishable from the curves for 650 feet of net head
Key:
cfs = cubic feet per second
ft = feet
MW = megawatt

Figure 4.2-5. Warne Powerplant Single-Unit Capability Curve for 634 and 655 Feet of Net Head

The Warne Powerplant units use Pelton turbines, and are not dependent on tail water elevation. The turbine elevation for the Warne Powerplant is 2,582 feet. Since the Warne Powerplant is a base-loaded plant without peaking capability, there is no diurnal or weekly load curve.

The Warne Powerplant generated an annual average of 304,364 megawatt-hours (MWh) from calendar year 2007 through calendar year 2017. The average annual plant factor for the powerplant for this time period was 0.46, based on the annual generation divided by the plant nameplate generating capability times the number of hours per calendar year. Annual gross generation and plant factors for the powerplant over the POR are provided in Table 4.2-1.

Table 4.2-1. Annual Generation and Plant Factors for Warne Powerplant Over the Relicensing Period of Record

Calendar Year	Annual Generation (MWh)	Annual Generation (aMW)	Plant Capability (MW)	Plant Factor
2007	465,000	53.1	75	0.71
2008	316,000	36.1	75	0.48
2009	284,000	32.4	75	0.43
2010	269,000	30.7	75	0.41
2011	244,000	27.9	75	0.37
2012	362,000	41.3	75	0.55
2013	374,000	42.7	75	0.57
2014	181,000	20.7	75	0.28
2015	270,800	30.9	75	0.41
2016	288,000	32.8	75	0.44
2017	294,200	33.6	75	0.45
Total	**3,348,000**	**NA**	**NA**	**NA**
Minimum	**181,000**	**20.7**	**75**	**0.28**
Average	**304,364**	**34.8**	**75**	**0.46**
Median	**288,000**	**33.3**	**75**	**0.44**
Maximum	**465,000**	**53.1**	**75**	**0.71**

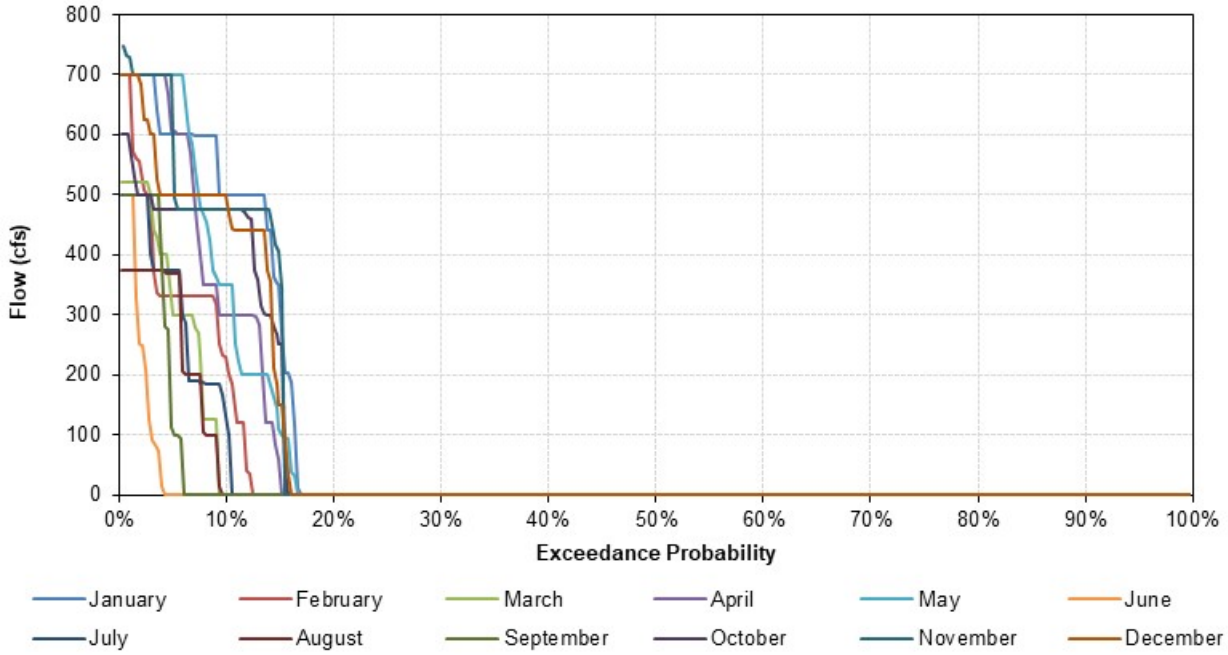
Source: DWR SWP Operations Report, Table 38
Key:
aMW = annual megawatt
MW = megawatt
MWh = megawatt hour
NA = This metric is not additive.

The dependable capacity of a generating facility is defined as “the generating capacity that the plant can deliver under the most adverse water supply conditions to meet the needs of an electric power system with a given maximum demand” (Elliott et al. 1997). One of the critical parameters for defining dependable capacity is the period over which the capacity must be provided. DWR determined the dependable capacity of the Warne Powerplant by averaging five years of reported Resource Adequacy data submitted to the California Independent System Operator (CAISO) for the years of 2013 through 2017. The Warne Powerplant’s dependable capacity is 60.4 MW.

4.2.1.5 Gorman Bypass Channel

As described in Section 3.1.4.2, the Gorman Bypass Channel is a man-made channel that is used to convey flow from Quail Lake to Pyramid Lake if there is insufficient capacity in the Peace Valley Pipeline or Warne Powerplant to move the full flow from the Lower Quail Canal. Flow in the Gorman Bypass Channel is gaged by DWR, and daily flows are published in Table 25 of DWR's SWP Operations Report (DWR 2017a).

Monthly flow duration curves for flow in the Gorman Bypass Channel over the relicensing POR are provided on Figure 4.2-6.



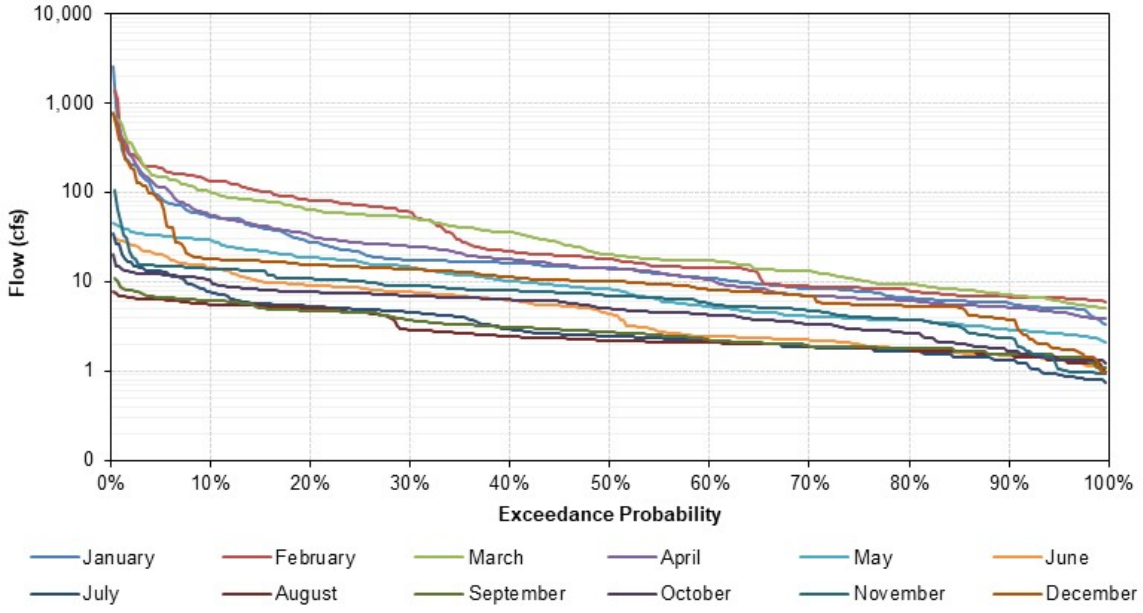
Source: DWR SWP Operations Report, Table 25
Key:
% = percent
cfs = cubic feet per second

Figure 4.2-6. Monthly Flow Duration Curves for the Gorman Bypass Channel for the Relicensing Period of Record Using Gaged Data

4.2.2 Castaic Power Development

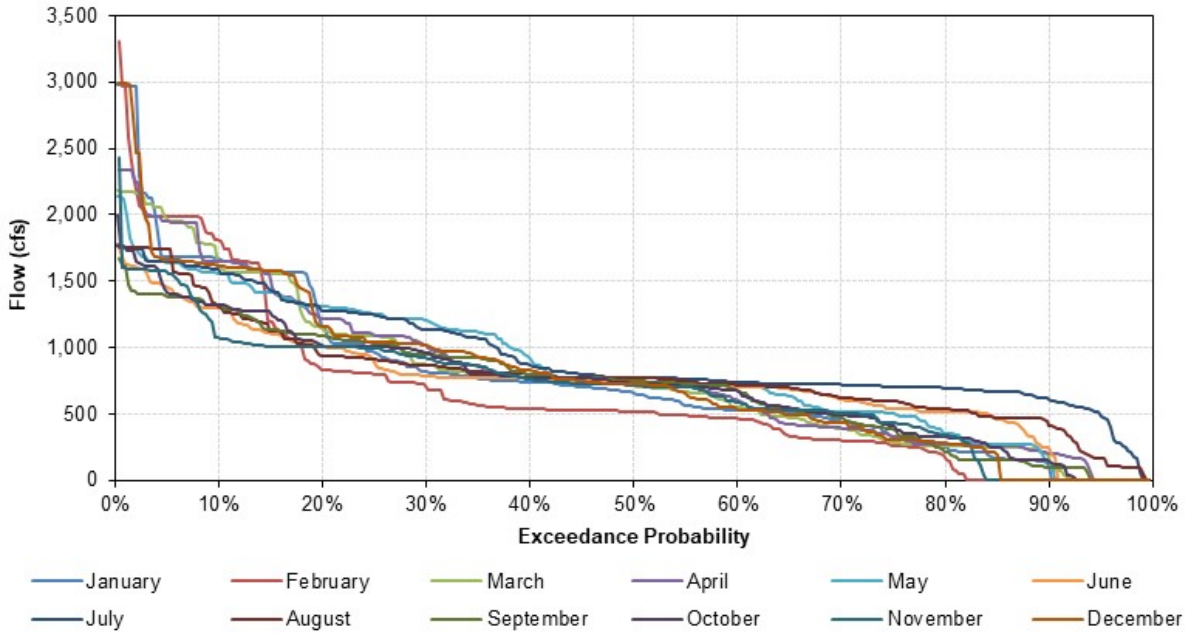
4.2.2.1 Inflow into Pyramid Lake

Figures 4.2-7, 4.2-8, and 4.2-9 provide monthly flow duration curves for inflow into Pyramid Lake, excluding pumpback water from Elderberry Forebay, from: (1) SWP; (2) natural flow; and (3) the combination SWP and natural inflow. As described in Section 3.1.4.1, the natural inflow includes the sum of USGS Gage 11109375 for Piru Creek; USGS Gage 11109395 for Cañada de Los Alamos; and the ungaged natural inflow. As described in Section 3.1.4.2, the SWP inflow is the sum of USGS Gage 11109398 for Warne Powerplant, and Table 25 of DWR's SWP Operations Report (DWR 2017a) for Gorman Bypass Channel. In the POR, the peak natural inflow was 2,553 cfs on January 27, 2008, the peak SWP inflow was 3,300 cfs on February 1, 2017, and the peak total inflow was 3,318 cfs on February 1, 2017.



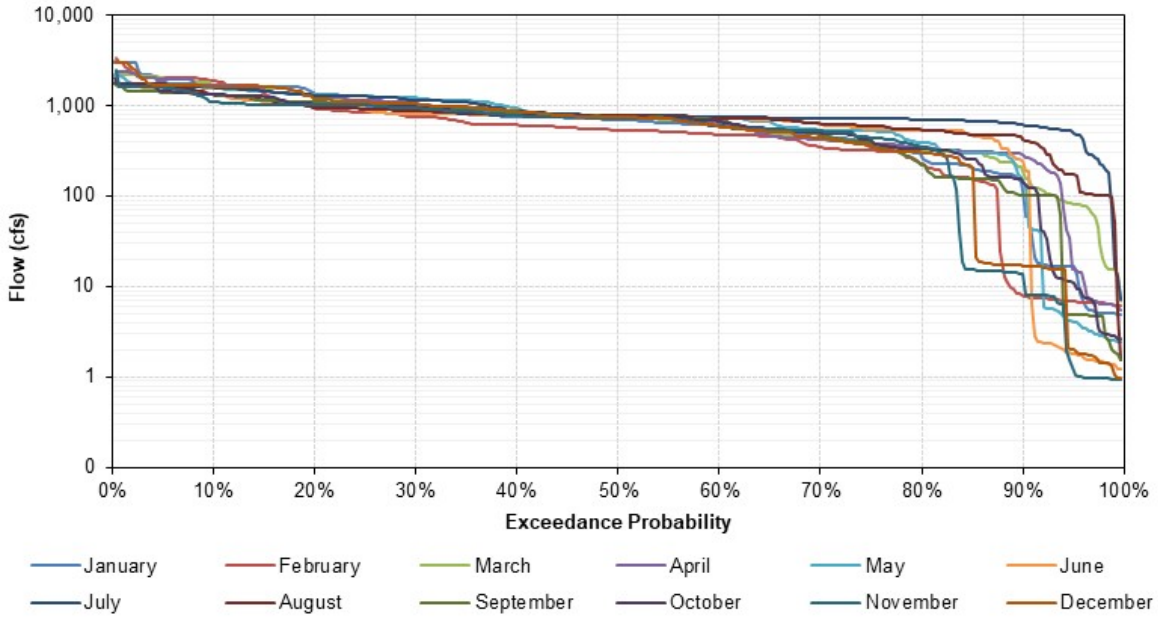
Source: USGS gages 111093898, 11109395, 11109375; DWR SWP Operations Report, Table 25
Key:
% = percent
cfs = cubic feet per second

Figure 4.2-7. Monthly Flow Duration Curves for Natural Inflow to Pyramid Lake for the Relicensing Period of Record



Source: DWR SWP Operations Report, Table 25
Key:
% = percent
cfs = cubic feet per second

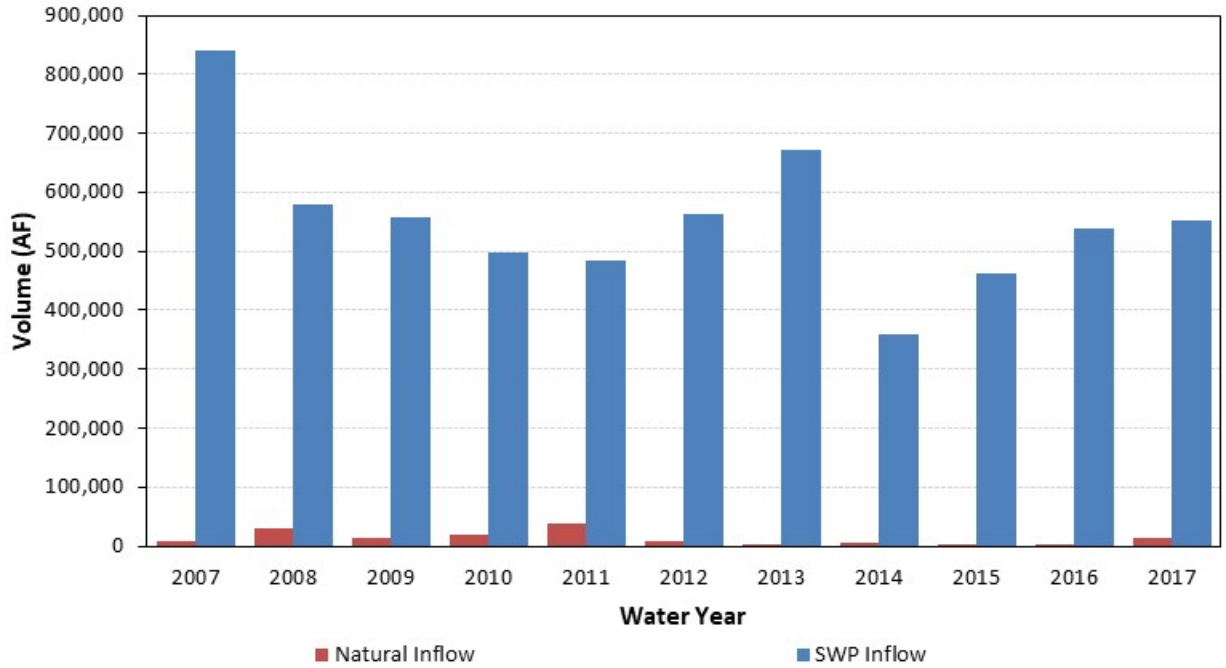
Figure 4.2-8. Monthly Flow Duration Curves for SWP Inflow to Pyramid Lake for the Relicensing Period of Record



Source: USGS gages 111093898, 11109395, 11109375; DWR SWP Operations Report, Table 25
Key:
% = percent
cfs = cubic feet per second

Figure 4.2-9. Monthly Flow Duration Curves for Total Inflow to Pyramid Lake for the Relicensing Period of Record

Figure 4.2-10 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 Pyramid Lake. The greatest difference between the two volumes of 831,976 AF occurred in WY 2007, and the smallest difference between the two volumes of 353,392 AF occurred in WY 2014.



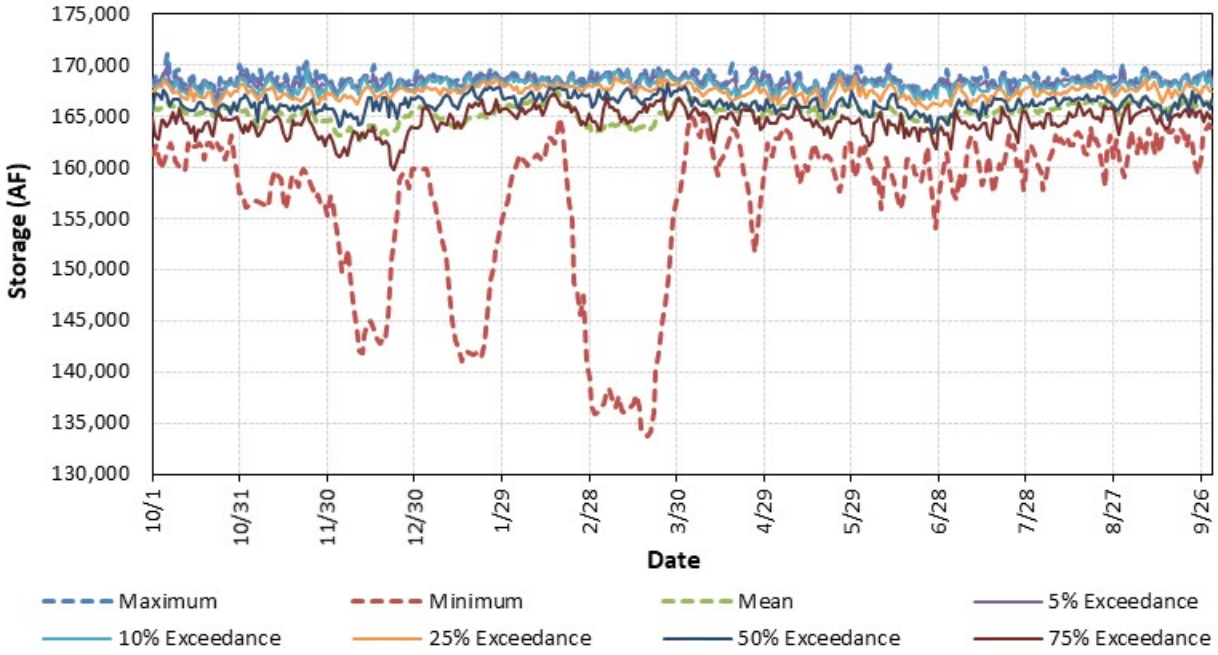
Sources: USGS Gages 111093898, 11109395, 11109375; DWR SWP Operations Report, Table 25
Key:
AF = acre-feet
SWP = State Water Project

Figure 4.2-10. Relative Contribution of Natural Inflow and SWP Inflow to Pyramid Lake

4.2.2.2 Pyramid Lake Storage

Pyramid Lake is the principal storage facility for the Project, and acts as the upper reservoir for Castaic Powerplant pumpback operations. The reservoir has a gross storage capacity of 161,375.0 AF (i.e., storage at the NMWSE of 2,579 feet) with a water surface area of 1,269 acres, and a usable storage capacity of 20,844 AF which corresponds to the minimum operating elevation of 2,560 feet which was set to establish a minimum pool for recreation on Pyramid Lake. Article 58 in the existing FERC license (Section 4.1.1) and the existing DWR agreement with USFS (Section 4.1.2) set this minimum operating elevation and provides some additional limits on reservoir fluctuations.

Figure 4.2-11 shows average daily storage in Pyramid 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.

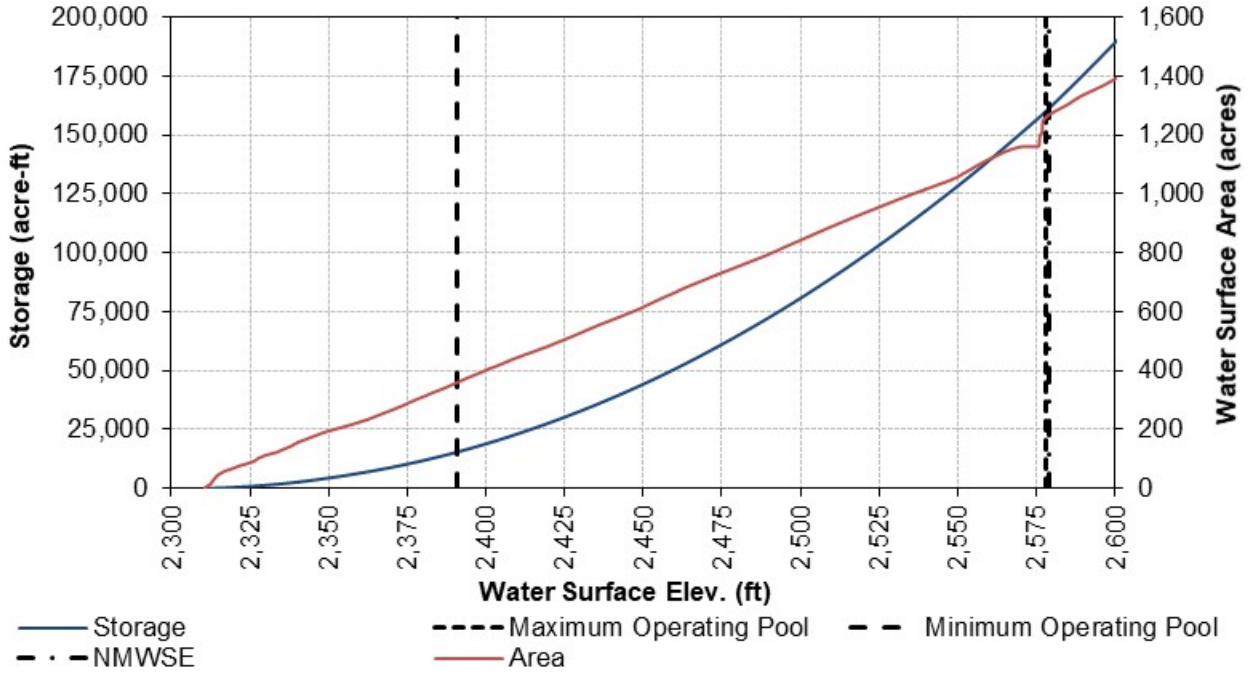


Sources: USGS Gage 11109520; DWR SWP Operations Report, Table 25
Key:
AF = acre-feet

Figure 4.2-11. Daily Storage Statistics for Pyramid Lake for the Relicensing Period of Record

Figure 4.2-11 shows that for most times in the relicensing POR, storage is consistently kept in the range of 160,000 AF to 170,000 AF. Of the 4,015 days in the relicensing POR, 3,786 (94 percent of days) are within this range. However, there are a few instances of low storage. In four of the 11 WYs (i.e., 2007, 2008, 2009, and 2010), storage drops below 155,000 AF. The lowest storage value of 133,667 AF occurred on March 20, 2008, when the Gorman Creek Improvement Channel failed by overtopping. The reservoir storage was dropped while emergency repairs were being completed.

The storage-capacity curve showing the usable and gross storage capacities of Pyramid Lake is shown on Figure 4.2-12. The surface area at the maximum operating pool of 2,578 feet is 1,269.0 acres, with a storage volume of 160,110 AF. The minimum operating pool for Castaic Powerplant is at 2,391 feet, corresponding to 360 acres of surface area, and 15,632 AF of storage.

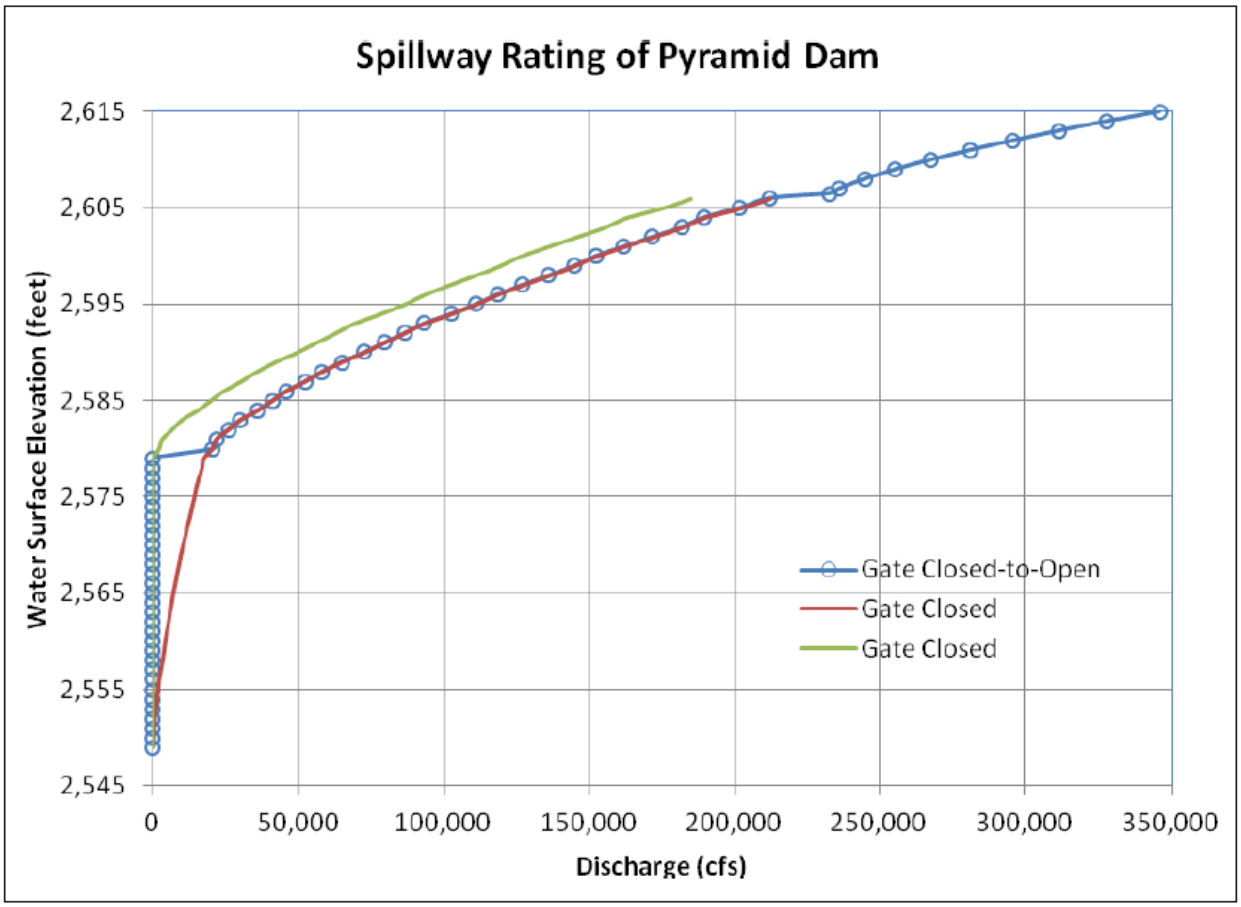


Key:
ft = feet
Source: DWR 2017b

Figure 4.2-12. Pyramid Lake Storage-Capacity Curve

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

There are two spillways on the right abutment of Pyramid Dam. One is a service spillway, which includes a single radial gate-controlled, depressed concrete-lined chute, 40 feet wide by 31 feet tall, terminating in a flip bucket for passing normal flows through the reservoir. The gated chute was designed to discharge small floods and emergency releases up to 17,000 cfs at reservoir elevation 2,578 feet. The second is an emergency spillway, which is an uncontrolled, unlined channel with a 375-foot-long overpour weir with the crest set at the reservoir's NMWSE. The emergency spillway is designed for discharging very large inflows. The combined spillways have a designed capacity of 165,900 cfs, with 5 feet of freeboard. The rating curve for the combined spillways is presented on Figure 4.2-13.

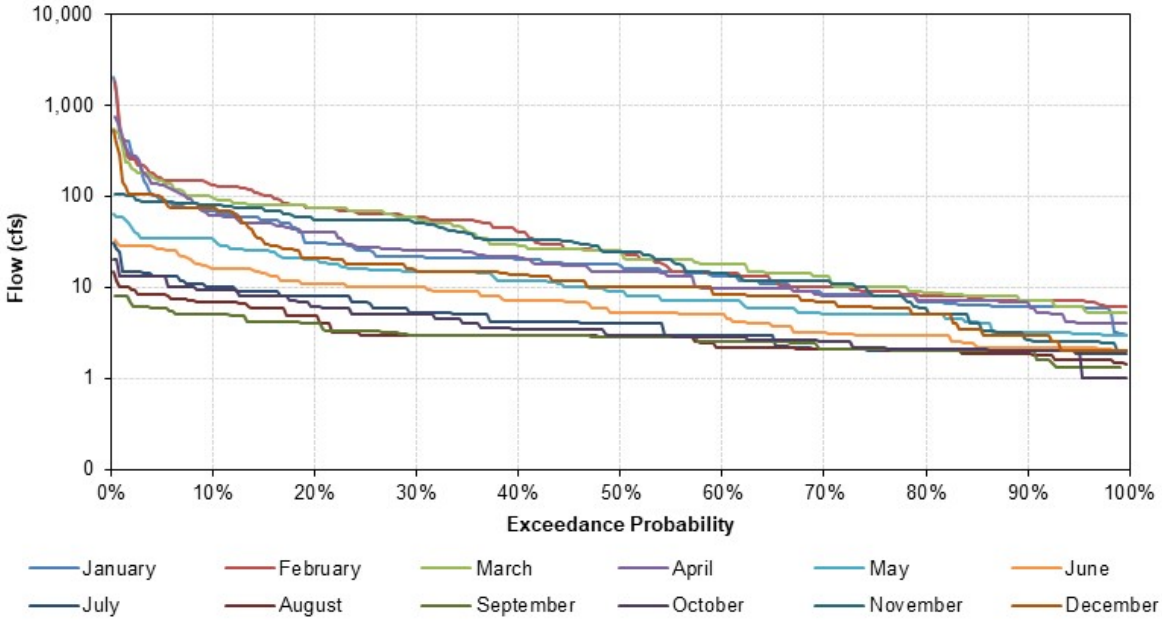


Source: DWR 2014
Key:
cfs = cubic feet per second

Figure 4.2-13. Pyramid Dam Spillway Rating Curve

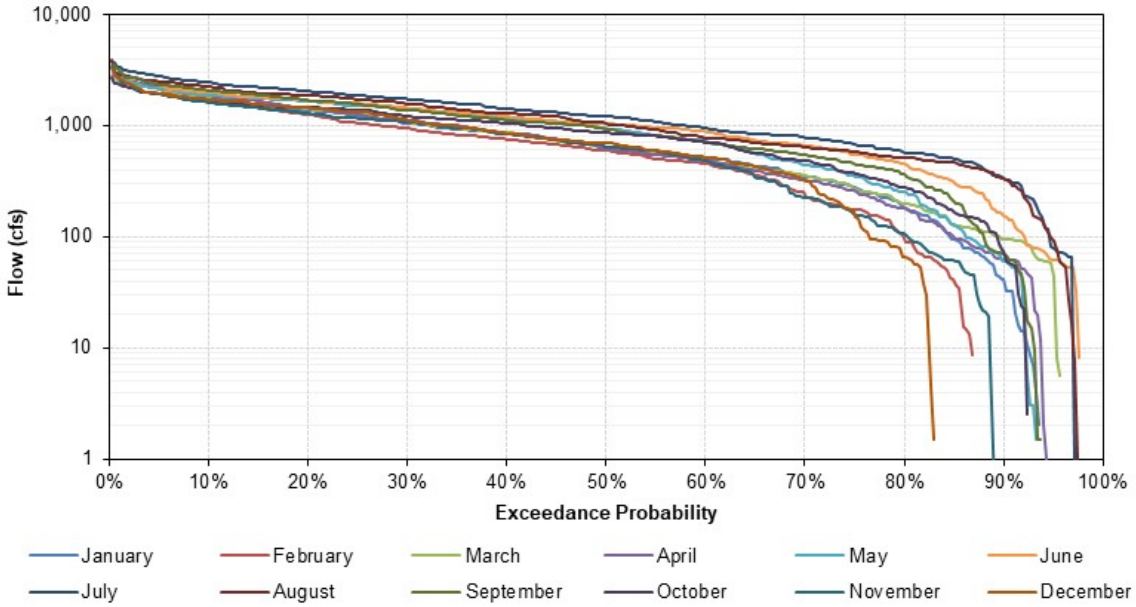
4.1.2 Outflow from Pyramid Lake

Figures 4.2-14, 4.2-15, and 4.2-16 provide monthly flow duration curves for outflow from Pyramid Lake from: (1) SWP; (2) natural flow; and (3) the combination SWP and natural outflow. The natural outflow is measured by USGS Gage 11109525, adjusted for SWP deliveries to UWCD, as described in Section 3.1.6.2 and Section 4.1.1. The SWP outflow is measured by DWR and reported in Table 25 of DWR's SWP Operations Report (DWR 2017a), as described in Section 3.1.6. In the POR, the peak natural outflow was 2,025 cfs on January 27, 2008, the peak SWP outflow was 3,866 cfs on August 29, 2008, and the peak total outflow was 3,871 cfs on August 29, 2008.



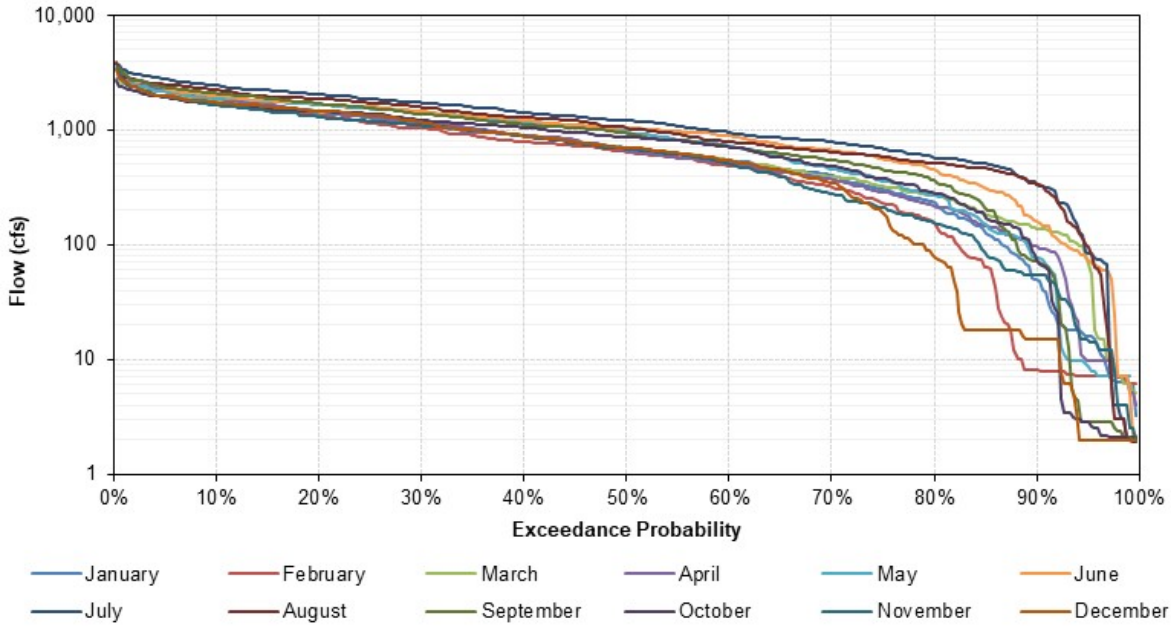
Source: USGS Gage 11109525
Key:
% = percent
cfs = cubic feet per second

Figure 4.2-14. Monthly Flow Duration Curves for Natural Outflow from Pyramid Lake for the Relicensing Period of Record



Source: DWR SWP Operations Report, Table 25
Key:
% = percent
cfs = cubic feet per second

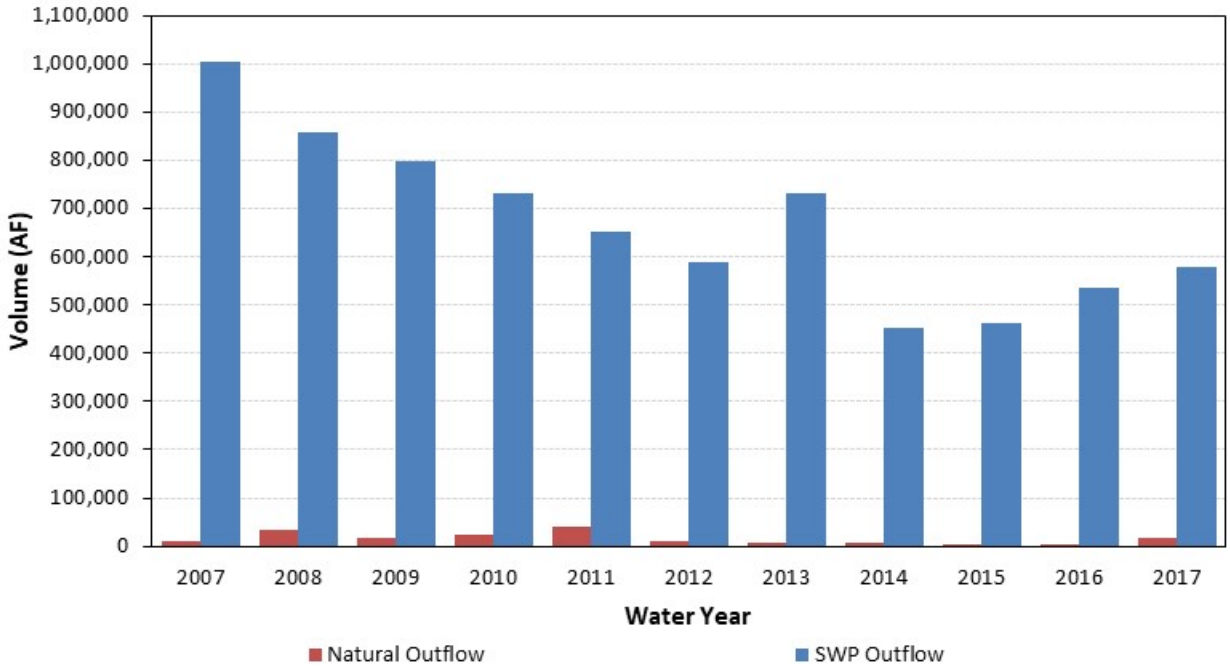
Figure 4.2-15. Monthly Flow Duration Curves for SWP Outflow from Pyramid Lake for the Relicensing Period of Record



Sources: DWR SWP Operations Report, Table 25; USGS Gage 11109525
Key:
% = percent
cfs = cubic feet per second

Figure 4.2-16. Monthly Flow Duration Curves for Total Outflow from Pyramid Lake for the Relicensing Period of Record

Figure 4.2-17 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 992,634 AF occurred in WY 2007, and the smallest difference between the two volumes of 444,211 AF occurred in WY 2014.



Source: USGS Gage 11109525; DWR SWP Operations Report, Table 25
Key:
AF = acre-feet
SWP = State Water Project

Figure 4.2-17. Relative Contribution of Natural Outflow and SWP Outflow

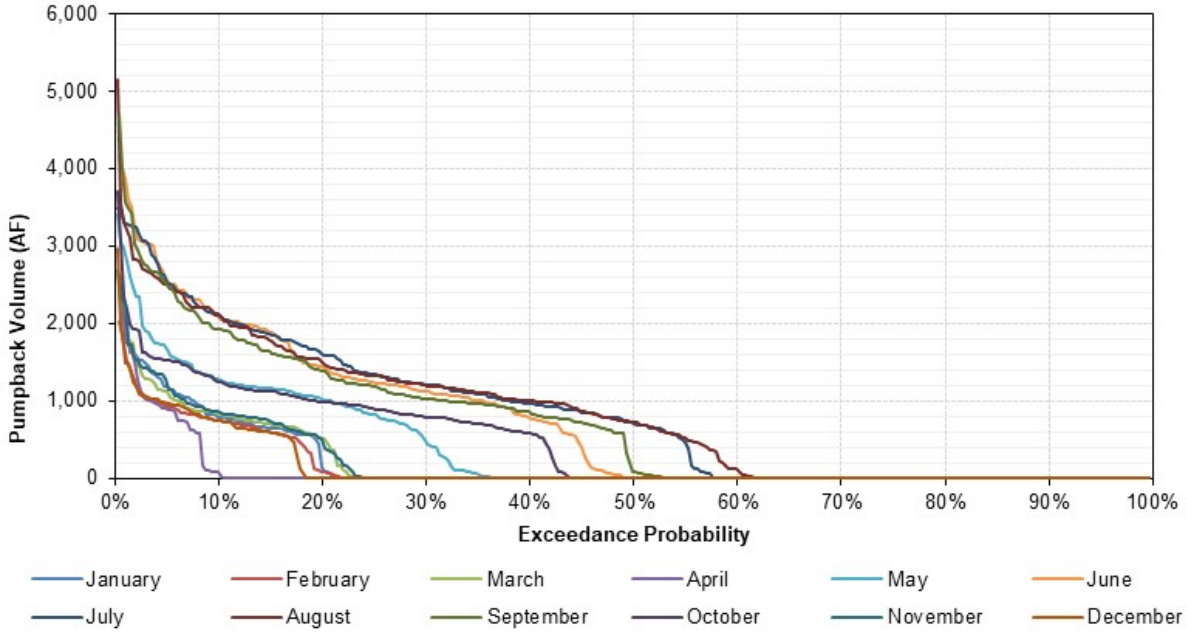
4.2.3 Angeles Tunnel and Castaic Penstocks

Releases of SWP water from Pyramid Lake, and pumpback water from Elderberry Forebay to the lake, are made through the Angeles Tunnel. The tunnel intake is a large, gravity-fed, reinforced concrete structure located at the south end of Pyramid Lake, just east of the dam embankment, with four 22-foot by 22-foot vertical-facing horizontal openings with a rim elevation of 2,344 feet. The Angeles Tunnel is 7.2 miles long, has a diameter of 30 feet, and has a maximum flow capacity of 18,400 cfs. The tunnel delivers water to the Castaic Penstock assembly for the seven units in Castaic Powerplant. These include six 2,400-foot-long steel penstocks ranging in diameter from 9 feet to 13.5 feet serving the six powerhouse units (Units 1 through 6). Unit 7 in the powerplant is served by a 1,900-foot-long steel penstock ranging in diameter from 7 feet to 9 feet, branching from a Y-connection between the tunnel portal and the main trifurcation. Combined flow capacity for all seven penstocks is 17,840 cfs. Flow through the tunnel and penstocks is discussed in the next section.

4.2.4 Castaic Powerplant

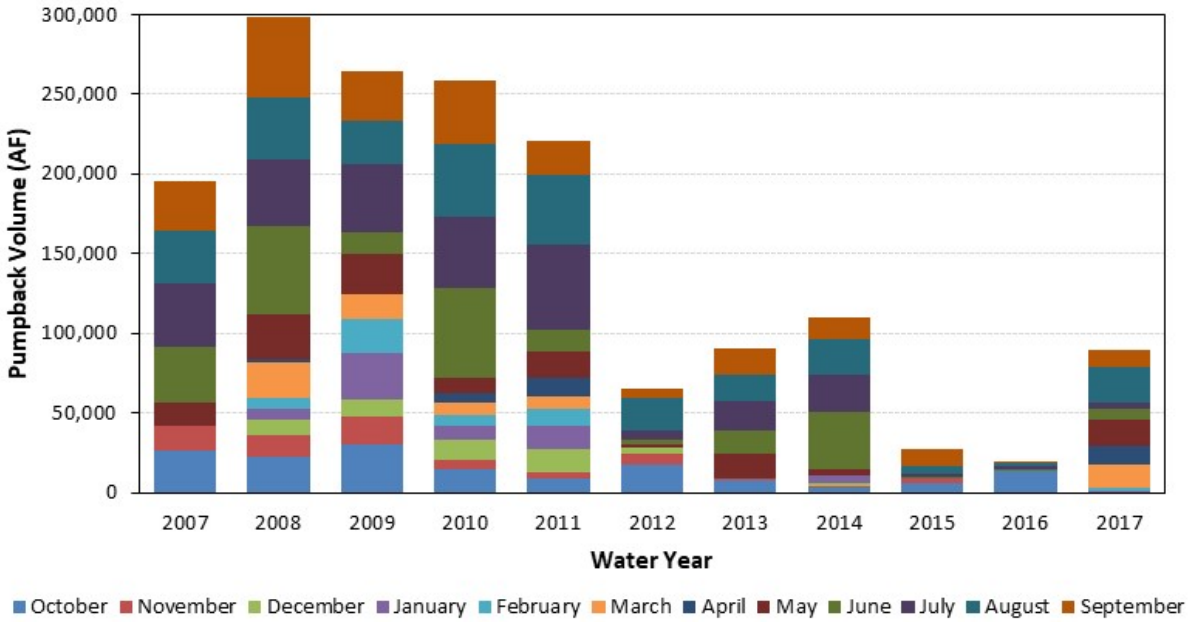
The Castaic Powerplant has six 212.5 MW reversible units and is operated as a pump-generating system. LADWP uses Castaic Powerplant to generate and to store power when it determines it is the most economical and beneficial to the citizens of Los Angeles. During on-peak power periods when power demands and costs are high, typically on weekday daylight hours (i.e., when extra power is needed in the Los Angeles service territory), water is released from Pyramid Lake through the Angeles Tunnel to generate power at Castaic Powerplant. In addition, water is pumped from Elderberry Forebay to Pyramid Lake to store excess power, normally to support system stability and reliability when there is excess intermittent generation. During off-peak power periods when power demands and costs are low, LADWP can pump water back from Elderberry Lake to Pyramid Lake to increase its generating capacity until it is needed for power generation. This water can be routed through the turbine generators in a very short time to meet peak and/or unanticipated demands on LADWP's electric system. The pumping function at Castaic Powerplant improves the availability of water for peak power generation, which enhances the power generation benefits to the Los Angeles service territory. Figure 4.2-18 shows monthly flow exceedance curves for pumpback water from Elderberry Forebay to Pyramid Lake over the POR. Figure 4.2-19 shows monthly flow volumes over the POR by WY and demonstrates that pumpback operations tend to peak in the summer months; and there are years when no pumpback operations occur during winter months.

In addition, Castaic Powerplant provides valuable ancillary services to LADWP as a balancing authority, including the ability to: (1) help balance load with generation, (2) integrate intermittent energy resources, and (3) provide crucial ancillary services to the grid – namely, reactive power support, regulation and frequency support service, and operating reserve services (both spinning and supplemental). These ancillary benefits enable LADWP to promote the dependability of its power system, especially when power demand is high (i.e., hot summers).



Source: DWR SWP Operations Report, Table 25
Key:
% = percent
AF = acre-feet

Figure 4.2-18. Monthly Exceedances of Total Daily Pumpback Volume from Elderberry Forebay to Pyramid Lake



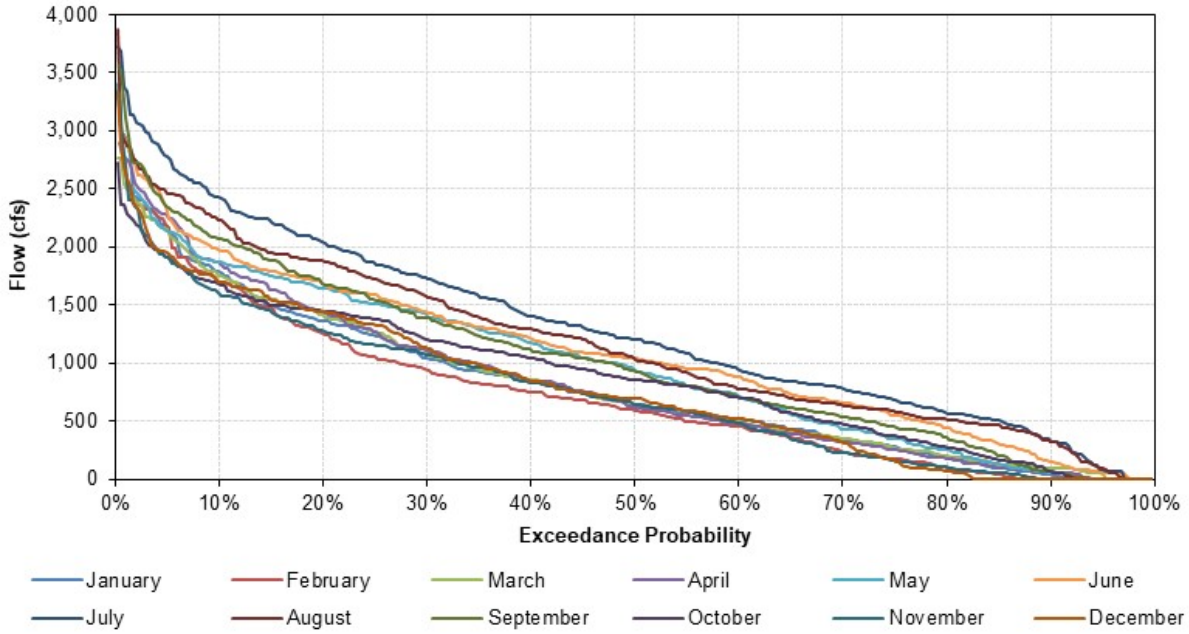
Source: DWR SWP Operations Report, Table 25
Key:
AF = acre-feet

Figure 4.2-19. Monthly and Annual Volumes of Pumpback from Elderberry Forebay to Pyramid Lake

Castaic Powerplant is manually operated, with LADWP 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, 3,866 cfs, and 927 cfs, respectively.

Castaic Powerplant has six Voith Siemens Hydro, reversible pump/turbines and motor/generators, Francis-type pump-turbine units each with a rated head of 1,000 feet, a runner speed of 257 rpm, a rated output of 363,000 hp, and an approximated rated discharge of 3,500 cfs (generator continuous capacity is 250,000 kilovolt-amperes [kVA] and maximum capacity is 287,500 kVA, with a power factor of 0.85, a frequency of 60 hertz [Hz] and voltage of 18,000 volts). It has one Alstom Pelton-type pump starting turbine unit with a rated head of 950 feet, a runner speed of 225 rpm, rated output of 69,000 hp, and an approximate rated discharge of 752 cfs (generator capacity is 70,000 kVA with a 0.80 power factor, frequency of 60 Hz, and voltage of 11,000 volts). The six Francis units have a combined licensed and authorized installed generating capacity of 1,275 MW, and a plant capacity of 21,000 cfs. Pumping capability at normal static head ranges from 2,200 cfs, with one unit operating to about 12,000 cfs with six units pumping. Castaic Powerplant's Unit 7 is a small generation unit housed in a separate building and used solely to start the six main units when they are used as pumps. In addition, Unit 7 is not used for power generation. Therefore, Unit 7 is excluded from the installed capacity calculation.

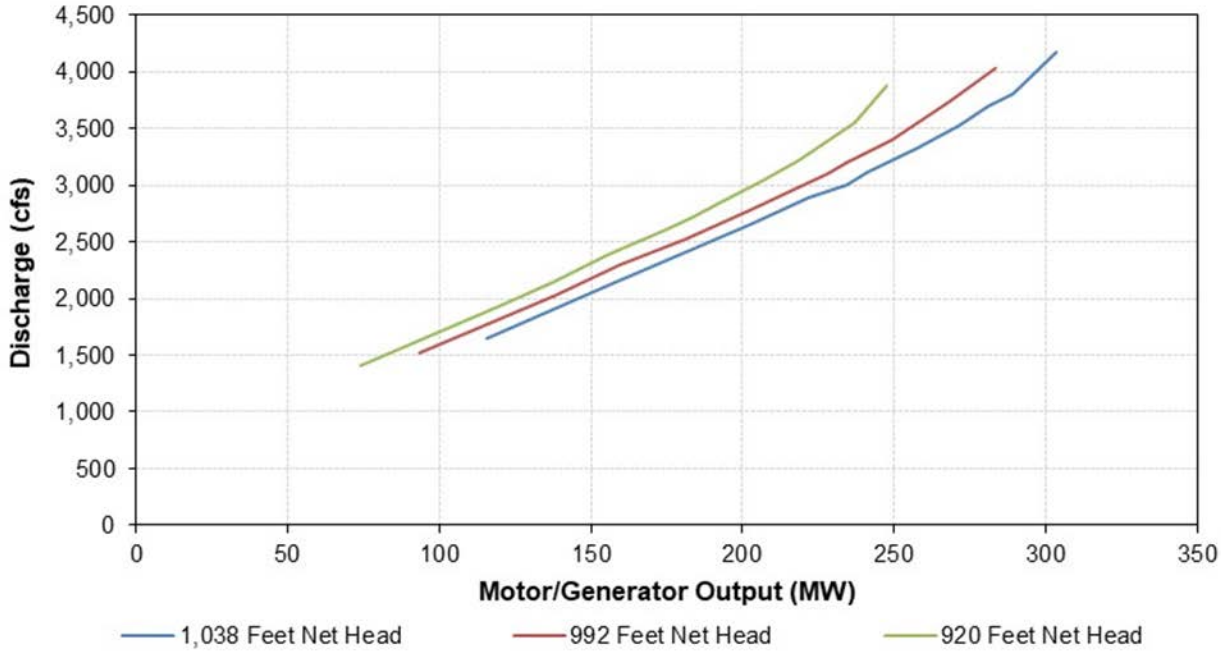
Monthly flow duration curves for releases from Castaic Powerplant into Elderberry Forebay over the relicensing POR are provided on Figure 4.2-20.



Source: DWR SWP Operations Report, Table 25
Key:
% = percent
cfs = cubic feet per second

Figure 4.2-20. Monthly Flow Duration Curves for Castaic Powerplant for the Relicensing Period of Record Using Gaged Data

Castaic Powerplant's generating capability versus flow for 920, 992, and 1,038 feet of net head are shown on Figure 4.2-21 for a single unit. Normal, minimum, and maximum operating heads for Castaic Powerplant generation operations are 1,060 feet, 1,130 feet, and 1,088 feet, respectively.



Source: Castaic Unit 2 September 2004 Turbine/Generator Index Tests
Note: Turbine tests conducted at various heads, data from each test corrected to specified net heads
Key:
cfs = cubic feet per second
Ft = feet
MW = megawatt

Figure 4.2-21. Castaic Powerplant Single-Unit Capability Curve for 920, 992, and 1,038 Feet of Net Head

LADWP does not track Castaic Powerplant pumping load versus head, and pumping loads for the normal, minimum, and maximum operating heads are also not available. Since LADWP operates the Elderberry Forebay storage through both releases to Castaic Lake and for pumping into Pyramid Lake, flow through the Castaic Powerplant is independent of its tailwater elevation, and there is no tailwater rating curve available for the Castaic Powerplant.

The Castaic Powerplant generated an average annual of 378,945 MWh from calendar year 2007 through calendar year 2017. The average annual plant factor for the powerplant for this time period was 0.03, based on the annual generation divided by the plant nameplate generating capability times the number of hours per calendar year. Annual gross generation and plant factors for the powerplant over the POR are provided in Table 4.2-2.

Table 4.2-2. Annual Generation and Plant Factors for Castaic Powerplant Over the Relicensing Period of Record

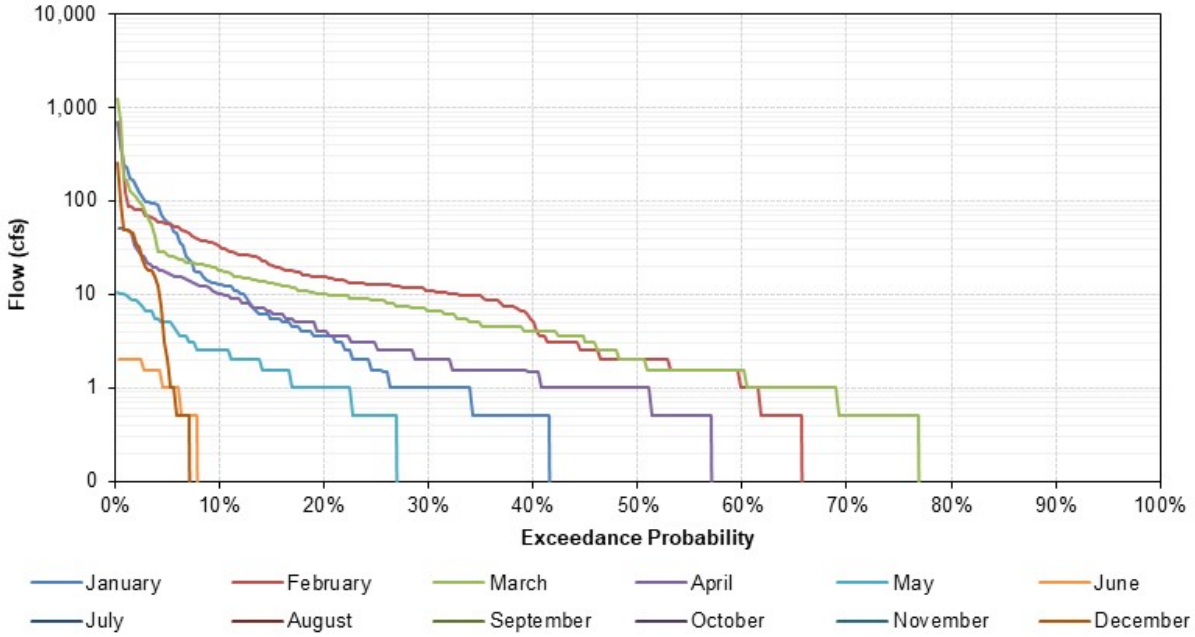
Calendar Year	Annual Generation (MWh)	Annual Generation (aMW)	Plant Capability (MW)	Plant Factor
2007	860,000	98.2	1,275	0.08
2008	323,153	36.9	1,275	0.03
2009	385,773	44.0	1,275	0.03
2010	241,544	27.6	1,275	0.02
2011	187,767	21.4	1,275	0.02
2012	464,193	52.8	1,275	0.04
2013	477,559	54.5	1,275	0.04
2014	163,370	18.6	1,275	0.01
2015	329,210	37.6	1,275	0.03
2016	378,884	43.1	1,275	0.03
2017	356,946	40.7	1,275	0.03
Total	**4,168.399**	**NA**	**NA**	**NA**
Minimum	**163,370**	**18.6**	**1,275**	**0.01**
Average	**378,945**	**43.2**	**1,275**	**0.03**
Median	**356,946**	**40.7**	**1,275**	**0.03**
Maximum	**860,000**	**98.2**	**1,275**	**0.08**

Source: LADWP Records; DWR SWP Operations Report, Table 38
Key:
aMW = annual megawatt
MW = megawatt
MWh = megawatt-hour
NA = This metric is not additive.

Based on 5 years of seasonal generation data, Castaic Powerplant's dependable capacity is 201.6 MW.

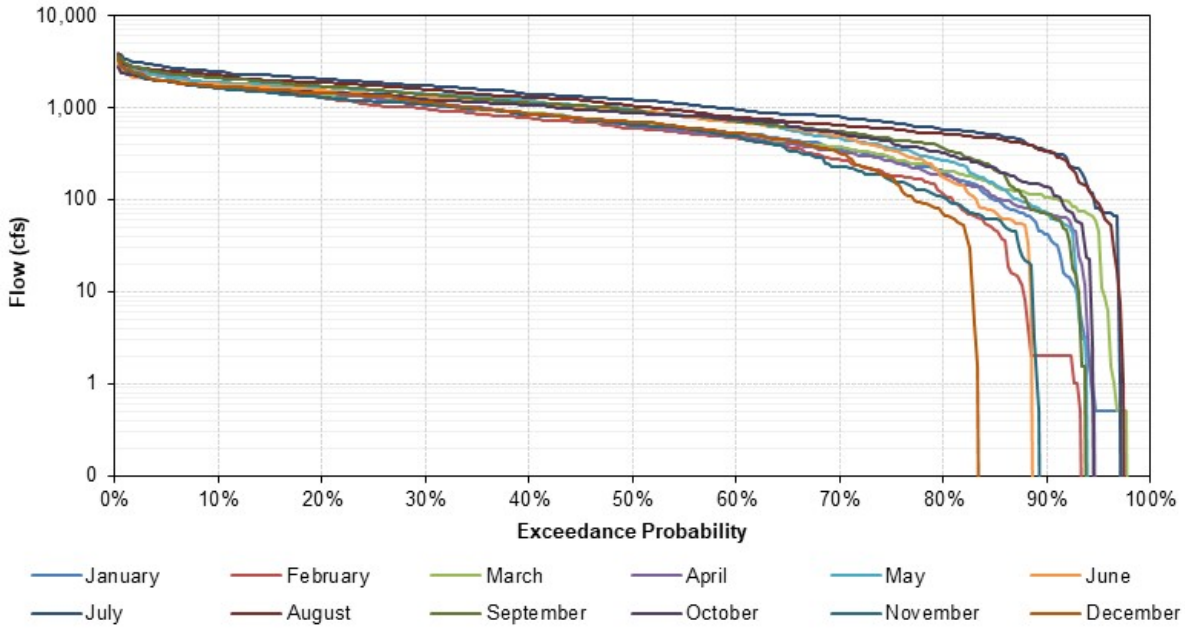
4.2.5 Inflow into Elderberry Forebay

Besides releases of water from the Castaic Powerplant described above, Elderberry Forebay receives local inflow from Castaic Creek and 4-26 ungaged drainage. Figure 4.2-20 above and Figures 4.2-22 and 4.2-23 provide monthly flow duration curves for inflow into Elderberry Forebay, excluding pumpback water from Elderberry Forebay, from: (1) SWP, as described in Section 4.2.4; (2) natural flow; and (3) the combination SWP and natural inflow. The natural inflow includes the sum of flows on Castaic Canyon and Fish Canyon creeks, as well as Elderberry Creek and other 4-26 ungaged tributaries as described in Section 3.1.7. The Storm Bypass Channel and associated check-dam basins do not store or divert water. In the POR, the peak natural inflow was 1,240 cfs on March 20, 2011, the peak SWP inflow was 3,866 cfs on August 29, 2008, and the peak total inflow was 3,866 cfs on August 29, 2008.



Source: DWR SWP Operations Report, Table 26
Key:
% = percent
cfs = cubic feet per second

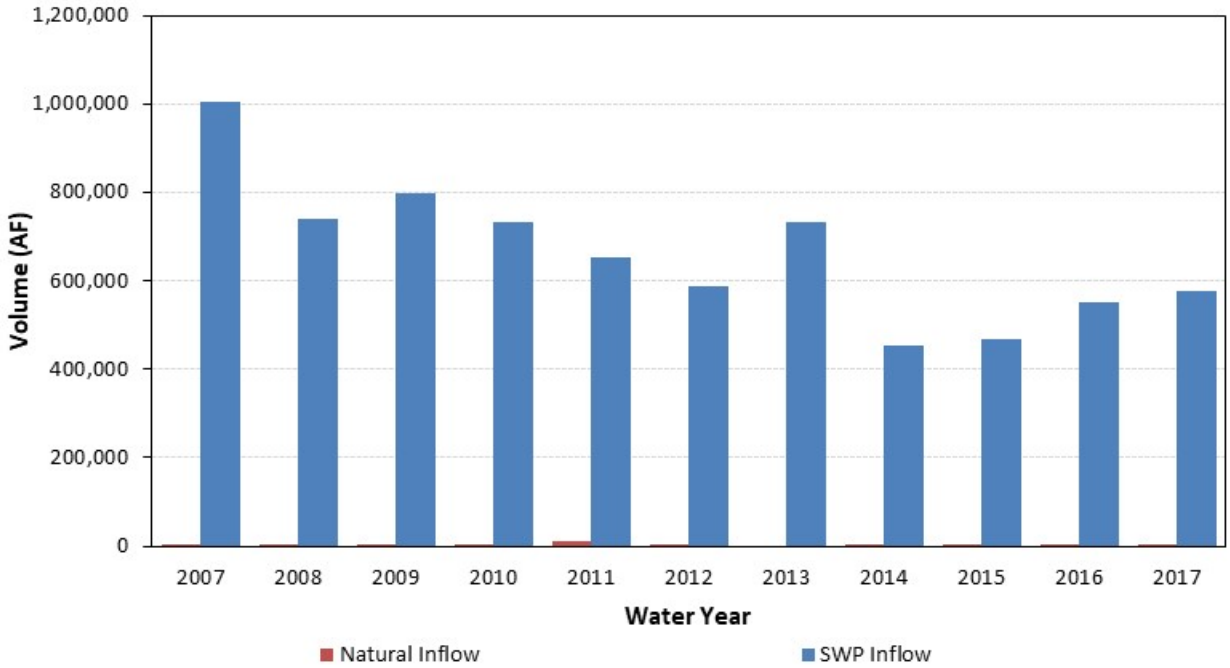
Figure 4.2-22. Monthly Flow Duration Curves for Natural Inflow to Elderberry Forebay for the Relicensing Period of Record



Source: DWR SWP Operations Report, Table 26
Key:
% = percent
cfs = cubic feet per second

Figure 4.2-23. Monthly Flow Duration Curves for Total Inflow to Elderberry Forebay for the Relicensing Period of Record

Figure 4.2-24 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 Elderberry Forebay. The greatest difference between the two volumes of 1,003,170 AF occurred in WY 2007, and the smallest difference between the two volumes of 295,182 AF occurred in WY 2015.



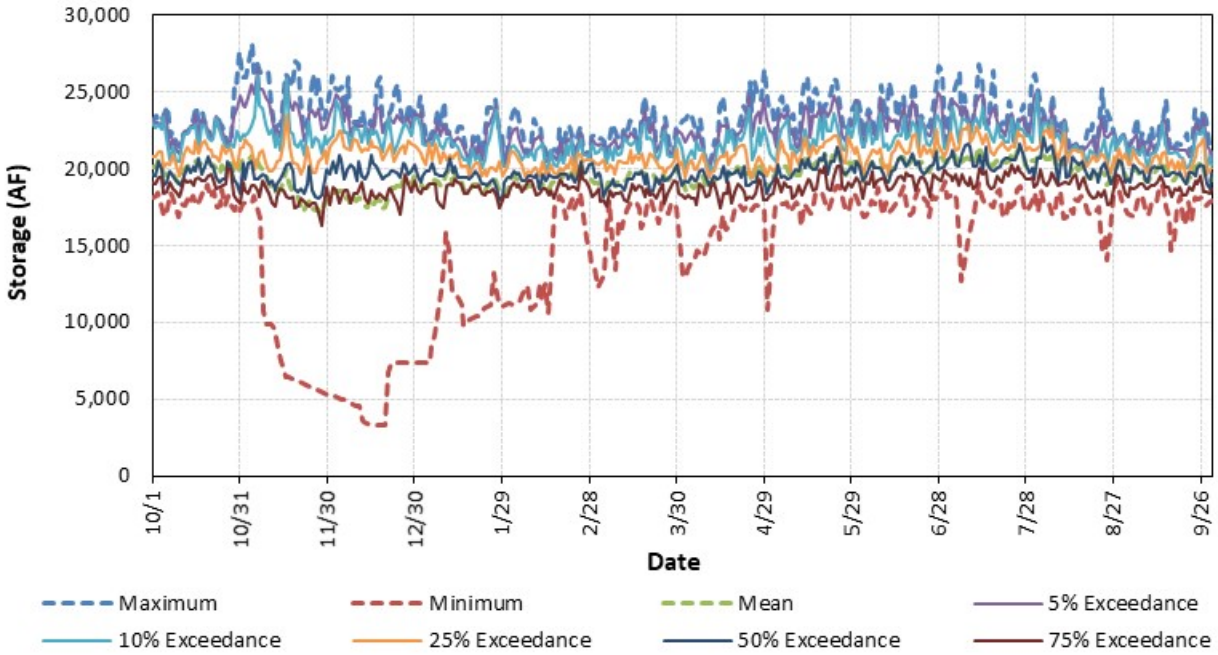
Source: DWR SWP Operations Report, Table 26
Key:
AF = acre-feet
SWP = State Water Project

Figure 4.2-24. Relative Contribution of Natural Inflow and SWP Inflow to Elderberry Forebay

4.2.5.1 Elderberry Forebay Storage

Elderberry Forebay is the lower reservoir for Castaic Powerplant pumpback operations. The forebay has a gross storage capacity of 31,196 AF, at the NMWSE of 1,540 feet, and a usable storage capacity of 23,096 AF. The minimum operating pool elevation for the Castaic Powerplant pumpback operations is based on the minimum safe pumping elevation allowable by the anti-vortex plates of 1,480 feet, corresponding to a gross storage of 8,100 AF. The forebay does not have a regulatory minimum pool requirement or any flood pool restrictions.

Figure 4.2-25 shows average daily storage in Elderberry Forebay, 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.

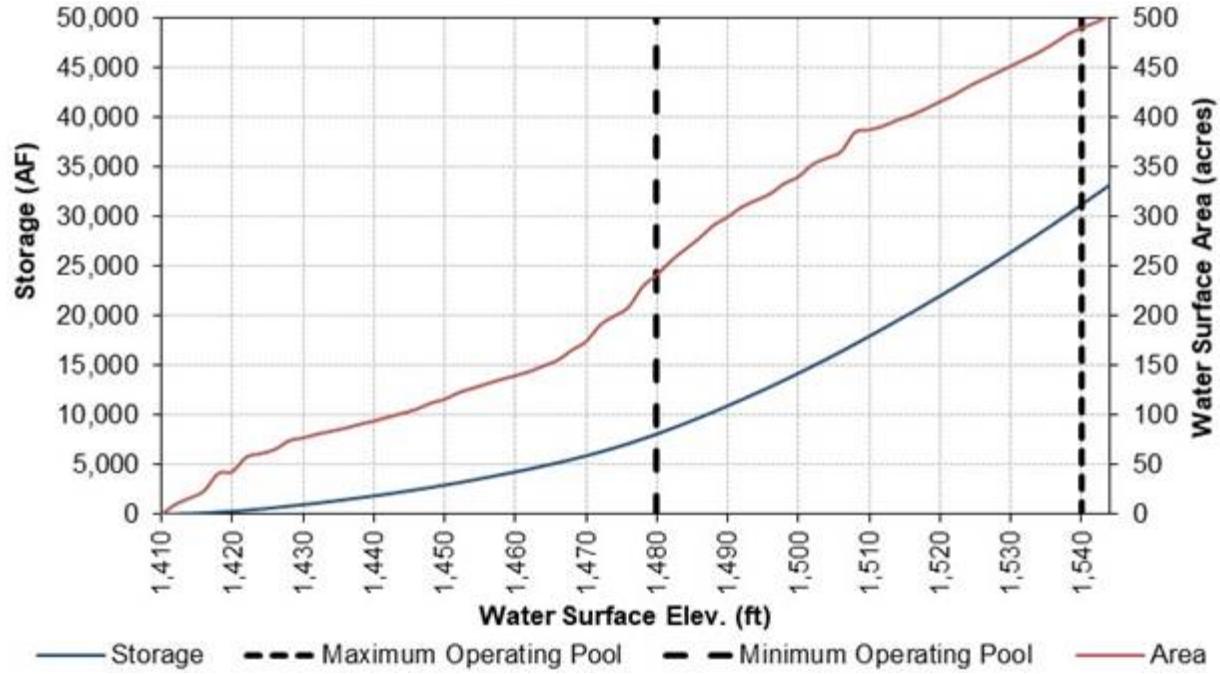


Source: DWR SWP Operations Report, Table 26
Key:
% = percent
AF = acre-feet

Figure 4.2-25. Daily Storage Statistics for Elderberry Forebay for the Relicensing Period of Record

Figure 4.2-25 shows that for most times in the relicensing POR, storage is consistently kept in the range of 18,000 AF to 24,000 AF. Of the 3,985 days in the relicensing POR, 3,310 (83 percent of days) are within this range. However, there are a few instances of low storage. In five of the 11 WYs (i.e., 2007, 2012, 2014, 2016, and 2017), storage drops below 15,000 AF. The lowest storage value of 3,330 AF occurred between December 18, 2016 and December 20, 2016 due to a 10-year Angeles Tunnel inspection. During the inspection, LADWP performed maintenance underwater, which included dredging. This inspection was in November through December 2016.

The storage-capacity curve showing the usable and gross storage capacities of Elderberry Forebay is shown on Figure 4.2-26. The surface area at the maximum operating pool of 1,540 feet is 496 acres, with a usable storage volume of 23,096 AF. The minimum operating pool for the Castaic Powerplant is at 1,490 feet, corresponding to 310 acres of surface area, and 10,938 AF of gross storage.



Source: LADWP 2018
Key:
Elev. = elevation
ft = feet

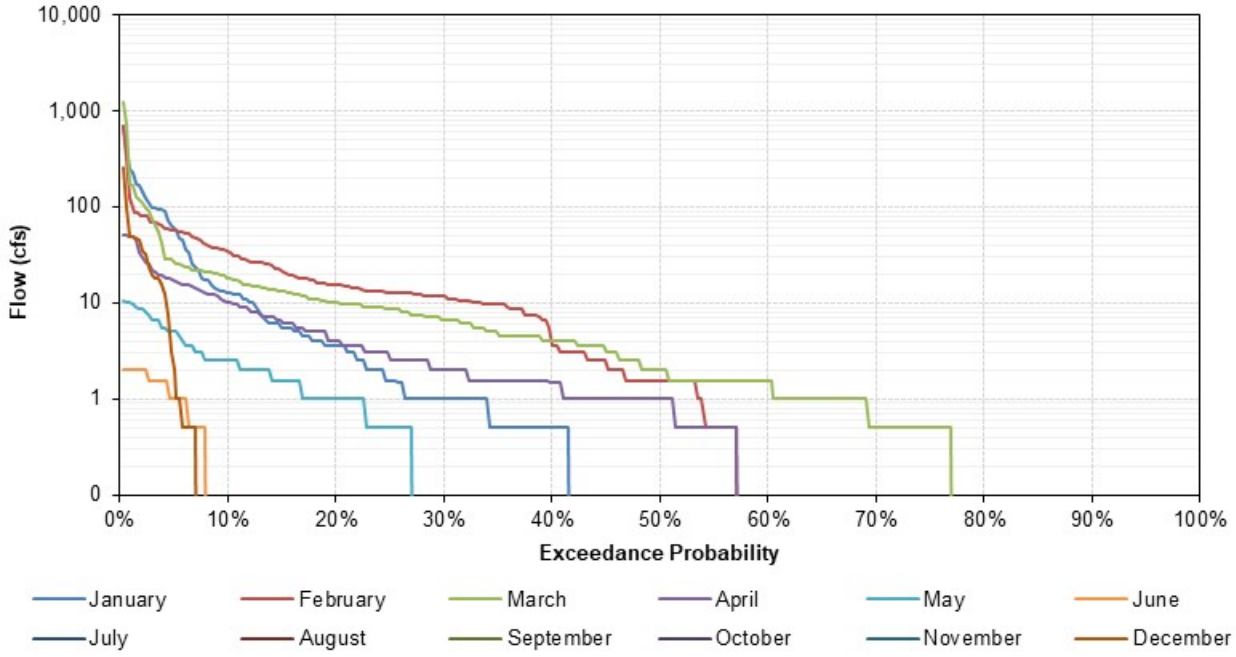
Figure 4.2-26. Elderberry Forebay Storage-Capacity Curve

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

4.2.6 Outflow from Elderberry Forebay

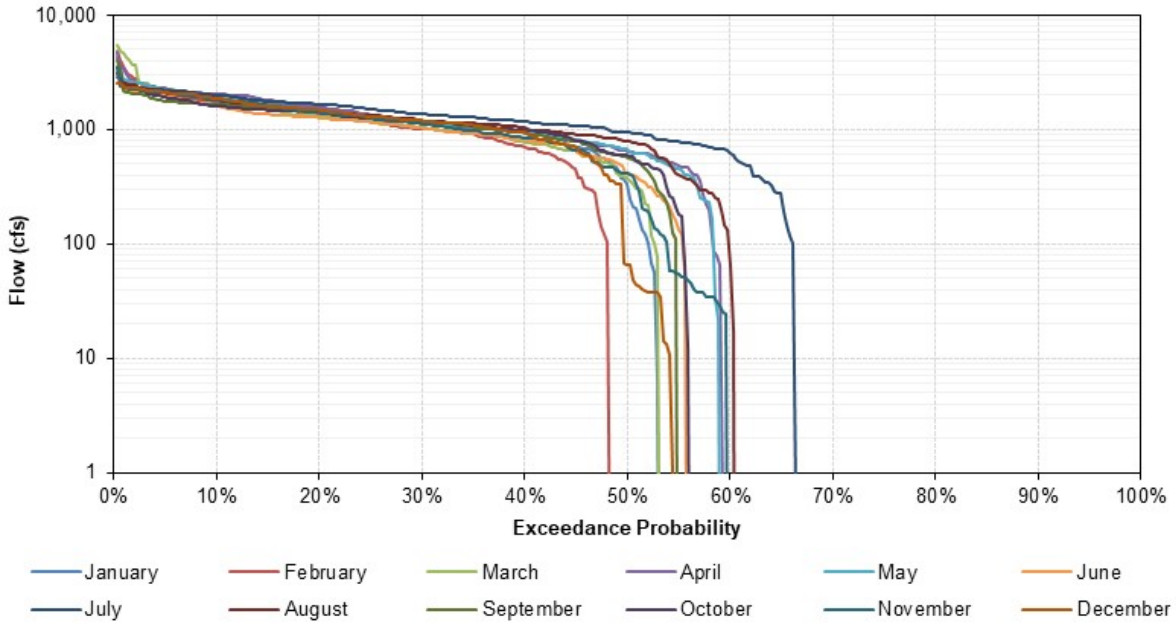
The outlet at Elderberry Forebay Dam consists of both high-level and low-level facilities. The capacity of the outlets is 17,000 cfs at reservoir elevation 1,540 feet. The high-level outlet is provided with slide gates on the service spillway shaft. There are two 8-foot-wide by 9-foot-high slide gates at elevation 1,498 feet and six 8-foot-wide by 12-foot-high slide gates at elevation 1,477 feet on the spillway shaft.

Figures 4.2-27, 4.2-28, and 4.2-29 provide monthly flow duration curves for outflow from Elderberry Forebay from: (1) SWP; (2) natural flow; and (3) the combination SWP and natural outflow. The natural outflow and SWP outflow are measured by DWR and reported in the DWR SWP Operations Report, Table 26, as described in Section 3.1.9. In the POR, the peak natural outflow was 1,240 cfs on March 20, 2011, the peak SWP outflow was 5,469 cfs on March 31, 2007, and the peak total outflow was 5,470 cfs on March 31, 2007.



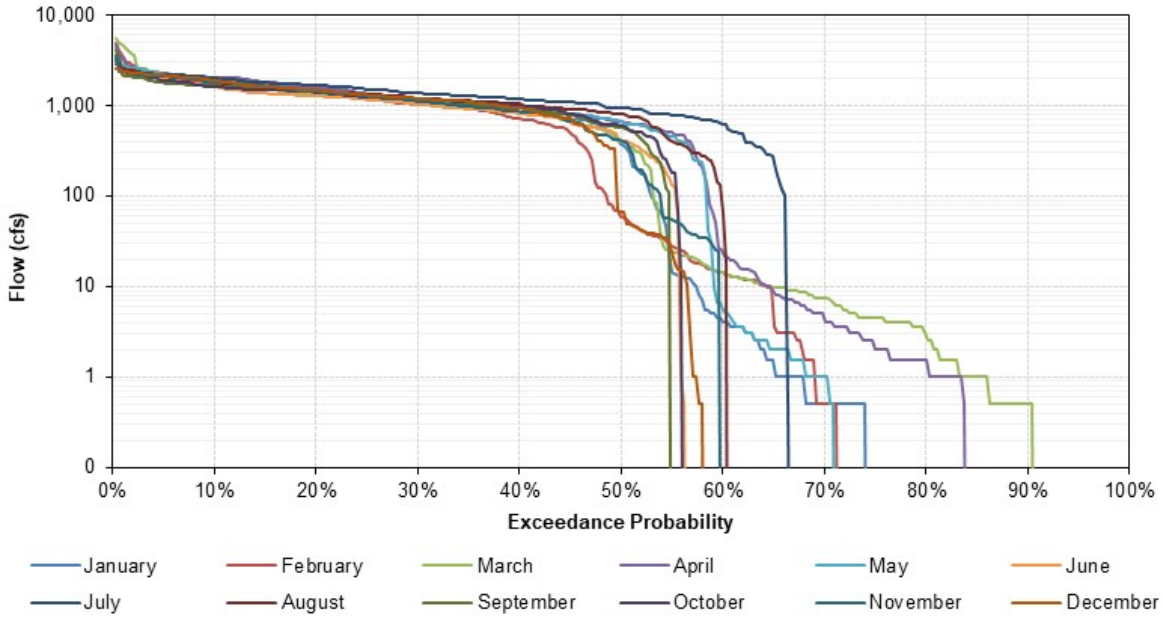
Source: DWR SWP Operations Report, Table 26
Key:
% = percent
cfs = cubic feet per second

Figure 4.2-27. Monthly Flow Duration Curves for Natural Outflow from Elderberry Forebay for the Relicensing Period of Record



Source: DWR SWP Operations Report, Table 26
Key:
% = percent
cfs = cubic feet per second

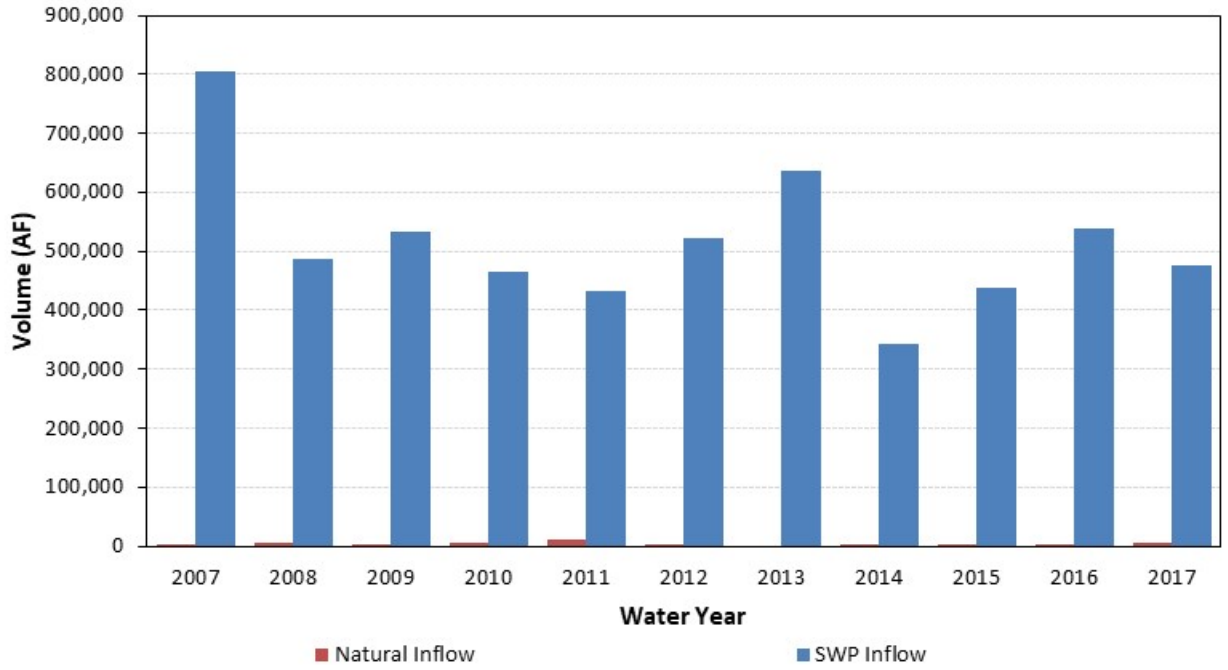
Figure 4.2-28. Monthly Flow Duration Curves for SWP Outflow from Elderberry Forebay for the Relicensing Period of Record



Source: DWR SWP Operations Report, Table 26
Key:
% = percent
cfs = cubic feet per second

Figure 4.2-29. Monthly Flow Duration Curves for Total Outflow from Elderberry Forebay for the Relicensing Period of Record

Figure 4.2-30 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 804,106 AF occurred in WY 2007, and the smallest difference between the two volumes of 284,337 AF occurred in WY 2015.



Source: DWR SWP Operations Report, Table 26
Key:
AF = acre-feet
SWP = State Water Project

Figure 4.2-30. Relative Contribution of Natural Outflow and SWP Outflow

Elderberry Forebay includes two spillways: an emergency spillway and a service spillway. The emergency spillway consists of an unlined approach channel, with side slopes protected by riprap; a 4-foot-high ungated, ogee crest; and a concrete-lined chute discharging into a natural draw. The crest elevation is 1,540 feet and the length is 420 feet. The service spillway is a 64-foot diameter, morning-glory type overflow crest located on a gate tower that is also the inlet structure for the outlet works. A 21-foot diameter reinforced concrete conduit connects the tower to a stilling basin in Castaic Lake near the downstream toe of the dam. The service spillway has 10-foot-high stop gates at the crest. The crest elevation is 1,530 feet, the crest length at 1,530 feet is 126 feet, and the crest diameter is 54.9 feet. Additional regulatory maximum storage elevation of 1,540 feet is provided by the stop gates, which span between 12 radial support piers at the crest. The spillway rating curve is presented on Figure 4.2-31.

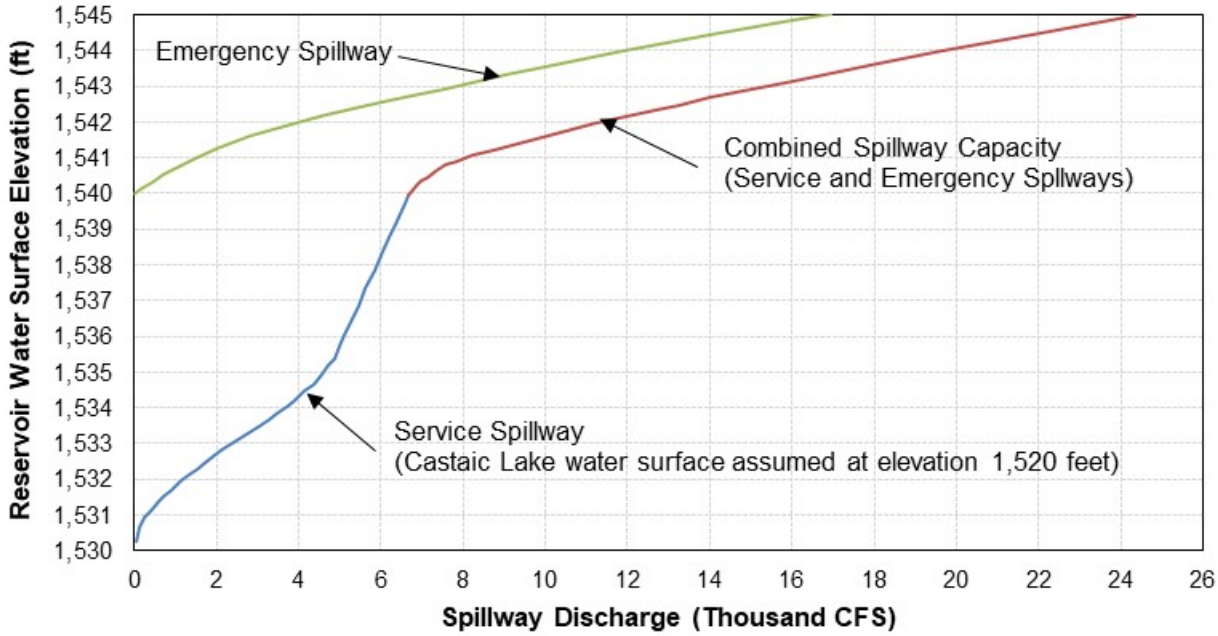


Figure 4.2-31. Elderberry Forebay Emergency Spillway Rating Curve

The capacity of the combined (service and emergency) spillways at elevation 1,545 feet with no stop gates in the service spillway is approximately 24,500 cfs. The zero-freeboard (crest elevation 1,550 feet) release capacity of the combined service and emergency spillways is expected to exceed 50,000 cfs.

4.3 PROJECT FACILITY MAINTENANCE

4.3.1 Angeles Tunnel

The Angeles 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 Powerplant Maintenance

The Licensees conduct mechanical and electrical inspections and maintenance at the Warne and Castaic Powerhouses to verify the structural and/or functional integrity of the facilities, and to identify conditions that might disrupt operations. This activity typically occurs twice a year (prior to summer and during fall) at Castaic Powerplant and annually at Warne Powerplant. During inspection and maintenance, the powerhouse units are offline to support planned outages which are based upon operating hours and system needs. Depending on maintenance work needed on the tunnel and penstock, it can be dewatered by closing the intake gates or valves.

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, facility painting, recreation facilities maintenance, transmission line maintenance, and debris management. Each of these activities is described below.

4.3.3.1 Vegetation Management

Vegetation management is implemented by the Licensees 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 adjacent 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.

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 onsite and are moved only if needed for safety. If moving logs is necessary, it may be completed by hand or machine, depending on the situation.

4.3.3.2 Pest Management

Herbicides, in combination with surfactants, are used in combination with hand trimming vegetation management activities on an annual basis at Project facilities located on Licensee-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 seasonally 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. A third cycle would be completed if required.

Licensees implement rodent control as needed in facility interiors using non-restricted rodenticides, which are applied in accordance with the label instructions. Rodent control occurs within the Warne and Castaic Powerplants.

4.3.3.3 Road Maintenance

Regular inspection of the Project access roads occurs during the course of day-to-day Project activities. Road maintenance is conducted on Project and shared roads 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.

4.3.3.4 Trail Maintenance

Regular inspection of trails to access the powerhouse and other ancillary facilities occurs during the course of day-to-day Project activities. Maintenance is conducted as needed. Trail maintenance generally includes, but is not limited to, the following types of activities: debris removal; basic repairs, including minor brushing; maintenance of erosion control features, such as water bars; repair, replacement, or installation of access control structures, such as barrier rock; and repair and replacement of signage. Vegetation management may be conducted concurrently with trail maintenance on an as-needed basis.

4.3.3.5 Facility Painting

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

4.3.3.6 Recreation Facilities Maintenance

Maintenance of recreation facilities is conducted by both DWR and its concessionaire. 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.

4.3.3.7 Transmission Line Maintenance

LADWP's Overhead Transmission (OHT) group performs aerial inspections on the Castaic transmission line twice per year at six-month intervals. These inspections include the portions of the transmission line from Castaic Powerplant south to the end of the FERC boundary near Haskell Canyon Switching Station. Aerial inspections are also performed during weather events, such as heavy rain for erosion control. OHT performs an eight-day insulator hand wash annually to maintain porcelain end insulators.

The transmission line rights-of-way are typically graded as needed before any scheduled maintenance or if there are potential erosion issues. During the grading process, OHT labor crews clear existing McCarthy drains and culverts, install coconut matting and waddles, and clear brush along the roadway. All other maintenance is performed on an as-needed basis.

4.3.3.8 Debris Management

Storm Bypass Channel and Check-Dam Basin Maintenance

The Storm Bypass Channel, which includes a series of three check-dam basins, captures sediment runoff during high flow events. The channel and check dams reduce the continued accumulation of sediment near the powerplant, and maintain the sustained efficiency of the Castaic Powerplant operation.

Sediment removals from the check dam basins are conducted on two- to three-year intervals. Once all necessary permits and environmental clearances are obtained, vegetation is grubbed and biologic controls (i.e., turtle refuge pond) are set up. Excavated sediments have been and are proposed to continue to be placed and compacted on designated spoil pile(s).

Elderberry Forebay Dredging

Mechanical dredging for the removal of soils deposited in Elderberry Forebay, including the tailbay, tailrace, the confluence of the tailbay, and tailrace areas, is conducted at 10-year intervals. The dredging was last completed in 2016, when approximately 480,110 cubic yards of material were removed from Elderberry Forebay.

The mechanical dredging from these areas requires a complete outage of Elderberry Forebay. All these areas are completely drained to allow mechanical dredging operations. The outage operations are carried out in conjunction with the outage and draining of Castaic Powerplant’s penstocks.

An earthen soil dam and ramps are constructed along the tailrace to allow construction equipment to access the areas to excavate and to load and haul dredging materials to the stockpile area (see Figures 4.3-1 and 4.3-2, below). A hauling route to the dewatering zones is determined based on the work stations assigned for the outage project. After dewatering of the soils, they are stored in the stockpile area.

Figure 4.3-1. Elderberry Forebay Sediment Removal Routes

Figure 4.3-2. Elderberry Forebay Soil Removal Area

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5.0 LICENSEES' PROPOSED PROJECT OPERATIONS

The Licensees propose to continue to operate the Project as it has operated historically.

The Licensees propose for inclusion in the new license the following 11 environmental measures to protect or enhance environmental resources at the Project:

Geology and Soils

- Measure GS1 – Implement the Erosion and Sediment Control Plan, within one year after license issuance, that includes measures to control sedimentation and erosion when stabilizing slopes affected by the Project.

Water Resources

- Measure WR1 – Maintain a minimum pool and limit water surface elevation fluctuations in Pyramid Lake for the benefit of recreation. This measure incorporates minimum pool and water surface elevation restrictions from the DWR and USFS 1969 MOU, as amended.
- Measure WR2 – Implement the Hazardous Materials Management Plan, within one year after license issuance, that includes measures to manage hazardous materials, including response and clean-up of hazardous materials spills.

Aquatic Resources

- Measure AR1 – Continue to provide minimum flows from Pyramid Lake into Pyramid reach. This measure is identical to the Pyramid Lake portion of Article 52 in the existing Project license, with the exception that the multiplier for estimating the ungaged flow into Pyramid Lake has been updated based on current GIS and hydrologic methods, as described in Appendix A to Exhibit E of this Application for New License.
- Measure AR2 – Stock fish in Pyramid Lake, beginning in the first full calendar year after license issuance and annually thereafter during the stocking season (October 1 to May 30), to maintain the rainbow trout recreational fishery and conduct periodic angler surveys. This measure is similar to Article 51 in the existing Project license.

Terrestrial Resources

- Measure TR1 – Develop and implement an Integrated Vegetation Management Plan, within one year after license issuance, that includes measures for controlling non-native plant species, protecting special-status species during vegetation management, and re-vegetating disturbed areas.

Recreation Resources

- Measure RR1 – Develop and implement a Recreation Management Plan, within one year after license issuance, that includes measures for the management and operations of Project recreational facilities, including periodic use monitoring, the modification of Project recreation facilities, and a schedule for implementing modifications.

Land Use

- Measure LU1 – Implement the Fire Prevention and Response Plan, within one year after license issuance, that provides measures for preventing, reporting, and investigating Project-related wildfires.

- Measure LU2 – Develop and implement a Project Safety Plan, within one year after license issuance, that provides measures for installing and maintaining signs, lights, sirens, and other devices at Project facilities. This measure is similar to Articles 60 and 402 in the existing license.

Visual Resources

- Measure VR1 – Implement the Visual Resources Management Plan, within one year after license issuance, that includes measures to reduce the visual contrast of Project facilities.

Cultural Resources

- Measure CR1 – Implement the Historic Properties Management Plan, within one year after license issuance, that provides specific actions and processes to manage historic properties.

See Appendix A of Exhibit E for a detailed description of each of the Licensees' proposed Protection, Mitigation, and Enhancement (PM&E) measures.

6.0 USE OF POWER

DWR is required to schedule all energy through the CAISO for pumping requirements and available resources to meet the SWP load, including energy from the Warne Powerplant. DWR considers power from the Warne 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 Warne Powerplant station service.

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

Year	Warne Powerplant Consumed Power (kWh)
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	468,468

Key:
kWh = kilowatt hour

When SWP water is delivered to Pyramid Lake, LADWP uses the delivered water to generate electricity and supply its load when it determines it is the most economical and beneficial to the citizens of Los Angeles. LADWP delivers the electricity equivalent to the DWR water delivery on an hourly schedule throughout the week from the LADWP system to DWR. LADWP also releases the equivalent amount of water from Elderberry Forebay to downstream water users.

Table 6.0-2 shows energy used each year on-site for the Castaic Powerplant station service, including consumption for pumping and condensing.

Table 6.0-2. Consumed Power for the Castaic Powerplant Over the Relicensing Period of Record

Year	Castaic Power Plant Consumed Power (MWh)*
2007	315,062
2008	472,736
2009	485,409
2010	382,087
2011	346,904
2012	130,904
2013	166,006
2014	213,589
2015	111,902
2016	69,863
2017	208,622
Average	263,917

Key:
MWh = Megawatt hour
**Plant consumption includes power for pumping, condensing, and station service.*

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

At this time, the Licensees have no plans, other than those described in their Application for New License, to expand the Project or to develop other water projects in the Piru Creek or Castaic Creek watersheds.

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8.0 REFERENCES CITED

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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 for the Project, and will be filed separately with the Federal Energy Regulatory Commission (FERC) on a Disc. The data has been provided in two file formats:

- HEC-DSS file of historical hydrology data from U.S. Geological Survey gages and California Department of Water Resources records
- PDF of the hardcopy hydrology information used in the Licensees' draft Application for New License

Since the HEC-DSS file is not an acceptable FERC e-filing format, the PDF of the hardcopy hydrology information has also been included on the Disc. The Licensees can be contacted for a copy of this Appendix A.

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

Hydrology Data	File Type on Disc	File Size on Disc
Hydrology Dataset for the Relicensing Period of Record	1 HEC-DSS file	23,791 KB
Hardcopy Hydrology Information	1 PDF file	15,962 KB
Total File Size		**39.753 MB**

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SOUTH SWP HYDROPOWER
FERC PROJECT NO. 2426-227

DRAFT LICENSE APPLICATION
EXHIBIT C – CONSTRUCTION HISTORY AND PROPOSED CONSTRUCTION SCHEDULE FOR THE PROJECT

September 2019

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

Los Angeles
DEPARTMENT OF
WATER AND POWER

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TABLE OF CONTENTS

COMMONLY USED TERMS, ACRONYMS & ABBREVIATIONS

§	Section
CFR	Code of Federal Regulations
FERC	Federal Energy Regulatory Commission
LADWP	Los Angeles Department of Water and Power
Licensees	California Department of Water Resources and Los Angeles Department of Water and Power
Project	South SWP Hydropower, Federal Energy Regulatory Commission Project Number 2426

1.0 INTRODUCTION

The California Department of Water Resources and the Los Angeles Department of Water and Power (Licensees) have prepared this Exhibit C, Construction History and Proposed Construction Schedule, as part of their Application for a New License Major Project – Existing Dam from the Federal Energy Regulatory Commission (FERC) for the South SWP Hydropower, FERC Project Number 2426 (Project). This exhibit was prepared to conform with Title 18 of the Code of Federal Regulations (CFR), Subchapter B (Regulation under the Federal Power Act), Part 5 (Application for License for Major Project – Existing Dam) (Integrated Licensing Process). In particular, this exhibit complies with the regulations in 18 CFR Section (§) 5.18(a)(5)(iii). For reference, 18 CFR § 5.18(a)(5)(iii) states:

> License for a major project—existing dam: § 4.51 of this chapter (General instructions, initial statement, Exhibits A, B, C, D, F, and G)

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 three sections: Section 2.0 addresses the requirement for a history of Project construction and existing facilities; Section 3.0 addresses the requirement for a proposed schedule for construction of new facilities and features; and Section 4.0 provides a list of references that were consulted to develop this exhibit.

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 the Licensee'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.

2.0 CONSTRUCTION HISTORY AND EXISTING STRUCTURES AND FEATURES

The Licensees are applying to FERC for a new license, not an initial license, for the Project. Therefore, the requirement of 18 CFR § 4.51(d)(1) regarding a tabulated chronology of construction of existing structures and facilities does not apply. However, the History of the Project in Exhibit H provides a description of the construction history of the major structures that comprise the existing Project.

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3.0 CONSTRUCTION SCHEDULE FOR LICENSEES' PROPOSED NEW FACILITIES AND FEATURES

The Licensees do not propose any new generation facilities to be constructed during the term of the new license. The Licensees propose to add to the Project the existing Quail Detention Embankment, which will not require any construction. As required in 18 CFR 5.18(b)(5)(C), an implementation schedule for these measures is included in Exhibit E.

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4.0 REFERENCES CITED

None.

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SOUTH SWP HYDROPOWER
FERC PROJECT NO. 2426-227

DRAFT LICENSE APPLICATION
EXHIBIT D – STATEMENT OF COSTS AND FINANCING

September 2019

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

Los Angeles
DEPARTMENT OF WATER AND POWER

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LIST OF TABLES

COMMONLY USED TERMS, ACRONYMS & ABBREVIATIONS

§	Section
Application for New License	Licensees' Application for New License for Major Project – Existing Dam for South SWP Hydropower, FERC Project Number 2426
CEC	California Energy Commission
CFR	Code of Federal Regulations
DWR	California Department of Water Resources
FERC	Federal Energy Regulatory Commission
FPA	Federal Power Act
kW	kilowatt
kWh	kilowatt hour
LADWP	Los Angeles Department of Water and Power
Licensees	California Department of Water Resources and Los Angeles Department of Water and Power
Licensees' Proposal	Continued operation of the Project; addition of the existing Quail Detention Embankment, an existing stream flow gage (USGS Gage No. 11109525), and existing Primary Project Roads; modification to the existing Project boundary; and removal of the Warne Transmission Line
MW	megawatt
MWh	megawatt hour
O&M	operations and maintenance
Protection, Mitigation, and Enhancement measures	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
Project	South SWP Hydropower, FERC Project Number 2426
U.S.	United States
U.S.C.	United States Code

1.0 INTRODUCTION

The California Department of Water Resources (DWR) and the Los Angeles Department of Water and Power (LADWP) (Licensees) have prepared this Exhibit D, Statement of Costs and Financing, as part of their Application for New License Major Project – Existing Dam (Application for New License) from the Federal Energy Regulatory Commission (FERC) for the South SWP Hydropower, FERC Project Number 2426 (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 [FPA]), Part 5 (Application for License for Major Project – Existing Dam) (Integrated Licensing Process). In particular, this exhibit complies with the regulations in 18 CFR Section (§) 5.18(5)(iii). For reference, 18 CFR § 5.18(a)(5)(iii) states:

> License for a major project—existing dam: § 4.51 of this chapter (General instructions, initial statement, Exhibits A, B, C, D, F, and G)

For reference, 18 CFR § 4.51(e) states:

> Exhibit D is a statement of costs and financing. The 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 10 sections. Section 2.0 describes Licensees' 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 Licensees' proposed new developments. Section 6.0 presents the Licensees' estimated annual cost of operations and the value of Project power under the No Action Alternative and the Licensees' Proposal. Section 7.0 compares the amount of power and value of power under the No Action Alternative and the Licensees' Proposal. Section 8.0 describes how the Licensees would finance continued Project operations and maintenance (O&M). Section 9.0 describes the cost of obtaining an equivalent amount of power from another source. Section 10.0 provides the cost to develop the license application, and Section 11.0 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 the Licensees' 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 present value (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) over a 30-year period. 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. The Licensees have 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 releases 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 the Licensees' best estimate of the costs to operate the Project in the future.

- Licensees' Proposal. This is the Licensees' proposed Project, including the Licensees' proposed conditions, which are described in the Licensees' Application for New License. Costs under the Licensees' Proposal are similar to the costs under the No Action Alternative, with the exception of the Licensees' proposed additions to the Licensees' Proposal and proposed protection, mitigation, and enhancement measures.

Basic economic assumptions used by the Licensees in developing costs and benefits under both the No Action Alternative and the Licensees' Proposal are summarized in Table 2.0-1.

Table 2.0-1. Economic Assumptions the Licensees Used in Developing Costs and Power Benefits Under the No Action Alternative and the Licensees' Proposal

Assumption	Value
Dollars	United States (U.S.) dollars to the nearest $1,000, unless otherwise specified
Period of Analysis	30 Years, consistent with Mead Decision
Base Year for Costs and Benefits	Calendar Year 2018
Annual Escalation Rate	0%

While FERC's current cost approach requires an applicant to base costs on a 30-year license term, the Licensees request from FERC a new license with a term of 50 years

because FERC's Policy Statement on Establishing License Terms for Hydroelectric Projects, 161 FERC ¶ 61,078 (2017) includes as a justification for granting a longer license term where significant measures are expected to be implemented under the new license for non-development purposes (environmental, recreation, water supply) or those that enhance power and developmental purposes. Further, 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.

Based on these FERC and Congressional directives, a license term of 50 years is warranted. Over the years, the Licensees have invested considerable funds in the Project not required by the current license. These projects include LADWP's $271,000,000 modernization of the Castaic Powerplant, the $18,000,000 addition of a 230-kilovolt (kV) circuit on the existing Castaic-Haskell transmission line (Castaic-Haskell Line 3), the $10,000,000 upgrade of Elderberry Forebay Spillway, and the $2,000,000 upgrade of Elderberry Forebay Dam. LADWP's modernization upgrades on Units 1 through 6 result in improved unit performance, efficiency, and increased capacities, and LADWP's transmission line upgrade reduces the risk of interruption of service due to wildfires and earthquakes and hardens the electrical grids with an alternate path. LADWP's upgrade of Elderberry Forebay Spillway improves flows and drainage and meets current codes and seismic requirements, and upgrade of Elderberry Forebay Dam includes installing additional and upgrading existing piezometers that will improve the accuracy and amount of data currently being collected. In addition, DWR has expended over $17,000,000 in upgrades to the Project over the past 15 years. These include the $14,000,000 Pyramid Dam Emergency Spillway Analysis Project to enhance dam safety, which may entail substantial additional expenditures to address any subsequent findings; the $2,000,000 Pyramid Dam Conduit and Ducting Upgrade Project; and the $1,000,000 Warne Development Centralized Communication System Upgrade Project. The Licensees believe that a 50-year license is necessary and appropriate to recognize these Project investments.

3.0 ORIGINAL COSTS

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

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4.0 COST OF PROJECT TAKEOVER

DWR and LADWP are municipalities, established under the laws of the State of California, within the meaning of Section 3(7) of the FPA; since DWR is an agency of the State and LADWP is a city agency, the Project is not subject to the takeover provisions of Section 14 of the FPA (16 U.S.C. § 807). Accordingly, an estimate of the amount which would be payable if the Project were taken over pursuant to Section 14 is not required to be included in the Licensees' Application for New License.

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5.0 COST OF NEW POWER DEVELOPMENT

The Licensees are not proposing to add any additional power generation facilities or new developments to the Project.

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

Section 6.0 is divided into two major sections, each of which addresses the No Action Alternative and the Licensees' Proposal. Section 6.1 discusses the Licensees' annual cost of operations. Section 6.2 discusses the value of Project power.

6.1 ANNUAL COST OF OPERATIONS

6.1.1 No Action Alternative

Under the No Action Alternative, the Licensees' non-environmental and non-recreation average annual O&M cost for the Project is $38,547,000: $19,776,000 related to DWR's O&M of the Warne Power Development and $18,771,000 related to LADWP's O&M of the Castaic Power Development, of which $4,361,000 is for electricity to pump water from Elderberry Forebay to Pyramid Lake. These costs include O&M, station power, annual renewals and replacements, and major infrastructure repairs/improvements.

The Licensees' estimated average annual cost related to environmental actions, excluding recreation, under the existing license is $2,124,000: $102,000 related to DWR's operation of the Warne Power Development and $2,022,000 related to LADWP's operation of the Castaic Power Development. Examples of LADWP's environmental actions include hazardous waste management activities, Certified Unified Program Agency permit activities, biotic assessments and sensitive resource surveys, biological assessment reporting, sediment removal projects, annual laboratory support sampling and analysis, annual National Pollutant Discharge Elimination System activities, and permitting activities relative to Section 401 of the Clean Water Act for the Elderberry Forebay, check dams, and Elderberry Forebay Spillway.

The Licensees' estimated average annual cost related to recreation actions under the existing license is $400,000 for operations of the Warne Power Development and Castaic Power Development recreation-related facilities.

DWR does not have shareholders and therefore does not finance projects with equity capital. Any new construction is financed through various financial instruments, mainly the issuance of revenue bonds. DWR has maintained an exceptional bond rating throughout the years, including maintaining an AAA Standard and Poor's rating since 2001. Costs of borrowings for new construction that has taken place since the original facilities were completed are reported in Bulletin 132, an annual publication produced by DWR and available on the following website: https://water.ca.gov/. As a State agency in California, DWR is not subject to payment of any State, local, or federal taxes associated with the Project.

LADWP is the largest municipal utility in the United States and is a proprietary department of the City of Los Angeles. The revenues from sale of electricity to LADWP customers are used to pay for Power System O&M. LADWP's Power System is responsible for providing the electric service almost entirely within the LADWP service

territory. The majority of the Power System capital improvements and new construction is financed primarily with the issuance of tax-exempt, long-term revenue bonds. The Power System has maintained strong bond ratings in the double A category throughout the years. Currently, the bonds are rated AA by both Standard & Poor's and Fitch Ratings, and Aa2 by Moody's Investor Service, with a stable outlook.

6.1.2 Licensees' Proposal

The Licensees anticipate that the average annual cost related to non-environmental and non-recreation O&M will be the same under the Licensees' Proposal as it is under the No Action Alternative, because the Licensees do not propose any significant changes to Project generation facilities or operations.

At the time the DLA was prepared, the Licensees were collaborating with Relicensing Participants on potential PM&E measures for the new license, and therefore, detailed cost estimates for implementation of PM&E's measures in the new license at this time are unknown. This collaboration is ongoing. As an example, the Licensees are actively working with Relicensing Participants on a Recreation Management Plan, but the details of the plan are unknown at this time. Table 6.1-1 provides the Licensees best estimate of costs at this time for its proposed PM&E measures, with a 'TBD' (i.e., to be determined) notation in cells where costs are uncertain at this time. The Licensees intend to include reliable, detailed PM&E measure costs in the FLA.

Table 6.1-1. Licensees' Estimated Costs in 2019 Dollars Related to Implementation of Licensees' Proposed Conditions

Licensees' Proposed Condition		Total Capital Cost Over 30 Years[1, 2] (2019 U.S. Dollars)	Total O&M Cost Over 30 Years (2019 U.S. Dollars)	Annualized Cost Over 30 Years[3] Excluding Energy (2019 U.S. Dollars)
Designation	**Description**			
Environment-Related Measures				
GS1	Implement the Erosion and Sediment Control Plan	$0	$0	$0
WR1	Implement Pyramid Lake Water Surface Elevation Restrictions	$0	$450,000	$15,000
WR2	Implement the Hazardous Materials Management Plan	$0	$150,000	$5,000
AR1	Implement Flow Releases into Pyramid Reach	$0	$450,000	$15,000
AR2	Implement Pyramid Lake Fish Stocking Measure	$0	$8,806,000	$294,000

Table 6.1-1. Licensees' Estimated Costs in 2019 Dollars Related to Implementation of Licensees' Proposed Conditions (continued)

Licensees' Proposed Condition		Total Capital Cost Over 30 Years[1, 2] (2019 U.S. Dollars)	Total O&M Cost Over 30 Years (2019 U.S. Dollars)	Annualized Cost Over 30 Years[3] Excluding Energy (2019 U.S. Dollars)
Designation	**Description**			**Designation**
TR1	Develop and Implement an Integrated Vegetation Management Plan	$0	TBD	TBD
LU1	Implement the Fire Prevention and Response Plan	$0	$450,000	$15,000
LU2	Develop and Implement a Project Safety Plan	$0	TBD	TBD
VR1	Implement the Visual Resources Management Plan	$0	$121,000	$4,000
CR1	Implement the Historic Properties Management Plan	$0	$3,503,000	$117,000
Recreation-Related Measures				
RR1	Develop and Implement a Recreation Management Plan	TBD	TBD	TBD
Total		**TBD**	**TBD**	**TBD**

Notes:
[1]Refer to Appendix A of Exhibit E for the complete text of each of the Licensees' proposed measures.
[2]Capital cost includes new facilities or equipment or replacement of existing facilities or equipment with facilities or equipment that extend the life expectancy of the existing facilities or equipment.
[3]Annualized costs are calculated by summing Capital Cost and Total O&M Cost, and dividing the sum by 30.
Key:
O&M = Operation and Maintenance
TBD – To Be Determined
U.S. = United States

6.2 VALUE OF PROJECT POWER

6.2.1 No Action Alternative

The installed capacity of the Warne Powerplant is 74,290 kilowatts (kW) and the installed capacity of the Castaic Powerplant is 1,275,000 kW, excluding one pump-starting unit at the Castaic Powerplant, for a total Project installed capacity of 1,349,290 kW. The Licensees estimate the dependable capacity of the Warne Powerplant is 60,400 kW and the dependable capacity of the Castaic Powerplant is 201,600 kW. The total Project dependable capacity is 262,000 kW. The Licensees estimated the value of

capacity is $52,528,000: $1,382,000 for the Warne Power Development and $51,146,000 for the Castaic Power Development. (Table 6.2-1.)

In addition, the Licensees estimated average annual energy production of the Project under the No Action Alternative is 683,309 MWh: 304,364 MWh for the Warne Power Development and 378,945 MWh for the Castaic power Development. The Licensees estimate that 93,775 MWh (30.8 percent) of the Warne Powerplant average total annual energy production and 353,177 MWh (93.2 percent) of the Castaic Powerplant average total annual energy production occurs as peak power. The Licensees estimate that the remaining 210,689 MWh (69.2 percent) of the Warne Powerplant average total annual energy production and the remaining 25,768 MWh (6.8 percent) of the Castaic Powerplant average total annual energy production is off-peak power. The average annual values of the peak and off-peak power for Warne Powerplant are $2,631,000 and $5,892,000, respectively, and the average annual values of the peak and off-peak power for the Castaic Powerplant are $18,961,000 and $1,362,000, respectively. The total Project average annual energy production value is $28,846,000. (Table 6.2-1.)

Castaic Powerplant is a crucial asset to LADWP. As a load serving entity, LADWP utilizes the Castaic Powerplant to store hundreds of megawatts, which facilitates load leveling and peak shaving. Castaic Powerplant provides valuable ancillary services to LADWP as a balancing authority, including the ability to: (1) help balance load with generation, (2) integrate intermittent energy resources, and (3) provide crucial ancillary services to the grid – namely, reactive power support, regulation and frequency support service, and operating reserve services (both spinning and supplemental). These ancillary benefits enable LADWP to promote the dependability of its Power System, especially when power demand is high (i.e., hot summers). (LADWP 2014). LADWP estimates the value of its average annual value of ancillary services is $84,031,000. The Warne Powerplant does not provide ancillary services. (Table 6.2-1.)

Table 6.2-1 summarizes the annual capacity of the Project, the total average annual value of capacity, the total average annual value of energy and ancillary services for the Project, and the total Project power value.

Table 6.2.1 Average Annual Project Power Under the No Action Alternative

Value	No Action Alternative[1]		
	Warne Power Development	**Castaic Power Development**	**Total Project**
Annual Capacity			
Installed (kW)	74,290	1,275,000	1,349,290
Dependable (kW)	60,400	201,600	262,000
Values	$1,382,000	$51,146,000	--
Total Average Annual Value of Capacity (2018 U.S. Dollars)	**$52,528,000**		
Annual Generation			
Peak Energy (MWh)	93,775	353,177	446,952
Off-Peak Energy (MWh)	210,689	25,768	236,457
Subtotal (MWh)	304,364	378,945	683,309
Values	$8,523,000	$20,323,000	--
Subtotal	*$8,523,000*	*$20,323,000*	--
Total Average Annual Value of Energy (2018 U.S. Dollars)	**$28,846,000**		
Annual Ancillary Services			
Regulation-Up (MWh)	0	438,000	438,000
Regulation-Down (MWh)	0	620,500	620,500
Spinning Reserve (MWh)	0	8,470,433	8,470,433
Subtotal	*0*	9,528,933	9,528,933
Total Average Annual Value of Ancillary Services (2018 U.S. Dollars)	**$84,031,000**		
Total Project Power Value (2018 U.S. Dollars)	**$165,405,000**		

Key:
kW = kilowatt
kWh = kilowatt hour
MW = megawatt
MWh = megawatt hours
U.S. = United States

6.2.2 Licensees' Proposal

The Licensees do not propose to add or remove generation facilities from the Project, and propose to operate the Project as it has been operated historically. Therefore, average annual Project generation and value of power under the Licensees' Proposal is the same as under the No Action Alternative.

7.0 CHANGES IN PROJECT COST, POWER, AND VALUE

Table 7.0-1 compares the average annual power benefits and average annual costs of the No Action Alternative and the Licensees' Proposal. For the reasons described in Table 6.1-1, Table 7.0-1 is incomplete in this DLA. At the time the DLA was prepared, the Licensees were collaborating with Relicensing Participants on potential PM&E measures for the new license, and therefore, detailed cost estimates for implementation of PM&E's measures in the new license at this time are unknown. This collaboration is ongoing. Where the costs are unknown, the cell in Table 7.0-1 shows 'TBD' (i.e., to be determined). The Licensees will complete this table in the FLA.

Table 7.0-1. Comparison of Annual Power Benefits, Costs, and Net Benefits of the No Project Alternative and the Licensees' Proposal

Value	No Action Alternative	Licensees' Proposal	Change[1]
Average Annual Power Benefits			
Capacity			
Installed (kW)	1,349,290	1,349,290	0
Dependable (kW)	262,000	262,000	0
Value (2018 U.S. Dollars)	**$52,528,000**	**$52,528,000**	**$0**
Generation			
Peak Energy (MWh)	446,952	446,952	0
Off-Peak Energy (MWh)	236,457	236,457	0
Subtotal (MWh)	*683,309*	*683,309*	*0*
Value (2018 U.S. Dollars)	**$28,846,000**	**$28,846,000**	**$0**
Ancillary Services			
Regulation-Up (MWh)	438,00	438,00	0
Regulation-Down (MWh)	620,500	620,500	0
Spinning Reserve (MWh)	8,470,433	8,470,433	0
Subtotal (MWh)	*9,528,933*	*9,528,933*	*$0*
Value (2018 U.S. Dollars)	**$84,031,000**	**$84,031,000**	**$0**
Total Benefits (2018 U.S. Dollars)	**$165,405,000**	**$165,405,000**	**$0**
Average Annual Costs			
Non-Environmental / Non-Recreation (2018 U.S. Dollars)	$38,547,000	$38,547,000	0
Environmental (2018 U.S. Dollars)	$2,124,000	TBD	TBD
Recreation (2018 U.S. Dollars)	$400,000	TBD	TBD
Total Value (2018 U.S. Dollars)	**$41,071,000**	**TBD**	**TBD**
Average Annual Net Benefits			
Value (2018 U.S. Dollars)	**$124,334,000**	**TBD**	**TBD**

[1]Calculated by subtracting the No Action Alternative values from the values for the Licensees' Proposal.
Key:
kWh = kilowatt hours
MWh = megawatt hours
TBD = To Be Determined
U.S. = United States

8.0 SOURCES OF FINANCING AND ANNUAL REVENUES TO MEET PROJECT COSTS

The Licensees are financially able to operate and maintain the Licensees' Proposal. In support of this statement, DWR and LADWP refer to their history of operating these facilities, and the continued need for power and the many energy market opportunities in California.

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9.0 COST OF OBTAINING AN EQUIVALENT AMOUNT OF POWER FROM THE LOWEST COST ALTERNATIVE SOURCE

From the Licensees' perspective, to truly be considered an alternative to the Project's power, an alternative, or suite of alternatives, must meet three criteria: (1) be a zero-carbon emissions resource; (2) be able to be developed by the Licensees so that it could create a revenue stream, as the Warne Power Development does, to partially offset DWR's State Water Project energy costs; and (3) be able to be developed by the Licensees so it provides the benefits of flexibility, as the Castaic Power Development does for LADWP. Regarding flexibility, the zero emissions energy recovered by Castaic Powerplant is delivered back to DWR at LADWP's Sylmar intertie with CAISO, and becomes part of SWP's power portfolio. The Licensees are aware of no non-hydro, large-scale generating sources that can meet these three criteria, other than the Project.

In looking at alternatives to the electricity provided by the Project, it is essential to bear in mind that 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. Although DWR does not maintain reserve margins, the Project generates carbon-free energy. In this way, the Project is consistent with of California's statutory greenhouse gas (GHG) emissions reduction mandates as well as, DWR's Climate Action Plan. Specifically, Senate Bill 350, California's Clean Energy and Pollution Reduction Act (Ch. 547, Stats. 2015) establishes California's GHG emissions reduction target of 40 percent below 1990 levels by 2030, and 80 percent by 2050. Additionally, in 2018, California enacted Senate Bill 100, the 100 Percent Clean Energy Act (Ch. 312, Stats. 2018), which established a State policy that eligible renewable energy resources and zero-carbon resources supply 100 percent of retail sales of electricity to California end-use customers and 100 percent of electricity procured to serve all state agencies (including electricity procured by DWR to serve the SWP) by December 31, 2045.

In February 2019, the Mayor of Los Angeles announced the decision not to proceed with the repowering of LADWP's three existing coastal plants. This strategic shift in focus is expected to help accelerate Los Angeles's transition to 100 percent clean energy by 2045 and put the City on track to meet carbon neutrality by 2050. In support of this new initiative, LADWP is in the process of developing the Clean Grid L.A. Plan. This plan will lay the roadmap and framework on how LADWP's local grid including its distribution, transmission, and generation assets can support Los Angeles' clean energy goals in a reliable, flexible, and environmentally beneficial manner while taking rate impacts into consideration.

If DWR and LADWP were called upon to replace electricity currently provided by the Project that procurement would be subject to California's carbon-reduction mandates. In addition, LADWP would be mandated to follow the mayor's directive and the Clean Grid L.A. Plan. Accordingly, the cost of replacement must be based on carbon-free alternatives as set forth below.

It is unlikely that the Project's electricity 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 carbon-free and renewable energy resources goals, the only available alternatives to the Project's generation are geothermal, biomass, solar, or wind. To estimate replacement costs for the 304,364 MWh of annual generation at the Warne Power Development, DWR used the California Energy Commission (CEC) 2015 report, *Estimated Cost of New Renewable and Fossil Generation in California*, which provides a range of annual levelized cost of alternative energy. Using the CEC's costs for a single 250 MW Solar Parabolic Trough With Storage facility, the least expensive of the carbon-free emission sources in CEC's report, the levelized cost would be $134.81/MWh 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 average annual cost to replace the Warne Power Development's generation using the least expensive carbon-free source would be approximately $43,820,000 (i.e., $144.02 times 304,364 MWh). LADWP estimated that the most likely scenario of obtaining an equivalent amount of Castaic Power Development power from an alternative carbon-free source is a renewable facility with energy storage at a cost of $216,000,000. The capital cost for energy storage, designed to replicate Castaic Powerplant's storage capabilities make up the bulk of this estimate. Therefore, the total average annual cost to replace the Project's power is at least $259,820,000. This figure is an underestimate as there are currently no practicable alternatives to pump storage at this location.

10.0 COST TO DEVELOP THE LICENSE APPLICATION

The cost to develop the information necessary to complete the license application through 2022 is estimated to be $34,669,000: $24,669,000 for DWR and $10,000,000 for LADWP. This estimate includes all study costs, Integrated Licensing Process costs, and personnel and administrative costs associated with processing.

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11.0 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, DC.

Los Angeles Department of Water and Power (LADWP). 2014. Energy Storage and Development Plan. Grid Planning and Development, System Studies and Research Group. September 2, 2014. Available online: https://www.energy.ca.gov/assessments/ab2514_reports/Los_Angeles_Dept/Los_Angeles_Dept_of_Water_and_Power_Energy_Storage_Development_Plan.pdf. Accessed: October 31, 2018.

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SOUTH SWP HYDROPOWER
FERC PROJECT NO. 2426-227

DRAFT LICENSE APPLICATION
EXHIBIT F – GENERAL DESIGN DRAWINGS

September 2019

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

Los Angeles
DEPARTMENT OF
WATER AND POWER

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§	Section
Application for New License	Licensees' Application for a New License for Major Project – Existing Dam for the South SWP Hydropower Relicensing, FERC Project Number 2426
CEII	Critical Energy Infrastructure Information
CFR	Code of Federal Regulations
CL	centerline
elev.	elevation
FERC	Federal Energy Regulatory Commission
kV	kilovolt
Licensees	California Department of Water Resources and Los Angeles Department of Water and Power
Licensees' Proposal	Continued operation of the Project; addition of the existing Quail Detention Embankment, an existing stream flow gage (USGS Gage No. 11109525), and existing Primary Project Roads; modification to the existing Project boundary; and removal of the Warne Transmission Line
No.	number
Project	South SWP Hydropower Relicensing
T.L.	transmission line
STA.	Station

1.0 INTRODUCTION

The California Department of Water Resources and the Los Angeles Department of Water and Power (Licensees) have prepared this Exhibit F, General Design Drawings, as part of their Application for a New License Major Project – Existing Dam (Application for New License) from the Federal Energy Regulatory Commission (FERC) for the South SWP Hydropower, FERC Project Number 2426 (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 5 (Application for License for Major Project – Existing Dam) (Integrated Licensing Process). This exhibit includes the principal Project works as described in Exhibit A, as well as the supporting information to describe the exhibit drawings and basis of design.

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:

> 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 F 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. Single-line electrical diagrams have been prepared that show system transmission elements in relation to the Project, and other principal interconnected system elements. These design drawings are considered Critical Energy Infrastructure Information (CEII). Section 3.0 addresses the use of the Licensees’ 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 the Licensees’ 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 and Geodetic Survey Datum of 1929 unless otherwise specified.

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2.0 GENERAL DESIGN DRAWINGS

General design drawings for the Licensees' Proposal as described in Exhibit A to this Application for New License are provided in the exhibit drawings listed in Table 2.0-1. The Licensees consider 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 the existing license's FERC-approved Exhibit L drawings, which depict the as-built principal Project works. For ease of reference, the Licensees list 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 South SWP Hydropower Relicensing 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-36-c L-37-c	2/17/1977	2426-289 2426-290	Exhibit F-01	Quail Lake and Lower Quail Canal - General Plan	Drawings 2426-289 and 2426-290 merged into a single drawing (F-1).
L-37-c	2/17/1977	2426-290	Exhibit F-02	Quail Lake - General Plan	Updated to clearly show Quail Lake and other features such as Quail Lake Outlet Structure and operating road.
--	--	--	Exhibit F-03	Lower Quail Canal Plan - STA. 277+90.11 to STA. 260+00	New exhibit showing plan view of the Lower Quail Canal.
--	--	--	Exhibit F-04	Lower Quail Canal Plan - STA. 260+00 to STA. 290+00	New exhibit showing plan view of the Lower Quail Canal.
--	--	--	Exhibit F-05	Lower Quail Canal Plan - STA. 290+00 to STA. 320+00	New exhibit showing plan view of the Lower Quail Canal.
--	--	--	Exhibit F-06	Lower Quail Canal Plan - STA. 320+00 to STA. 337+95	New exhibit showing plan view of the Lower Quail Canal.
--	--	--	Exhibit F-07	Quail Detention Embankment Plan, Sections, and Details	New exhibit showing Quail Detention Embankment Plan, sections, and details.
L-38-c	2/17/1977	2426-291	Exhibit F-08	Quail Embankment - Typical Canal Sections	Updated Quail Canal sections to include more detail, and new sections added for maintenance road, berm ditch, and cutoff ditch.
L-39-d	3/19/1979	2426-292	Exhibit F-09	Peace Valley Pipeline - Plan and Profile	Updated plan and profile to show final condition, and hydraulic data added for Peace Valley Pipeline.
--	--	2426-195-1	Exhibit F-10	Gorman Bypass Channel - General Plan (Sheet 1 of 2)	New exhibit showing Gorman Bypass Channel General Plan.
--	--	2426-195-2	Exhibit F-11	Gorman Bypass Channel - General Plan (Sheet 2 of 2)	New exhibit showing Gorman Bypass Channel General Plan.
--	--	--	Exhibit F-12	Warne Powerplant - Single-Line Diagram	New exhibit showing Warne Powerplant Transmission system
L-70-a	3/22/1978	2426-187 2426-193	Exhibit F-13	Warne Powerplant - General Plan	New exhibit showing the General Plan for Warne Powerplant.
--	--	2426-188-1	Exhibit F-14	Warne Powerplant Transverse Section - CL Units	New exhibit showing transverse section at centerline of units.
--	--	2426-188-2	Exhibit F-15	Warne Powerplant Transverse Section Between Units	New exhibit showing transverse section between units.
--	--	2426-188-3	Exhibit F-16	Warne Powerplant Longitudinal Section - CL Units	New exhibit showing longitudinal section at centerline of units.
--	--	2426-189-1	Exhibit F-17	Warne Powerplant General Arrangement - Plan Elev. 2582.00	New exhibit showing general plan of powerplant at elev. 2582.
--	--	2426-189-2	Exhibit F-18	Warne Powerplant General Arrangement - Plan Elev. 2598.00	New exhibit showing general plan of powerplant at elev. 2598.
--	--	2426-189-3	Exhibit F-19	Warne Powerplant General Arrangement - Plan Elev. 2614.00	New exhibit showing general plan of powerplant at elev. 2614.
L-16-c	2/17/1977	2426-273	Exhibit F-20	Pyramid Reservoir General Map	New exhibit showing the updated final plan clearly presenting the dam embankment, Interstate 5, and other features.
L-17-c	1/9/1975	2426-274	Exhibit F-21	Pyramid Dam and Lake - Plan and Sections	Updated plan view to clearly show features related to Pyramid Dam and Spillway; removed the capacity and rating curves, and updated profile to include curve information.
--	--	--	Exhibit F-22	Pyramid Dam Outlet Works - Valve Chamber General Arrangements	New exhibit showing Pyramid Dam outlet works valve chamber plan and sections.
L-18-c	2/11/1975	2426-275	Exhibit F-23	Angeles Tunnel - North Portal Plan and Profile	Updated plan view to show final condition, which now includes access roads and alignment information for Angeles Tunnel.

Table 2.0-1. Proposed Relicensing Drawing List for the South SWP Hydropower Relicensing 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
L-19c	2/11/1975	2426-276	Exhibit F-24	Angeles Tunnel - Plan and Profile - Sheet 1 of 3	Very similar exhibit to existing but clearly shows the plan and profile, and all the callouts.
L-20c	2/11/1975	2426-277	Exhibit F-25	Angeles Tunnel - Plan and Profile - Sheet 2 of 3	Very similar exhibit to existing but clearly shows the plan and profile, and all the callouts.
L-21c	2/1/1975	2426-278	Exhibit F-26	Angeles Tunnel - Plan and Profile - Sheet 3 of 3	Very similar exhibit to existing but clearly shows the plan and profile, and all the callouts.
L-22c	2/11/1975	2426-279	Exhibit F-27	Angeles Tunnel - South Portal Cast-in-Place Pipe	Same exhibit but includes additional callouts.
--	--	--	Exhibit F-28	Angeles Tunnel - North Adit - Plan, Sections, and Details	New exhibit showing the Angeles Tunnel North Adit.
L-23c	2/22/1977	2426-280	Exhibit F-29	Angeles Tunnel - Osito Canyon Adit - Plan and Sections	Very similar exhibit to existing but the details and text are more clear and some additional section details are added.
			Exhibit F-30	Angeles Tunnel - South Adit - Plan, Sections, and Detail	New exhibit showing the Angeles Tunnel South Adit.
L-24-c	2/11/1975	2426-281	--	--	Angeles Tunnel sections and details; no new corresponding Exhibit F General Design Drawings.
L-25-d	3/19/1979	2426-297	Exhibit F-31	Castaic Power Project - General Plan	Same exhibit as existing.
L-26-d	3/16/1979	2426-298	--	--	Elderberry Forebay Dam Hydrologic and Hydraulic Data; no new corresponding Exhibit F General Design Drawings.
L-27-d	3/19/1979	2426-299	Exhibit F-32	Elderberry Forebay Dam - Plan and Sections	Same exhibit as existing.
--	--	--	Exhibit F-33	Castaic Power Project - Power System	New exhibit showing Castaic Power System.
L-28-c	1/9/1975	2426-282	Exhibit F-34	Castaic Powerplant - Penstocks and Tailrace Channel	Same exhibit as existing.
L-29-c	1/9/1975	2426-283	Exhibit F-35	Castaic Powerhouse - Plan and Section	Same exhibit as existing.
L-30-c	1/9/1975	2426-284	Exhibit F-36	Castaic Unit 7 Powerhouse - Plan and Sections	Same exhibit as existing.
L-31-d	3/19/1979	2426-285	--	--	Castaic Dam and Reservoir; no new corresponding Exhibit F General Design Drawings.
L-32-c	1/9/1975	2426-287	--	--	Castaic Transmission Line Routes Investigated; no new corresponding Exhibit F General Design Drawings.
L-33-c	12/16/1970	2426-287	--	--	Castaic Transmission Line Route F; no new corresponding Exhibit F General Design Drawings.
L-34-c	1/9/1975	2426-288	Exhibit F-37	Castaic Powerplant General - Single-Line Diagram	Updated single-line diagram to show final condition
L-35-d	3/19/1979	2426-300	Exhibit F-38	Castaic Transmission Lines - Right of Way Utilization	Very similar to existing but updated the titles for each line and proposed Castaic 230 kV T.L. No. 4.

Source: California Department of Water Resources, Division of Engineering, pers. comm. 2018
Key:
CL = centerline
elev. = elevation
FERC = Federal Energy Regulatory Commission
kV = kilovolt
No. = number
STA.= Station
T.L. = transmission line

3.0 SUPPORTING DESIGN REPORT

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…"

3.1 PART 12 INDEPENDENT DAM SAFETY INSPECTION REPORT

The Licensees' recent Part 12 Independent Dam Safety Inspection Reports and supporting correspondence have been filed with FERC, and the Licensees propose that 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 for the existing license are on file with FERC.

The Quail Lake Detention Embankment is not in the existing license, and therefore is not currently subject to Part 12. Documentation regarding original design of the embankment is included in Appendix A as Drawing F-07 and Drawing F-08.

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4.0 REFERENCES CITED

Parsons, J., California Department of Water Resources, Division of Engineering; email communication with D. Burr, Supervising Geologist, Stantec Consulting Services Inc., Sacramento, California; October 1, 2018.

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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's (FERC) regulations, and in light of heightened national security concerns, the Licensees request 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.

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SOUTH SWP HYDROPOWER
FERC PROJECT NO. 2426-227

DRAFT LICENSE APPLICATION
EXHIBIT G – PROJECT MAPS

September 2019

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

Los Angeles
DEPARTMENT OF WATER AND POWER

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Application for New License	Licensees' Application for a New License for Major Project – Existing Dam for the South SWP Hydropower Relicensing, FERC Project Number 2426
CFR	Code of Federal Regulations
FERC	Federal Energy Regulatory Commission
Licensees	California Department of Water Resources and Los Angeles Department of Water and Power
Licensees' Proposal	Continued operation of the Project; addition of the existing Quail Detention Embankment, an existing stream flow gage (USGS Gage No. 11109525), and existing Primary Project Roads; modification to the existing Project boundary; and removal of the Warne Transmission Line
Project	South SWP Hydropower Relicensing
Project Maps	proposed Project boundary maps

1.0 INTRODUCTION

The California Department of Water Resources and the Los Angeles Department of Water and Power (Licensees) have prepared this Exhibit G, a Project Boundary Map with this supporting information, as part of Application for a New License Major Project – Existing Dam (Application for New License) from the Federal Energy Regulatory Commission (FERC) for the South SWP Hydropower Relicensing, FERC Project Number 2426 (Project). This exhibit has been prepared to conform with Title 18 of the Code of Federal Regulations (CFR), Subchapter B (Regulations under the Federal Power Act), Part 5 (Application for License for Major Project – Existing Dam) (Integrated 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, Section 4.41(h) states:

> 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 (U.S.C.) 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.

This Exhibit G includes supplemental supporting information and proposed Project boundary maps. Besides this introductory material, this exhibit includes three sections. Section 2.0 provides a description of the Licensees' proposed changes to the existing Project boundary. Section 3.0 provides a list of Project boundary maps proposed for inclusion in the new license. The proposed Project boundary maps (Project Maps) are provided at the end of Section 3.0. Section 4.0 provides 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, Exhibit D for costs and financing information, and Exhibit E for a discussion of potential environmental effects and the Licensees' 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 North American Datum of 1983 (NAD83) unless otherwise specified.

2.0 DESCRIPTION OF DATA PRESENTED IN PROJECT MAPS

The Licensees propose changes to the existing Project boundary. The specific changes being proposed to the existing Project boundary are described 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.

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Table 2.0-1. Proposed Changes to South SWP Hydropower Relicensing 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 Drawings
K-1	9/22/1965	--	N/A	N/A	Previous drawing showed vicinity and location; replaced by Exhibit G-1.
K-1-c	3/23/1979	2426-253	Exhibit G-1	South SWP Hydropower Proposed Project Boundary Overview Map	Removal of East Branch from Project Overview map.
K-2-F	--	--	Exhibit G-2	South SWP Hydropower Quail Lake and Lower Quail Canal Proposed Project Boundary Map	Removal of Project area north of Quail Lake, removal of Project area east of Lower Quail Canal; addition of Quail Detention Embankment (area to Project boundary west of Lower Quail Canal).
K-2-F	--	--	Exhibit G-3	South SWP Hydropower Peace Valley Pipeline, Warne Powerplant Proposed Project Boundary Map	Project boundary narrowed along Peace Valley Pipeline, Los Alamos Campground included within Project boundary.
K-2-F	--	--	Exhibit G-4	South SWP Hydropower Pyramid Lake and Dam Proposed Project Boundary Map	Project boundary around Pyramid Lake narrowed to 100-foot buffer from normal maximum water surface elevation. Boundary now includes 175-foot radius buffer around stream flow gage on Pyramid reach of Piru Creek; also now includes 30-foot buffer of access roads leading from Golden Highway to Angeles Tunnel access routes.
K-2-F	--	--	Exhibit G-5	South SWP Hydropower Angeles Tunnel Proposed Project Boundary Map	Boundary now includes 30-foot buffer of access roads leading from Golden Highway to Angeles Tunnel access routes. Areas around Castaic Penstocks are now narrowed to include only necessary features, and 50-foot buffer or roads leading to facilities.
K-2-F	--	--	Exhibit G-6	South SWP Hydropower Castaic Powerplant and Elderberry Forebay Proposed Project Boundary Map	Removal of area up to a 25-foot offset from Project road on the west and Forest Road 6N13 on the east. Addition of Castaic Transmission Line right of way, and 30-foot buffer of Project roads leading to Castaic Transmission Line.
K-2-F	--	--	Exhibit G-7	South SWP Hydropower Castaic Transmission Line Proposed Project Boundary Map	Addition of Castaic Transmission Line right-of-way, and 30-foot buffer of Project roads leading to Castaic Transmission Line.
K-2-F	--	--	Exhibit G-8	South SWP Hydropower Castaic Transmission Line Proposed Project Boundary Map	Addition of Castaic Transmission Line right-of-way, and 30-foot buffer of Project roads leading to Castaic Transmission Line.
K-4-b	3/23/1979	2426-256	N/A	N/A	Previous drawing showed ownership of land; drawing information incorporated into Exhibit G-4 and Exhibit G-6.
K-5-b	1/9/1975	2426-257	N/A	N/A	Previous drawing showed ownership of land; drawing information incorporated into Exhibit G-1 through Exhibit G-7.

Source:
California Department of Water Resources and Department of Energy pers. comm. 2018
Key:
FERC = Federal Energy Regulatory Commission

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3.0 LIST OF PROJECT MAPS

General maps for the Licensees' Proposal as described in Exhibit A of this Application for New License 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. Licensees' Proposed Project Boundary Maps

Drawing Number	Title
Exhibit G-1	South SWP Hydropower Proposed Project Boundary Overview Map
Exhibit G-2	South SWP Hydropower Quail Lake and Lower Quail Canal Proposed Project Boundary Map
Exhibit G-3	South SWP Hydropower Peace Valley Pipeline and Warne Powerplant Proposed Project Boundary Map
Exhibit G-4	South SWP Hydropower Pyramid Lake and Dam Proposed Project Boundary Map
Exhibit G-5	South SWP Hydropower Angeles Tunnel Proposed Project Boundary Map
Exhibit G-6	South SWP Hydropower Castaic Powerplant and Elderberry Forebay Proposed Project Boundary Map
Exhibit G-7	South SWP Hydropower Castaic Transmission Line Proposed Project Boundary Map
Exhibit G-8	South SWP Hydropower Castaic Transmission Line Proposed Project Boundary Map

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Appendix A

Project Maps

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SOUTH SWP HYDROPOWER
FERC PROJECT NO. 2426-227

DRAFT LICENSE APPLICATION
EXHIBIT H – PLANS AND ABILITY OF APPLICANT TO OPERATE EFFICIENTLY

September 2019

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

Los Angeles
DEPARTMENT OF WATER AND POWER

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LIST OF TABLES

COMMONLY USED TERMS, ACRONYMS & ABBREVIATIONS

§	Section
AB	Assembly Bill
AC	alternating current
Application for New License	Licensees' Application for a New License for Major Project – Existing Dam for the South SWP Hydropower Relicensing, FERC Project Number 2426
CEC	California Energy Commission
CFR	Code of Federal Regulations
DC	direct current
DWR	California Department of Water Resources
DSOD	California Division of Safety of Dams
EAP	Emergency Action Plan
FERC	Federal Energy Regulatory Commission
HVAC	heating, ventilation, and air conditioning
kV	kilovolt
LADWP	Los Angeles Department of Water and Power
LAUSD	Los Angeles Unified School District
Licensees	California Department of Water Resources and Los Angeles Department of Water and Power
Licensees' Proposal	Continued operation of the Project; addition of the existing Quail Detention Embankment, an existing stream flow gage (USGS Gage No. 11109525), and existing Primary Project Roads; modification to the existing Project boundary; and removal of the Warne Transmission Line
MWh	megawatt hour
O&M	operation and maintenance
Project	South SWP Hydropower, FERC Project Number 2426
RPS	Renewable Portfolio Standard
SB	Senate Bill
SCADA	Supervisory Control and Data Acquisition

SWP	State Water Project

1.0 INTRODUCTION

The California Department of Water Resources (DWR) and the Los Angeles Department of Water and Power (LADWP) (Licensees) have 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 South SWP Hydropower, FERC Project Number 2426 (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 5 (Application for License for Major Project – Existing Dam) (Integrated Licensing Process). In particular, this exhibit complies with the regulations in 18 CFR Section (§) 5.18(c). For reference, 18 CFR § 5.18(c) states:

> (c) Exhibit H. The information required to be provided by this paragraph (c) must be included in the application as a separate exhibit labeled “Exhibit H."
>
> (1) Information to be provided by an applicant for new license: Filing requirements.
>
> (i) Information to be supplied by all applicants. All applicants for a new license under this part must file the following information with the Commission:
>
> (A) 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:
>
> (1) Increase capacity or generation at the project;
>
> (2) Coordinate the operation of the project with any upstream or downstream water resource projects; and
>
> (3) Coordinate the operation of the project with the applicant's or other electrical systems to minimize the cost of production.
>
> (B) A discussion of the need of the applicant over the short and long term for the electricity generated by the project, including:
>
> (1) 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;

(2) 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;

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

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

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

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

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

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

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

(i) 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;

(ii) A resource analysis, including a statement of system reserve margins to

be maintained for energy and capacity; and

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

(iv) 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: The total annual cost of each alternative source of power to replace project power; the basis for the determination of projected annual cost; and 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 the effect on the direct providers (and their immediate customers) of alternate sources of power.

(D) 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.

(E) 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 Indian tribe for electricity generated by the project to foster the purposes of the reservation.

(F) 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:

(1) 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;

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

(3) 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.

(G) 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.

(H) 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.

(I) 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.

(J) 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.

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

(1) 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

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

(L) 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.

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

(A) The information specified in paragraph (c)(1).

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

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

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

(3) 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;

(4) 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

(5) 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.

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

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

(E) 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.

(F) 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.

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

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

(I) 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.

Excluding this introductory material, Exhibit H includes 20 sections. Section 2.0 describes the Project's efficient and reliable electric service, and Section 3.0 discusses 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. Section 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 discusses any modifications to the Project needed for consistency with comprehensive plans. Section 9.0 describes the Licensees' financial and personnel resources for operating the Project. Section 10.0 provides details regarding proposed Project boundary expansions. Section 11.0 discusses the Licensees' electricity consumption efficiency improvement programs. Section 12.0 addresses Indian tribes that may be interested in the Project relicensing. Section 13.0 addresses the safe management, operation, and maintenance of the Project. Section 14.0 describes the Project's current operations and constraints to operations, 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 discusses the Project's compliance record, and Section 18.0 discusses actions taken by the Licensees that have affected the public. Section 19.0 details the effect on ownership and operating expenses should the license be transferred. Section 20.0 provides the annual fees paid by the Licensees for use of federal lands and Indian lands. 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 the Licensees' 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

The Licensees have consistently demonstrated their 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, the Licensees have implemented several enhancements to increase energy recovery from the Project. These projects include LADWPs' modernization of the Castaic Powerplant and addition to the Project as a non-capacity amendment of a 230-kilovolt (kV) circuit on the existing Castaic-Haskell transmission line (Castaic-Haskell Line 3). The non-capacity transmission line upgrade reduces the risk of interruption from fire and earthquakes, and hardens the electrical grids with an alternate path. The transmission line upgrade provides no operational changes in the existing facilities; the licensed capacity of Castaic Power Plant remains at 1,275 megawatts following these upgrades. Furthermore, LADWP's modernization upgrades on Units 1 through 6 resulted in improved unit performance and efficiency. The overall capacity of Castaic Powerplant did not change due to limitation of water flow in the Angeles Tunnel.

Additionally, the Licensees' 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, the Licensees will look for applications that will continue to improve Project efficiency and reliability.

2.1 INCREASE IN CAPACITY OR GENERATION

The Licensees' Proposal does not include new capacity or generation. The Licensees 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

The Licensees actively coordinate 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. In essence, the Project is operated in a run-of-release mode, generating power as SWP water is provided for downstream consumptive use, with the exception that Castaic Powerplant is a pumping–generating plant that reuses SWP water in a pump-back mode to generate electricity before that water is delivered to downstream water users.

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

Electricity generated at the Project's Warne Powerplant is connected to the California electric grid at Southern California Edison's transmission lines that connect to the Warne Switchyard.

Electricity generated at the Castaic Powerplant is transmitted from the Castaic Switchyard via the 11.4-mile-long, three circuit, 230-kV Castaic Transmission Line to Haskell Junction Substation. When Castaic Powerplant is in its pump-back operating mode, electricity is provided to the powerplant via the same transmission lines. Castaic Powerplant is a pump storage facility that uses stored water in Pyramid Lake and Elderberry Forebay to generate electricity during peak hours when electricity prices are higher. When electricity prices are lower or to address system reliability issues, LADWP can pump water back from Elderberry Forebay to Pyramid Lake to increase its generating capacity. When SWP water is delivered to Pyramid Lake, LADWP uses the delivered water to generate the electricity when it determines it is the most economical and beneficial to the citizens of Los Angeles. LADWP delivers the electricity equivalent to the DWR delivered water on an hourly schedule throughout the week. LADWP also releases the equivalent amount of water delivered to Pyramid Lake from Elderberry Forebay into Castaic Lake to be delivered to downstream water users.

3.0 NEED FOR THE PROJECT AND AVAILABILITY OF ALTERNATIVE POWER SOURCES

3.1 LICENSEES' NEED FOR THE PROJECT'S POWER

The power generated at the Warne Power Development 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 Warne Powerplant output is delivered to the CAISO market, 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 pumping 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, Warne Power Development power generation is necessary in both the short and long term to maintain system reliability, operational flexibility, and low-cost electricity.

Similarly, the power generated at the Castaic Power Development is a critical resource for LADWP in its provision of reliable electric supply to its 1.5 million customers. In the last several years, LADWP has relied heavily on Castaic Powerplant generation to continue to supply its customers reliably during frequent natural gas curtailments imposed by the gas company during the cold winter months, and in the summer during high temperature peak load days. This importance will increase markedly over the next several years, primarily because LADWP must continue to increase the proportion of the energy it supplies that is generated from renewable resources, achieving 33 percent Renewable Portfolio Standard (RPS) goal by 2020, 50 percent RPS goal by 2025, 55 percent RPS by 2030, and 65 percent RPS goal by 2036 (LADWP 2017). The bulk of that renewable power will come from resources that are inherently intermittent, such as wind and solar, which would need Castaic Powerplant to help integrate and maintain LADWP grid reliability. Coupled with planned reductions in key conventional resources, such as coal-fired power from the Navajo Generating Station and Intermountain Power Project, LADWP will face unprecedented variability in supply. Further, because of its flexible operating characteristics, Castaic Powerplant can be employed daily as a non-polluting "shock absorber" (as contrasted with, for example, natural gas peaking plants) to mitigate renewable resource oscillations. In addition, LADWP will have an increasing need for heavy inertia and grid regulation that can be provided by the Castaic Powerplant.

3.2 COSTS AND AVAILABILITY OF ALTERNATIVE SOURCES OF POWER

Refer to Section 8.2 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 FACILITIES

The Licensees do not use the Project power for their own industrial facilities. Therefore, this item is not applicable.

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5.0 INDIAN TRIBES NEED FOR ELECTRICITY

The Licensees are not Indian tribes. Therefore, this item is not applicable.

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6.0 IMPACT ON LICENSEES' TRANSMISSION SYSTEMS

DWR does not currently own or operate an independent electrical transmission system in SCE's transmission area. Power from the Warne Powerplant is sold to the CAISO market at the point of interconnection with SCE's system, as described in Section 2.3.

LADWP owns and operates an independent electrical transmission system that includes 3,507 miles of overhead transmission circuits (alternating current [AC] and direct current [DC]) spanning five western states; 124 miles of underground transmission circuits; and 15,452 transmission towers. LADWP is one of only a few electric utilities that owns and operates a system utilizing both AC and DC transmission lines, enabling LADWP to have a geographically greater reach than the typical utility, which exclusively uses an AC system. LADWP uses its DC lines to import bulk power across state lines from markets and powerplants in Utah/Wyoming, Washington, and Oregon. To lower transmission losses, LADWP uses AC/DC conversion equipment to interconnect its long distance DC lines with the AC system. (LADWP 2017).

Most of LADWP's transmission facilities are located outside of the Los Angeles Basin. Its transmission assets were originally constructed to supply low-cost electricity to its customers, thereby maintaining low electricity rates. LADWP sells its excess transmission capacity on a non-discriminatory basis in a wholesale market under an Open-Access Transmission Tariff largely conforming to FERC Order 890. LADWP arranges for the transmission of energy for others through its Open Access Same-Time Information System when surplus transmission capacity is available and saleable; LADWP sells its excess energy and capacity in the California, Northwest, and Southwest energy markets. The revenues from the sale of LADWP's excess energy are used to reduce costs to customers and for capital improvements. (LADWP 2017).

However, the Castaic Powerplant electricity associated with the scheduled DWR water delivery to Pyramid Lake flows from Castaic Powerplant to the Sylmar Switching Station on the LADWP transmission system, and is provided to DWR at the Sylmar Switching Station. Any electricity generated in excess of the scheduled water delivery is used to supply LADWP's customer demand.

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7.0 PLANS TO MODIFY EXISTING PROJECT FACILITIES OR OPERATIONS

The Licensees have no plans to modify existing Project facilities, other than adding to the Project the existing Quail Detention Embankment, which lies along the northwest portion of the Lower Quail Canal, between Interstate 5 and the Peace Valley Pipeline Intake Embankment, and addressing the error, which included the Warne Transmission Line as a Project facility. It is important to note that SCE's transmission line segment has never been a Project work and was included in the original Project license in error – an inaccuracy that has been perpetuated through the term of the current license. See Section 5.3 of Exhibit A for additional information. The Licensees plan to operate the Project as it has been historically operated, consistent with the terms and conditions proposed by the Licensees in their Application for New License.

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8.0 COMPREHENSIVE DEVELOPMENT OF WATERWAYS

At the outset of the current relicensing process, the Licensees 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 modifications 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

The Licensees' sources of financing and revenue are sufficient to meet the continuing operation and maintenance (O&M) needs of the Project. Historically, DWR has funded Project O&M by issuance of short term Commercial Paper and Long-Term Revenue Bonds with ultimate repayment of all expenditures by the 29 SWP Contractors. Historically, the revenues from the sale of electricity to LADWP customers are used to pay for the Power System's O&M, including Castaic Powerplant O&M. These sources are available to the Licensees in the future.

9.2 PERSONNEL RESOURCES

The Licensees employ and train personnel to operate and maintain the Project in a safe, efficient, and reliable manner. The Licensees' current workforce assigned to the Project comprises approximately 114 positions. Of that number, the Project employs on-site approximately 78 positions: 26 DWR staff in its Southern Field Division, headquartered at Pearblossom, California, and 52 LADWP staff, headquartered at the Castaic Powerplant. In addition, management, accounting, environmental, human resources, safety, and management information systems staff located in DWR's offices in Sacramento and at LADWP's offices in Los Angeles support the Project on an as-needed basis.

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10.0 EXISTING PROJECT BOUNDARY EXPANSION NOTIFICATION

As described in Exhibit G, the Licensees propose to modify the existing Project boundary. This modification would entail reducing the boundary in certain locations and expanding it in other locations. Per 18 CFR § 4.32, via certified mail, the Licensees will notify the following of the filing of the Licensees' relicensing application: property owners on the lands to be encompassed by the proposed Project boundary (including those on additional lands proposed as part of the new boundary), and governmental agencies and subdivisions likely to be interested in or affected by the expansion.

WARNE POWER DEVELOPMENT

APN	Name
3252019800	SO CALIF EDISON CO SBE PAR 1 MAP (148-19-469) A 2PTS
3252017801	SO CALIF EDISON CO SB OF E PAR 2 MAP (148-19-469)
3252017800	SO CALIF EDISON CO SBE PAR 1 MAP (148-19-469) A 2PTS
3252007019	GROVER WALTER AND WALLIS D TRS. GROVER TRUST.
3252013901	STATE OF CALIFORNIA. FISH AND GAME.
3252017301	U. S. GOVERNMENT. FOREST SERVICE - ANGELES NF.
3252017907	STATE OF CALIFORNIA. PARKS AND RECREATION.
3250014300	U. S. GOVERNMENT. FOREST SERVICE - ANGELES NF.
3250013305	U. S. GOVERNMENT. FOREST SERVICE - ANGELES NF.
3250013304	U. S. GOVERNMENT. FOREST SERVICE - ANGELES NF.
3250013306	U. S. GOVERNMENT. FOREST SERVICE - ANGELES NF.
3250013303	U. S. GOVERNMENT. FOREST SERVICE - ANGELES NF.
3250016903	U. S. GOVERNMENT. FOREST SERVICE - ANGELES NF.
	LOS ANGELES COUNTY
	U. S. GOVERNMENT. FOREST SERVICE - ANGELES NF.
	STATE OF CALIFORNIA. CALTRANS.
	STATE OF CALIFORNIA. CALTRANS.
	LOS ANGELES COUNTY
	STATE OF CALIFORNIA. CALTRANS.

CASTAIC POWER DEVELOPMENT

APN	Name
3247005022	OLSON GREGORY C & WASANA
3244003018	NORTHLAKE ASSOCIATES LLC
3247010046	CORDOVA BETTYROSE & RUDOLPH
3244003017	CORDOVA NANCY L CORDOVA N
3244004051	NORTHLAKE ASSOCIATES LLC
3244012049	NORTHLAKE ASSOCIATES LLC
3244012050	NORTHLAKE ASSOCIATES LLC
3244012058	NORTHLAKE ASSOCIATES LLC
3244012059	NORTHLAKE ASSOCIATES LLC
3244012904	CASTAIC UNION SCHOOL DISTRICT
3247010050	NORTHLAKE ASSOCIATES LLC
3244015018	NORTHLAKE ASSOCIATES LLC
2865004002	MONTGOMERY FRANCIS J TR ET AL MONTGOMERY
2865004018	PREACHL JEFF L & TERI A. MEOTTEL ROBERT K & LORI L.
3244023011	SCHULTZ JOHN CO TR ET AL ROSS K
3244164001	BLC TESORO LLC
2865004300	U. S. GOVERNMENT. FOREST SERVICE - ANGELES NF.
3250015301	U. S. GOVERNMENT. FOREST SERVICE - ANGELES NF.
3250017300	U. S. GOVERNMENT. FOREST SERVICE - ANGELES NF.
3250018301	U. S. GOVERNMENT. FOREST SERVICE - ANGELES NF.
3250019300	U. S. GOVERNMENT. FOREST SERVICE - ANGELES NF.
3250019301	U. S. GOVERNMENT. FOREST SERVICE - ANGELES NF.
3250018302	U. S. GOVERNMENT. FOREST SERVICE - ANGELES NF.
3249013303	U. S. GOVERNMENT. FOREST SERVICE - ANGELES NF.
3249017303	U. S. GOVERNMENT. FOREST SERVICE - ANGELES NF.
3250018303	U. S. GOVERNMENT. FOREST SERVICE - ANGELES NF.
3250018304	U. S. GOVERNMENT. FOREST SERVICE - ANGELES NF.
3249017301	U. S. GOVERNMENT. FOREST SERVICE - ANGELES NF.
3249017300	U. S. GOVERNMENT. FOREST SERVICE - ANGELES NF.
3249016305	U. S. GOVERNMENT. FOREST SERVICE - ANGELES NF.
3249016308	U. S. GOVERNMENT. FOREST SERVICE - ANGELES NF.
3249016300	U. S. GOVERNMENT. FOREST SERVICE - ANGELES NF.
3247001301	U. S. GOVERNMENT. FOREST SERVICE - ANGELES NF.
3247001303	U. S. GOVERNMENT. FOREST SERVICE - ANGELES NF.
3247005304	U. S. GOVERNMENT. FOREST SERVICE - ANGELES NF.
3247002302	U. S. GOVERNMENT. FOREST SERVICE - ANGELES NF.
3247005303	U. S. GOVERNMENT. FOREST SERVICE - ANGELES NF.

CASTAIC POWER DEVELOPMENT (continued)

APN	Name
3247003302	U. S. GOVERNMENT. FOREST SERVICE - ANGELES NF.
3247004900	U. S. GOVERNMENT. BLM.
3244001900	U. S. GOVERNMENT. FOREST SERVICE - ANGELES NF.
3244004905	STATE OF CALIFORNIA. PARKS AND RECREATION.
3244004300	U. S. GOVERNMENT. BLM.
3244012900	STATE OF CALIFORNIA. PARKS AND RECREATION.
3244011902	STATE OF CALIFORNIA. PARKS AND RECREATION.
3244015904	STATE OF CALIFORNIA. PARKS AND RECREATION.
3244017301	U. S. GOVERNMENT. FOREST SERVICE - ANGELES NF.
3244016909	STATE OF CALIFORNIA. PARKS AND RECREATION.
2865004300	U. S. GOVERNMENT. FOREST SERVICE - ANGELES NF.
3244023300	U. S. GOVERNMENT. FOREST SERVICE - ANGELES NF.
3244022301	U. S. GOVERNMENT. FOREST SERVICE - ANGELES NF.
3244018300	U. S. GOVERNMENT. FOREST SERVICE - ANGELES NF.
3244026301	U. S. GOVERNMENT. FOREST SERVICE - ANGELES NF.
3244026302	U. S. GOVERNMENT. FOREST SERVICE - ANGELES NF.
3250019902	U. S. GOVERNMENT. FOREST SERVICE - ANGELES NF.
3244016907	STATE OF CALIFORNIA. PARKS AND RECREATION.
	U. S. GOVERNMENT. FOREST SERVICE - ANGELES NF.
3244003902	STATE OF CALIFORNIA. PARKS AND RECREATION.
	LOS ANGELES COUNTY
	LOS ANGELES COUNTY
5019003	U. S. GOVERNMENT. FOREST SERVICE - LOS PADRES NF.
3250017303	U. S. GOVERNMENT. FOREST SERVICE - ANGELES NF.
3250017304	U. S. GOVERNMENT. FOREST SERVICE - ANGELES NF.
3249018300	U. S. GOVERNMENT. FOREST SERVICE - ANGELES NF.
3250013306	U. S. GOVERNMENT. FOREST SERVICE - ANGELES NF.

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11.0 ELECTRICITY CONSUMPTION EFFICIENCY IMPROVEMENT PROGRAM

11.1 CONSERVATION ENCOURAGEMENT

11.1.1 Electricity Conservation

DWR, as a State of California agency, participates in the State's 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.

LADWP's energy conservation programs comply with applicable regulatory requirements, including those under the California Code of Regulations Title 20 and Title 24; Senate Bill (SB) 1037; Assembly Bill (AB) 2021; SB350; and AB802. In compliance with these requirements, LADWP has:

- Reported annually on energy efficiency and demand reduction programs to the California Energy Commission (SB1037)
- Established annual energy efficiency and demand reduction targets projecting over 10 years (AB2021)
- Established annual energy efficiency targets consistent with statewide goals (SB350)
- Provided aggregated energy usage for energy use benchmarking purposes (AB 802)

As applicable, LADWP will include energy efficiency towards meeting the renewable energy and zero-carbon resource mandates recently set forth by SB100. In addition, per SB350 requirements, LADWP will file an Integrated Resource Plan every five years, starting in 2019, evaluating energy efficiency as an energy supply alternative.

LADWP's electric efficiency programs include, but are not limited to, the following:

- Behavior-Based Efficiency Program
- Efficient Product Marketplace Program (online market for energy efficient products)
- Consumer Rebate Program
- Home Energy Improvement Program

- Refrigerator Exchange Program
- Refrigerator Turn-In & Recycle Program
- HVAC [Heating, Ventilation, and Air Conditioning] Optimization Program
- Residential Lighting Efficiency Program
- Commercial Lighting Incentive Program
- Custom Performance Program
- Commercial Refrigerator and Food Service Equipment Rebate Program
- Energy Efficiency Technical Assistance Program
- Savings By Design Program
- Upstream HVAC Incentive Program
- California Advanced Homes Incentive Program
- Energy Savings Assistance Program
- Home Energy Upgrade CA
- LAUSD [Los Angeles Unified School District] Direct Install (Upgrade) Program
- Commercial Direct Install (Upgrade) Program
- LADWP Plumbing Ordinances
- Embedded Energy from Water Measures
- Embedded Energy from Passive Water Conservation

12.0 INDIAN TRIBES NAMES AND MAILING ADDRESSES

The proposed Project is not located on Indian tribe lands.

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13.0 SAFE MANAGEMENT, OPERATION, AND MAINTENANCE OF THE PROJECT

The Licensees' first and foremost consideration when operating the Project is the safety of the public, the Licensees' employees, and their contractors. The Licensees' 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's reservoirs do not include dedicated flood control space and Project spillways are not constrained for flood control periods (i.e., gates must remain closed for periods of time). However, Project facilities are designed to minimize the impacts during high flow periods. For example, the dam spillways are designed to handle high flows and the Quail Detention Embankment is designed to attenuate waters from Quail Lake or the Lower Quail Canal, and to protect Interstate 5 if an unplanned release of water occurs from these facilities.

13.2 WARNING DEVICES FOR PUBLIC SAFETY

As described in its Project Public Safety Plan (DWR 2014), DWR has implemented many practices to promote the safety of its employees and the public. DWR educates and informs the public with many different displays and attractions, including those at the Vista Del Lago Visitor Center. At the center, visitors learn about the SWP and Project, the facilities, their purpose and operations, and many safety items. Information at the center informs the public about safety features at Pyramid Lake, and brochures and videos are available to visitors to learn about water safety, especially for children.

The DWR Water Safety web page (http://www.water.ca.gov/recreation/safety/) includes all the brochures and videos that are at the Vista Del Lago Visitors Center. The videos "Water Safe for Life" and "Come Back Alive!" are to educate and inform the public on SWP recreational facilities. The brochures "SWP Water Safety" and "Water Safety Materials" are helpful tips and information to help keep the public informed and safe.

At its Project facilities, DWR uses many warning devices, such as signs, buoy lines, and alarms to warn the public of any dangers or hazards. Many signs advise the public that the said area is dangerous and that its access is prohibited; some tell the public 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 Project areas. DWR facilities that are not accessible to the public due to safety reasons (e.g., Lower Quail Canal, Warne Powerplant and Switchyard) are surrounded by chain link fencing with applicable signage. Manually operated gates are locked with chains and special locks made solely for Licensees' staff. Electric gates require a specific key, or authorized security badge, to get through, and the powerplants have a security camera watching the front gate with an operator and security guard monitoring at all times. A buoy line across the entire

width of the Lower Quail Canal at the Quail Lake Outlet prevents the public from getting too close to the outlet gates, and signage warns the public of the direction of the flowing water.

The Castaic Powerplant, Elderberry Forebay, Elderberry Forebay Dam, penstocks, switchyard, and related facilities are not open to the public. While roads are located along the west (Los Angeles City Water and Power Road) and east (Goodell Fire Road/Castaic Canyon Road – 6N13) of the Elderberry Forebay, public vehicular access on these roadways is prohibited. The switchyard is surrounded by chain link fencing with applicable signage. LADWP's private security staff patrol these facilities and maintain control 24 hours per day, seven days per week.

13.3 EMERGENCY ACTION PLAN

The Licensees completed a comprehensive revision of its Project Emergency Action Plan (EAP) in December 31, 2018. Licensees conduct Tabletop and Functional exercises on a five-year cycle. The last Tabletop and Functional exercises performed by DWR were in December 5, 2018 and February 6, 2019 . The last Tabletop and Functional exercises performed by LADWP were in April 2015. DWR's EAP is reviewed annually to confirm that all information is up to date.

13.4 MONITORING DEVICES

The civil structures are outfitted with a variety of monitoring devices to detect settlement or displacement movement and leakage in dams, and to protect from conduit failure. Devices installed and maintained include: leakage weirs, survey pedestals, level sensors, and loss of pressure alarms.

The Licensees monitor civil structures by conducting regular, periodic visual observations, and by reviewing and analyzing data collected from various instruments throughout the Project. This monitoring measures critical indicators of structural behavior. Data are collected, observations are made, and qualified personnel evaluate and make recommendations based on the collected data. Results are presented in reports and distributed to FERC and the California Division of Safety of Dams (DSOD). All facilities are observed and attended weekly. Periodic scheduled inspections are made less frequently (i.e., monthly, quarterly, or annually) for collection of monitoring data. The results of these inspections are recorded and placed into databases used for tracking history of the measurements. Annual inspections are conducted with a Field Engineering Inspector from FERC and DSOD.

An integral part of the maintenance and monitoring program includes the Part 12D Independent Consultant's Safety Inspection Reports completed every five years. These inspections and reports provide an independent, third party assessment of the instrumentation and performance-monitoring program. These reports also include recommendations by the independent inspector for any additional instrumentation that would improve monitoring. The devices used for monitoring civil structures and water conduits are described below.

The Licensees complete and file periodic surveillance monitoring reports with FERC as required by FERC regulation at 18 CFR 12.41 and FERC guidelines provided within its Engineering Guidelines for the Evaluation of Hydropower Projects, Chapter 14 Dam Safety Performance Monitoring Program.

13.4.1 Leakage Weirs

Leakage weirs are located throughout Pyramid Dam. The data are tabulated and provided to FERC in the Licensees' periodic surveillance monitoring reports.

13.4.2 Survey Pedestals

Pyramid Dam and Elderberry Forebay Dam survey pedestals consist of steel pipes secured by concrete.

13.4.3 Level Sensors

Sensors provide for Quail Lake, Pyramid Dam, and Elderberry Forebay elevations and are monitored via a Supervisory Control and Data Acquisition (SCADA) system at DWR's Warne Powerplant and LADWP's Castaic Powerplant.

13.4.4 Loss of Pressure Alarm

There is a pressure sensor that provides a loss of pressure alarm to SCADA for the Warne Penstocks and Castaic Penstocks.

13.5 EMPLOYEE SAFETY AND PUBLIC SAFETY RECORDS

Based on California Division of Occupational Safety and Health Form 300 annual reports, in the past five years, there have been four lost-time accidents for a total of one day away for work involving DWR's on-site Project operations employees, and two lost-time accidents for a total of 24 days away for work involving LADWP's on-site Project operations employees.

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

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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. Refer to Section 2 of this Exhibit H for a description of the Licensees' upgrades to the Project.

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16.0 GENERATION LOST OVER THE LAST FIVE YEARS

The Licensees typically take scheduled outages for about two to three weeks per powerplant 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 the Licensees' control. "Momentary" outages may be caused by transmission trouble; the Licensees are usually able to quickly restore the Project to service shortly after these occur. Unscheduled outages also may occur so that the Licensees 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 Project Powerplants Were Shut Down for Unscheduled (Forced) Outages for More Than 24 Hours from Calendar Year 2014 Through 2018 and the Reason for Each Outage

Period	Duration of Shut Down (hrs)	Estimated Lost Power (MWh)	Reason for Shut Down
Warne Powerplant			
4/23/14-5/2/14	119	4,541	During operation, the Unit 2 turbine's hydraulic oil line to needle #5 was discovered to be leaking oil. The unit was forced out of service to make repairs.
5/15/15-5/19/15	101	3,841	During inspection, it was discovered that the B phase stab of motor operated disconnect switch 165 was not seated completely in its saddle. The MOD was deenergized and opened, forcing the unit out of service until repairs were made to the MOD.
5/15/18-5/17/18	48	1,828	The 13.8 kV unit breaker PCB/VCB 212 failed to close on startup, forcing the unit out of service until troubleshooting and repairs were completed.
Castaic Powerplant			
0	--	--	--
Total Project			
3 Instances	268	10,210	--

Key:
kV = kilovolt
MOD = Motor Operated Disconnect
MWh = megawatt hours
PCB/VCB = Power Circuit Breaker/Vacuum Circuit Breaker

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17.0 LICENSEES' COMPLIANCE RECORD

Under the existing license, three non-compliance events related to the Project have occurred since the year 2000. The events are related to: (1) Biennial Trout Stocking Report Filing in 2007 and 2014: (2) Arroyo Toad (*Anaxyrus californicus)* and Sensitive Species Monitoring Report Filing in 2012; and (3) Project Safety-Related Plan and Schedule Filing in 2014. The non-compliance events have been addressed and no penalties or corrective actions were required by FERC for any of the events.

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18.0 ACTIONS TAKEN BY LICENSEES AFFECTING THE PUBLIC

As discussed in Exhibit D, the Project provides recreational resources for the public, including Quail Lake and Pyramid Lake, and delivers water to 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 power plants, 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 power plant 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 Exhibit D.

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20.0 ANNUAL FEES FOR FEDERAL OR INDIAN LANDS

The Project occupies federal land managed by the U.S. Department of Agriculture, Forest Service and U.S. Department of the Interior, Bureau of Land Management. No Native American tribal lands are included within the existing Project boundary. In 2018, the LADWP paid $30,234.95 for use of federal lands.

In accordance with 18 CFR 11.6(a)(3), since February 22, 2008, DWR has filed with FERC an application for full exemption from payment of annual fees for use of federal lands. During those years, DWR was not 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. FERC has granted DWR's application for full exemption, so DWR does not pay any fees for use of federal lands.

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21.0 REFERENCES CITED

California Department of Water Resources (DWR). 2014. South SWP Hydropower Project Public Safety Plan. Prepared by DWR Southern Field Division.

Los Angeles Department of Water and Power (LADWP). 2017. Power Strategic Long-Term Resource Plan. December 2017. Available online: https://www.ladwp.com/ladwp/faces/wcnav_externalId/a-p-doc?_adf.ctrl-state=q4iwp5l2k_4&_afrLoop=688763113742683. Accessed: November 2, 2018.

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