

## Project Description

### Middle Fork American River Hydroelectric Project (FERC Project No. 2079)

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#### 1.0 OVERVIEW OF THE MIDDLE FORK AMERICAN RIVER HYDROELECTRIC PROJECT

The Middle Fork American River Hydroelectric Project (Project) is owned and operated by the Placer County Water Agency and is a multi-purpose water supply and hydro-generation Project designed to conserve and control waters of the Middle Fork American River, the Rubicon River and certain tributaries. The Project began operations in 1967.

The Project consists of a series of seven diversions and five powerhouses with a nameplate generating capacity of 223,750 kilowatts (KW). Water from the diversions is controlled and conveyed through seven tunnels. At the end of the system, Project water is released to the Middle Fork American River approximately 29 miles upstream of Folsom Reservoir.

The Project includes two principal water storage reservoirs, French Meadows and Hell Hole (combined gross storage of 342,583 acre-feet), two limited storage afterbays, Interbay and Ralston (combined storage of 2,959 acre-feet) and three small diversions, Duncan Creek Diversion, North Fork Long Canyon Diversion and South Fork Long Canyon Diversion. These Project features are summarized on Table 1 and are shown geographically on Figure 1-“Project Facilities” and schematically on Figure 2-“Project Schematic Diagram.”

Duncan Creek Diversion is a 32 foot-high concrete gravity dam that routes flows from Duncan Creek into French Meadows Reservoir via the 7,864 foot-long, Duncan Creek Diversion Tunnel. The headwaters of the Middle Fork American River and its tributaries drain to the French Meadows Reservoir which is impounded by French Meadows Dam (also referred to as LL Anderson Dam), a 231 foot-high earth and rock fill structure. Water stored in French Meadows Reservoir travels to the Hell Hole Reservoir via the 2.6 mile-long French Meadows-Hell Hole Tunnel. Hell Hole Dam, a 410 foot-high rockfill structure, also impounds water flowing from the upper reaches of the Rubicon River drainage into Hell Hole Reservoir.

Water flowing from French Meadows to Hell Hole Reservoir passes through a 691 foot-long penstock and the French Meadows Powerhouse, located on the north shore of Hell Hole Reservoir approximately 1.5 miles east of the Hell Hole Dam. French Meadows Powerhouse has a nameplate generating capacity of 15,300 KW from a single generation unit at a maximum flow rate of about 400 cfs. The Hell Hole Powerhouse, located at the base of the Hell Hole Dam, generates electricity from fish-flow releases

into the Rubicon River, and has a nameplate generating capacity of 725 KW from a single generator using required stream flow releases.

Water stored in Hell Hole Reservoir is released through the 10.4 mile-long Hell Hole – Middle Fork Tunnel to a 3,653 foot-long penstock into the Middle Fork Powerhouse. Middle Fork Powerhouse has a nameplate generating capacity of 122,400 KW from two generating units at a design flow rate of about 990 cfs. Middle Fork Powerhouse releases water to Middle Fork Interbay, impounded by Interbay Dam, a 70 foot-high concrete dam on the Middle Fork American River. Middle Fork Interbay acts as an afterbay for the Middle Fork Powerhouse and as a forebay for the inlet to the Middle Fork-Ralston Tunnel.

Water in the Hell Hole - Middle Fork Tunnel is augmented by diversions from the North and South Forks of Long Canyon Creeks. Water diverted by a 10 foot-high concrete gravity dam from North Fork Long Canyon Creek and a 27 foot-high concrete gravity dam from South Fork Long Canyon Creek flows through respective short metal pipes into 6 foot diameter vertical shafts into the Hell Hole – Middle Fork Tunnel.

The 6.7 mile-long, Middle Fork-Ralston Tunnel terminates in a 1,670 foot-long penstock that supplies water to drive a single generating unit at the Ralston Powerhouse. The powerhouse has a nameplate electrical generating capacity of 79,200 KW from a single generating unit at a maximum flow rate of about 924 cfs, and discharges to the Ralston Afterbay. The Ralston Afterbay Dam is an 89 foot-high concrete dam located on the Middle Fork American River just down stream of the Rubicon River's confluence with the Middle Fork American River.

The Ralston Afterbay supplies water to the 403 foot-long Oxbow Tunnel. Oxbow Powerhouse at the downstream end of the tunnel has a nameplate electrical generating capacity of 6,100 KW from a single generator at a maximum flow rate of about 1075 cfs.

Water from the Oxbow Powerhouse is discharged back to the Middle Fork American River approximately 29 miles upstream of Folsom Reservoir.

## **1.1 OPERATION OF THE MIDDLE FORK PROJECT**

The Project is operated to meet three objectives: maintenance of water flows to protect environmental resources, water supply for PCWA customers, and generation of electrical energy. In addition to the FERC license, operation of the Project is also governed by water rights permits, water supply contracts, and a power purchase contract with PG&E. Water flows to protect and maintain environmental resources are defined in the FERC License and in agreements with the State of California.

The water rights permits, water supply contracts and FERC License conditions constrain how PCWA plans for water use and how PG&E optimizes electrical generation. Management of flows is also constrained by the water available annually and within each season. In late fall and early winter the water levels in French Meadows and Hell Hole reservoirs are reduced to provide adequate storage to manage spring runoff. The fall/winter drawdown must balance the objectives of providing

sufficient storage space to minimizing the potential for spilling the reservoirs if the following spring is wet, but must also retain sufficient water in storage to ensure an adequate water supply to meet environmental and consumptive demands if the following spring is dry. During spring runoff operating flows are adjusted to store as much runoff as possible without spilling the reservoirs. After the reservoirs have reached their maximum capacity in late spring or summer, flows are regulated to first meet environmental flow requirements, then to meet consumptive water supply requirements, and then to optimize power generation. Operation of the system varies from year to year based on the winter snow pack and amount of precipitation (wet year vs. dry).

Under typical operating conditions the Project generates approximately 1 million-megawatt hours annually. Operations patterns for the Project may include full load operations (typically during when runoff is high), “peaking” operations (when the Project is operated 15 to 18 hours a day to conserve water but help meet peak electrical demand), to low flow operations to conserve water for consumptive use or during Project maintenance periods.

While not within the FERC Project Boundaries, PCWA’s consumptive water rights permits identify two points of diversion for water for consumptive purposes downstream of the Project facilities. The Auburn Pumping Station diversion point is approximately 28 miles downstream of the Project’s FERC boundary. The second point of consumptive diversion is via facilities near Folsom Dam, at the downstream end of Folsom Reservoir, approximately 48 miles downstream of the Project’s FERC boundary.

## **1.2 SUPPORT FACILITIES**

While the diversions, reservoirs, afterbays, diversion pools, tunnels and powerhouses are the principal components of the Project, there are a number of support facilities, which are necessary to its operation.

The electrical output of the powerhouses (except Hell Hole Dam Powerhouse) is converted from generator voltage to either 230 kV or 60 kV transmission voltage by step-up transformers located at the powerhouses. The powerhouses are interconnected to PG&E’s transmission system. The PG&E transmission interconnection and transmission system is not a part of the Project.

Electrical output from the Hell Hole Dam Powerhouse is stepped up and transmitted at distribution voltage via a Project transmission line (a component of the Project) to the French Meadows Switchyard, where it is increased to transmission voltage and delivered with the output of the French Meadows Powerhouse to the PG&E transmission system.

A number of roads were constructed as part of the Project to provide access to project facilities. Subsequent to construction, roads were transferred to the U.S. Forest Service. PCWA also constructed and maintains personnel housing, maintenance facilities and a dormitory facility near the Hell Hole Dam.

PCWA, in coordination with the United States Geologic Survey installed and operates a number of gages located throughout the Project. These gages monitor flows in the streams and rivers, and water levels at the reservoirs and diversions.

### **1.3 RECREATION FACILITIES IN THE VICINITY OF THE PROJECT**

The Project is located within the Tahoe and Eldorado National Forests. As part of FERC's approval of the Project's license, PCWA agreed to replace certain Forest Service facilities affected by construction of the Project, to upgrade roads and to develop additional recreation facilities to provide beneficial public uses. Once constructed, these facilities are now operated and maintained by the respective National Forests. However, PCWA has an ongoing agreement with each Forest to provide continuing financial resources to support operation, maintenance and renewal of the facilities.

The largest concentration of recreation facilities are clustered around French Meadows Reservoir. Included among 18 recreation sites are family camp sites, group camp sites, picnic grounds, boat ramps, swimming beaches and a scenic outlook.

At Hell Hole Reservoir a boat access/trail camp has been developed at the upper end of the reservoir. Additional recreation facilities near Hell Hole Dam include a 10 unit campground for tents only, a vista site, and a boat launch ramp.

Two group campgrounds are located near the South Fork Long Canyon Diversion and a family camp was developed upstream of the group campgrounds.

The reach of the Middle Fork American River below the Ralston Afterbay is a popular rafting and kayaking area. PCWA has assisted in developing rafting access with parking and restrooms adjacent to the Oxbow Powerhouse discharge channel. PCWA also developed a picnic ground and day-use area nearby at the confluence of the Middle Fork American River with the Rubicon River.