

**DON PEDRO HYDROELECTRIC PROJECT
FERC NO. 2299**

AMENDMENT OF APPLICATION

EXHIBIT A – DON PEDRO PROJECT DESCRIPTION



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List of Acronyms

ac	acres
ACOE.....	U.S. Army Corps of Engineers
AF	acre-feet
AFLA	Amendment to the Final License Application
BLM.....	U.S. Department of the Interior, Bureau of Land Management
CCSF.....	City and County of San Francisco
CDFW	California Department of Fish and Wildlife
CFM	Constant Fractional Marking
cfs	cubic feet per second
Districts	Turlock Irrigation District and Modesto Irrigation District
DPRA.....	Don Pedro Recreation Agency
Elev or el	Elevation
FERC.....	Federal Energy Regulatory Commission
FLA	Final License Application
ft	feet
hp.....	horsepower
IG	Infiltration Gallery
M&I.....	Municipal and Industrial
mi ²	square miles
MID.....	Modesto Irrigation District
MVA	Megavolt-ampere
MW	megawatt
NGVD29	National Geodetic Vertical Datum of 1929
NEPA	National Environmental Policy Act
NMFS.....	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
PM&E	Protection, Mitigation and Enhancement
RM	River Mile
rpm	Revolutions per minute
RST	Rotary Screw Trap
SJR	San Joaquin River

SRP	Special Run Pools
TID	Turlock Irrigation District
USDOI	U.S. Department of the Interior
USFS	U.S. Department of Agriculture, Forest Service

EXHIBIT A – DON PEDRO PROJECT DESCRIPTION

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.*

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PREFACE

On April 28, 2014, the co-licensees of the Don Pedro Hydroelectric Project, Turlock Irrigation District (TID) and Modesto Irrigation District (MID) (collectively, the Districts), timely filed with the Federal Energy Regulatory Commission (Commission or FERC) the Final License Application (FLA) for the Don Pedro Hydroelectric Project, FERC No. 2299. As noted in the filing and acknowledged by FERC at the time, several studies were ongoing which were likely to inform the development of additional protection, mitigation, and enhancement (PM&E) measures. The Districts have now completed these studies and herein submit this Amendment of Application (Amendment to the Final License Application or AFLA). For ease of review and reference, this AFLA replaces the Districts' April 2014 filing in its entirety.

The Don Pedro Project provides water storage for irrigation and municipal and industrial (M&I) use, flood control, hydroelectric generation, recreation, and natural resource protection (hereinafter, the "Don Pedro Project"). The environmental analysis contained in this AFLA considers all the components, facilities, operations, and maintenance that make up the Don Pedro Project and certain facilities proposed to be included under the new license. The Don Pedro Project is operated to fulfill the following primary purposes and needs: (1) to provide water supply for the Districts for irrigation of over 200,000 acres of Central Valley farmland and M&I use, (2) to provide flood control benefits along the Tuolumne and San Joaquin rivers, and (3) to provide a water banking arrangement for the benefit of the City and County of San Francisco (CCSF) and the 2.6 million people CCSF supplies in the Bay Area. The original license was issued in 1966. In 1995, the Districts entered into an agreement with a number of parties, which resulted in greater flows to the lower Tuolumne River for the protection of aquatic resources.

Hydroelectric generation is a secondary purpose of the Don Pedro Project. Hereinafter, the hydroelectric generation facilities, recreational facilities, and related operations will be referred to as the "Don Pedro Hydroelectric Project," or the "Project". With this AFLA to FERC, the Districts are seeking a new license to continue generating hydroelectric power and implement the Districts' proposed PM&E measures. Based on the information contained in this AFLA, and other sources of information on the record, FERC will consider whether, and under what conditions, to issue a new license for the continued generation of hydropower at the Districts' Don Pedro Project. The Districts are providing a complete description of the facilities and operation of the Don Pedro Project so the effects of the operation and maintenance of the hydroelectric facilities can be distinguished from the effects of the operation and maintenance activities of the overall Don Pedro Project's flood control and water supply/consumptive use purposes.

Being able to differentiate the effects of the hydropower operations from the effects of the flood control and consumptive use purposes and needs of the Don Pedro Project will aid in defining the scope and substance of reasonable PM&E alternatives. As FERC states in Scoping Document 2 in a discussion related to alternative project operation scenarios: "...alternatives that address the consumptive use of water in the Tuolumne River through construction of new structures or methods designed to alter or reduce consumptive use of water are...alternative mitigation strategies that could not replace the Don Pedro *hydroelectric* [emphasis added] project. As such, these recommended alternatives do not satisfy the National Environmental

Policy Act (NEPA) purpose and need for the proposed action and are not reasonable alternatives for the NEPA analysis.”

1.0 DON PEDRO PROJECT LOCATION

The Don Pedro Project is located on the Tuolumne River in western Tuolumne County, California, along the western slope of the Sierra Nevada. The current Don Pedro Project Boundary extends from river mile (RM) 53.2 to approximately RM 80.8 of the Tuolumne River. The Tuolumne River is a tributary to the San Joaquin River, which eventually flows into the Sacramento-San Joaquin River Delta, thence to San Francisco Bay. The Don Pedro Project lies about 40 miles east of the City of Modesto and 26 miles northeast of the City of Turlock. A portion of the Project occupies lands of the United States, administered by the United States Department of Interior (USDOI) Bureau of Land Management (BLM) as part of the Sierra Resource Management Area. All other lands within the current Project Boundary are owned jointly by TID and MID, co-licensees of the Project.

The Don Pedro powerhouse and its electrical switchyard are located immediately downstream of the Don Pedro Dam at RM 54.6. The reservoir formed by the dam has a normal maximum water surface elevation¹ of 830 feet (ft) above mean sea level. The Project Boundary at the upper end of the reservoir extends to a water surface elevation of 845 ft at RM 80.8. The maximum water surface elevation resulting from the spillway design flood is estimated to be 852 ft. The top of the dam and dikes containing the reservoir is elevation 855 ft. The drainage area of the Tuolumne River at Don Pedro Dam is approximately 1,533 square miles (mi²) (ACOE 1972).

The Don Pedro Project was formerly referred to as the New Don Pedro Project (and the Don Pedro Dam was formerly referred to as the New Don Pedro Dam) because it displaced the smaller, original Don Pedro Dam and powerhouse, which were built in 1923 and located approximately 1.5 miles upstream of the current dam. The old Don Pedro Dam remains in place and has a top of dam at approximately 609 ft².

Figure 1.0-1 provides a general location map of the Don Pedro Project within the larger San Joaquin River watershed and Figure 1.0-2 provides a more detailed view of the vicinity and facilities.

¹ All elevations provided in the AFLA are referenced to the National Geodetic Vertical Datum of 1929 (NGVD 29).

² Elevation 609 refers to the elevation of the roadway along the top of dam; a 4-ft-high concrete parapet wall (guardrail) extends to elevation 613 ft.

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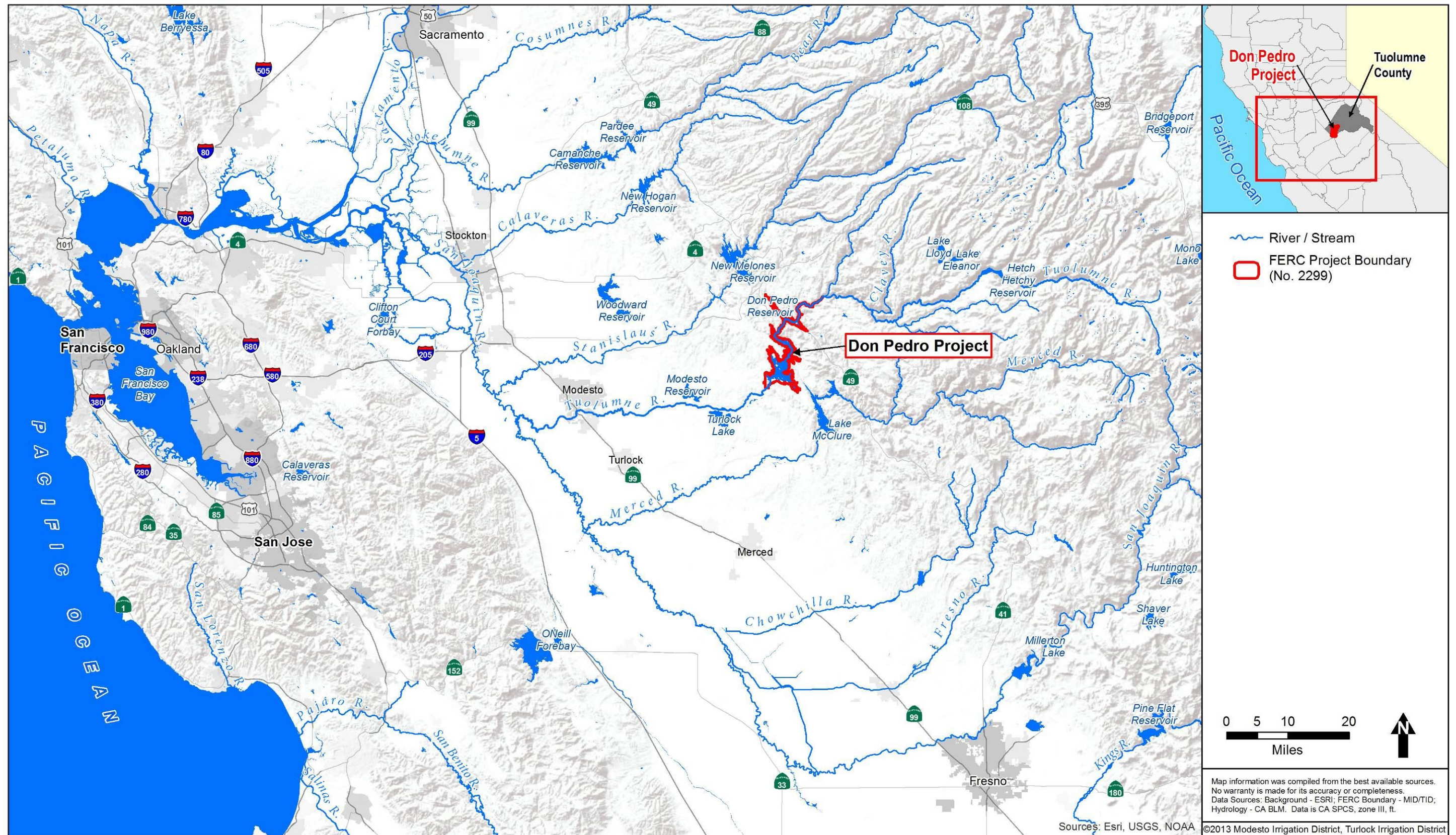


Figure 1.0-1. General map of the San Joaquin River basin showing the location of Don Pedro Project.

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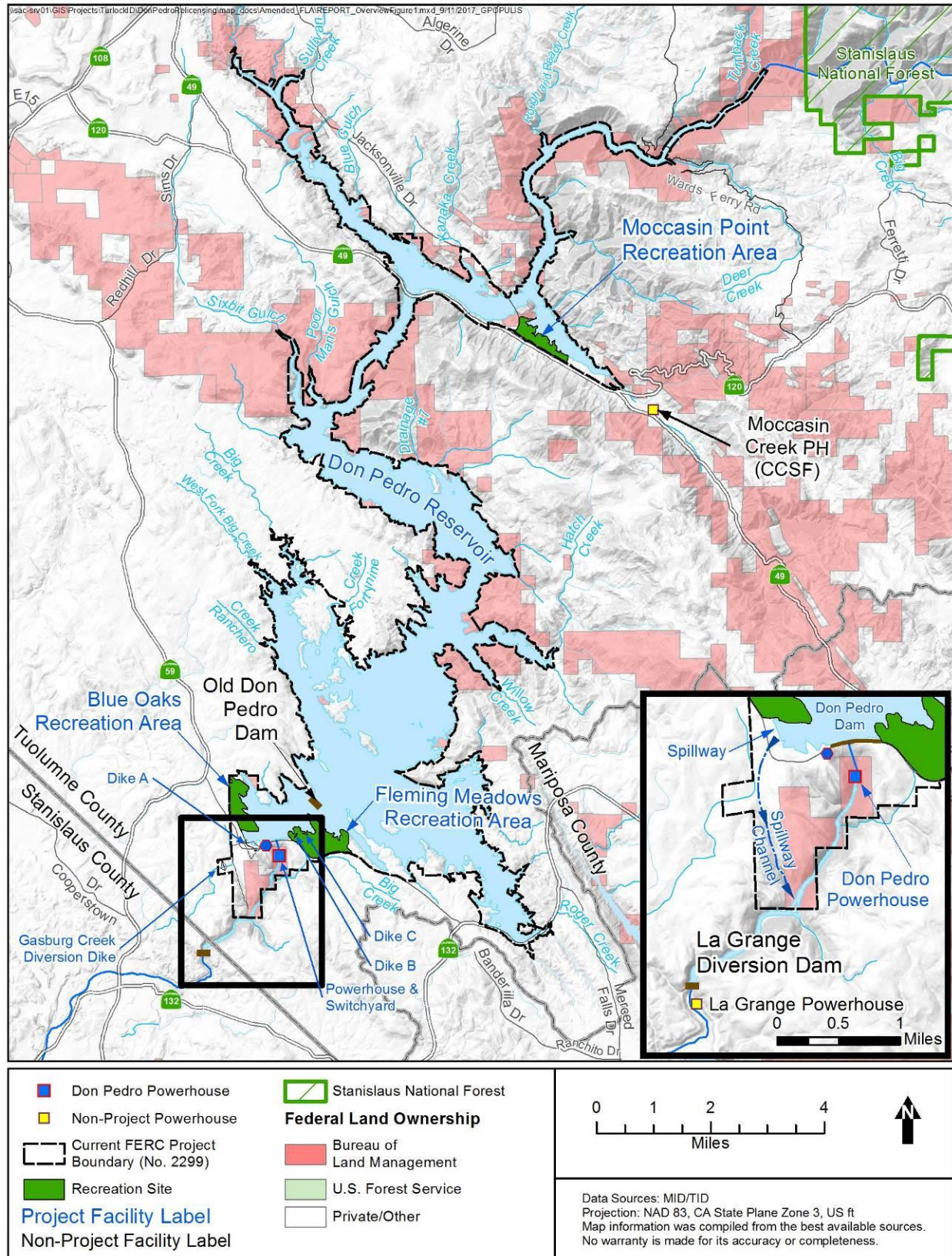


Figure 1.0-2. Don Pedro Project site location map.

2.0 EXISTING AND PROPOSED DON PEDRO PROJECT FACILITIES

2.1 Existing Project Facilities

On March 10, 1964, the Federal Power Commission, predecessor agency to the Federal Energy Regulatory Commission (FERC), granted the Districts an initial license authorizing the construction and operation of the new Don Pedro Dam and power plant. This initial license has a term that expires on April 30, 2016. Construction began in 1967 and commercial operation commenced in 1971. The current Don Pedro Dam was built approximately 1.5 mi downstream of the original Don Pedro Dam which had been in operation since 1923.

The primary Don Pedro Project facilities include: (1) Don Pedro Dam and Reservoir, (2) controlled and uncontrolled spillways on the right (west) abutment of the main dam, (3) controlled outlet works located in the diversion tunnel in the left (east) abutment of the main dam, (4) the power intake and tunnel, also in the left abutment, (5) the Don Pedro powerhouse, (6) the Project switchyard located at the powerhouse, and (7) four dikes—the Gasburg Creek Dike and Dikes A, B, and C. Three developed recreation areas are located within the Project Boundary, as are numerous other small recreation facilities (restrooms and buoys) outside of the developed areas. The Don Pedro Project facilities are described in detail below and summarized in Table 2.1-1.

Table 2.1-1. Description of Don Pedro Project facilities and features.

Don Pedro Dam and Reservoir	
River Mile of dam axis	54.8
Construction Period	1967–1971
Placed in Service	1971
Don Pedro Dam	--
Hazard Classification	High
Type	Zoned embankment with a core and rockfill shells
Maximum Height	Approximately 580 ft
Crest	--
Elevation	El. 855 ft (without camber)
Width	40 ft
Length	1,900 ft
Base	--
Elevation	El. 275 ft
Width	3,000 ft
Slope	--
Upstream Face (Horizontal to Vertical)	Slope varies until El. 725 ft, then 2.4H:1V
Downstream Face (Horizontal to Vertical)	Slope varies until El. 725 ft, then 2.1H:1V
Don Pedro Dam Gated Spillway	--
Type	3 Radial Gates
Crest	--
Elevation	El. 800 ft
Length	135 ft
Control	Three bays each with 45-ft wide by 30-ft high radial gates
Hoist Type	Cable

2.0 Existing and Proposed Don Pedro Project Facilities

Maximum Discharge	172,500 cfs at water surface elev. 850 ft (total spillway discharge)
Don Pedro Dam Ungated Spillway	
Type	Ogee crest
Crest	--
Elevation	El. 830 ft
Length	995 ft
Control	--
Hoist Type	--
Maximum Discharge	300,000 cfs at water surface elev. 850 ft (resulting in total spillway capacity of 472,500 cfs at water surface elev. 850 ft)
Don Pedro Outlet Works	
Number, Size, & Control	One tunnel leading to three individual service gates (4-ft by 5-ft slide gates).
Invert Elevation at the Intake	El. 342 ft
Invert Elevation at the Outlet	El. 300 ft (+/-)
Maximum Capacity	7,500 cfs at water surface elev. of 830 ft
Don Pedro Reservoir (under current license)	
Project Boundary Upstream Water Surface Elevation	El. 845 ft
Normal Maximum Water Surface Elevation	El. 830 ft
Normal Minimum Operating Pool	El. 600 ft
Drainage Area	1,533 mi ²
Gross Storage at elev. 830 ft	2,030,000 AF
Usable Storage at elev. 830 ft	1,721,000 AF
Surface Area at Normal Maximum Water Surface Elevation	12,960 ac
Length (approximate)	26 mi
Width (maximum)	10 mi
Maximum Depth	550 ft
Shoreline Length	160 mi, including islands
Don Pedro Powerhouse	
Don Pedro Powerhouse	
Location	Immediately downstream of Don Pedro Dam, RM 54.6
Placed in Service (Began Commercial Operation)	September 19, 1971
Plant Operation	Automatic
Normal Type of Operation	“Water first” operation (see Exhibit B)
Structure	--
Type	Outdoor, reinforced concrete
Construction Period	1968–1971
Turbine	--
Number of Units	Four
Type	Vertical Francis
Manufacturer	3 Mitsubishi; 1 Toshiba.
Maximum Output ¹	3@ 85,000 hp; 1@ 54,000 hp
Nameplate Output	3@ 77,700 hp at 450 ft gross head; 1@ 42,000 hp at 425 ft gross head
Maximum Gross Head	3@ 531 ft; 1@ 500 ft
Speed	3@ 277 RPM; 1@ 450 RPM
Nameplate Rated Flow	3@ 1,641 cfs at 450 ft gross head; 1@ 924 cfs at 425 ft gross head
Distributor Centerline Elevation	3@ 299.0 ft; 1@ 330.0 ft

Generator	--
Type	3 phase synchronous generator
Manufacturer	Toshiba
Nameplate Output	3@ 47,900 kVA; 1@ 38,200 kVA
Nameplate Capability	3@ 45,500 kW; 1@ 34,380 kW
Power Factor	3@ 0.95; 1@ 0.90
Voltage	13,800 Volts
Speed	3@ 277 rpm; 1@ 450 rpm
Governor	--
Type	Hydraulic power control unit
Manufacturer	3 Woodward; 1 Toshiba

¹ hp = horsepower.

2.1.1 Don Pedro Dam

The Don Pedro Dam is a 1,900 ft long and 580 ft high zoned earth and rockfill structure. The top of the dam is at elevation 855 ft. The drainage area of the Tuolumne River upstream of the Don Pedro Dam is 1,533 mi² (ACOE 1972). The dam has a top width of 40 ft and a bottom width of approximately 3,000 ft. The downstream slope is grass-covered and the upstream slope has riprap protection extending to elevation 585 ft. A secured access road is provided along the top of the dam for use by Districts' personnel. The downstream slope of the dam is shown in Figure 2.1-1.



Figure 2.1-1. Photograph of Don Pedro Dam - downstream slope.

2.1.2 Don Pedro Reservoir

The Don Pedro Reservoir extends for approximately 24 miles at the normal maximum water surface elevation of 830 ft and 26 miles at the upstream Project Boundary water elevation of 845 ft. The surface area of the reservoir at the 830 ft elevation is approximately 12,960 acres (ac) and the gross storage capacity is 2,030,000 acre-feet (AF). The Don Pedro Reservoir shoreline, including the numerous islands within the lake (at normal maximum water surface elevation), is approximately 160 mile long. The current minimum operating pool elevation is 600 ft³. Water storage below this elevation is approximately 309,000 AF. The old Don Pedro Dam, which was displaced by the construction of the new Don Pedro Dam, is located approximately 1.5 miles upstream of new Don Pedro Dam at approximately RM 56.4. The normal maximum water level of the old Don Pedro Dam was approximately at elevation 606 ft. The old Don Pedro Dam remains in place with its twelve original irrigation outlets in the open position. The permanent concrete spillway crest of the old Don Pedro Dam was at approximate elevation 597 ft and was topped by nine-foot-high gates, which were removed when the new Don Pedro Dam was constructed.

2.1.3 Don Pedro Spillway

The Don Pedro spillway includes gated and ungated sections, located adjacent to one another in a saddle area west of, and separated from, the main dam. The gated spillway section is 135 ft long, with a permanent crest elevation of 800 ft, and includes three radial gates each 45-feet-wide by 30-ft-high. The radial gates are operated by motor-driven steel cables. A travel way is provided over the gated spillway along a top deck at elevation 855 ft. Gate trunnions are located at elevation 810 ft. The ungated spillway is an ogee crest section 995 ft long with a permanent crest elevation of 830 ft and a top of abutment elevation of 855 ft. The total spillway capacity at a reservoir water level of 850 ft is 472,500 cubic feet per second (cfs) (TID/MID 2006). Flow over the ungated ogee crest section of the spillway has occurred only twice since Don Pedro Project construction, during the New Year's 1997 flood and just recently in February 2017. Flows over the spillway are released into a normally dry gulch named Twin Gulch, which discharges into the Tuolumne River approximately 1.5 miles downstream of the main dam. The spillway sections are founded on bedrock. The Twin Gulch spillway channel primarily consists of bedrock and boulders. The gated spillway structure is shown in Figure 2.1-2.

³ As referenced on original Exhibit F, Sheet 2.



Figure 2.1-2. Don Pedro spillway gate structure viewed from downstream.

2.1.4 Outlet Works

Low level outlet works are located at the left (east) abutment of the main dam. The outlet works consist of three individual service gate housings, each containing 4-foot-wide by 5-foot-high slide gates. The outlet works are situated in a 3,500-foot-long concrete lined tunnel, a portion of which originally served as the water diversion tunnel during original construction. The original water diversion tunnel had an inlet elevation centerline of 315 ft. At the completion of construction, the original inlet for the diversion tunnel was fitted with a concrete plug and a new 12 ft diameter inlet was constructed with an inlet invert of 342 ft. The diversion tunnel downstream of the new inlet was fitted with the three bonnetted slide gates (Figure 2.1-3). The invert of the three slide gates is at approximate elevation 310 ft. The inlet to the outlet works is provided with a maintenance gate, which travels on an inclined gate track. The outlet works tunnel daylights back to the Tuolumne River approximately 400 ft downstream of the powerhouse (Figure 2.1-4). The invert of the outlet works at the river discharge is approximately at elevation 300 ft. At a reservoir water surface elevation of 830 ft, the hydraulic capacity of the three gates constituting the outlet works is 7,500 cfs. The three gates were refurbished in 2016.



Figure 2.1-3. Don Pedro Dam - gate operators for the low level outlet works slide gates.



Figure 2.1-4. Don Pedro Dam - low level outlet works tunnel discharge.

2.1.5 Power Intake and Tunnel

Flows are delivered from the reservoir to the powerhouse via a 2,960-foot-long power tunnel located in the left (east) abutment of the main dam. The tunnel transitions from an 18-ft 6-in concrete lined section to a 16-ft steel lined section. Emergency closure can be provided by a 21-foot-high by 12-foot-wide fixed-wheel gate that is operated from a chamber at the top of the gate shaft located at the left dam abutment (Figure 2.1-5). Flows from the power tunnel are delivered to the four unit powerhouse and a hollow jet bypass control valve in the powerhouse. The inlet to the power tunnel is fitted with trash racks and a hydraulically operated bulkhead gate for tunnel dewatering or emergency closure. The power tunnel centerline at the intake is at elevation 534 ft, 66 ft below the minimum power pool elevation of 600 ft.



Figure 2.1-5. Don Pedro Dam - power tunnel shaft and gate housing.

2.1.6 Don Pedro Powerhouse, Turbines, and Generators

Located immediately downstream of the main dam, the reinforced concrete outdoor-type powerhouse contains four turbine generator units and a 72-in hollow jet valve (Figure 2.1-6). The powerhouse is 171 ft long, 110 ft high and 148 ft wide. It houses four Francis-type turbines direct connected to electrical generators. Unit performance characteristics are provided in Table 2.1-2 and Table 2.1-3. The current FERC-authorized capacity is 168 megawatt (MW). Combined hydraulic capacity of the four units under the maximum gross operating head of 530 ft is approximately 5,500 cfs. Each of the three original turbines and generators have a rotational speed of 277 revolutions per minute (rpm) and are rated at 77,700 horsepower (hp) and 48 megavolt-amperes (MVA), respectively, at 450 ft of net head. Unit 4 was installed in 1989 after

FERC approved the Districts' amendment to add the fourth unit in February 1987 (38 FERC 61,097). At maximum head, the powerhouse has an output capability of 203 MW at full gate flow supplied to each of the four units.

The powerhouse also contains a 72-in hollow jet valve located in the east end of the powerhouse with a centerline elevation at discharge of 305 ft. The maximum hydraulic capacity of the hollow jet valve is 3,000 cfs. While turbines 1, 2, and 3 discharge directly to the river channel, Unit 4 discharges to the outlet works tunnel approximately 250 ft upstream of the tunnel outlet. Water to Unit 4 is delivered through a bifurcation from the hollow jet valve piping. With Unit 4 in operation, the hollow jet valve capacity is reduced from 3,000 cfs to 800 cfs.

Access to the powerhouse is via a secured gate located off the former Visitor Center parking area. The road provides access directly onto the top deck of the powerhouse at elevation 340 ft. A 4-ft high parapet wall surrounds the top deck. A two-hook gantry crane sits atop the deck and provides equipment and materials delivery to the powerhouse and maintenance services. The generator floor in the powerhouse is at elevation 323 ft and the turbine floor is at elevation 308 ft.



Figure 2.1-6. Don Pedro powerhouse and hollow jet valve viewed from tailwater.

Table 2.1-2. Don Pedro Units 1, 2, and 3 performance characteristics.¹

Net Head (ft)	Flow (cfs)	Turbine Output (hp) ²	Generator Output (MW)	Turbine Efficiency
530	545	24,000	17.2	73.5%
530	800	39,000	28.2	81.3%
530	1,000	51,300	37.5	85.6%
530	1,200	65,200	47.6	90.6%
530	1,350	75,000	54.8	92.7%
530	1,510	85,000	62.1	93.9%
450	400	14,500	10.4	71.2%
450	600	24,650	17.8	80.7%

Net Head (ft)	Flow (cfs)	Turbine Output (hp) ²	Generator Output (MW)	Turbine Efficiency
450	800	34,900	25.5	85.7%
450	1,000	45,550	33.3	89.5%
450	1,200	56,800	41.5	93.0%
450	1,400	67,150	49.1	94.2%
450	1,579	75,000	54.8	93.3%
450 ³	1,641 ³	77,700	56.8	93.0%
375	400	12,350	8.8	72.8%
375	600	20,400	14.6	80.2%
375	800	29,100	21.1	85.8%
375	1,000	38,300	27.7	90.3%
375	1,200	47,300	34.2	92.9%
375	1,400	55,100	39.9	92.8%
375	1,460	56,800	41.1	91.7%

¹ Units can operate at lower flows than indicated in the table.

² hp = horsepower.

³ Head at nameplate rating.

Table 2.1-3. Don Pedro Unit 4 performance characteristics.¹

Net Head (ft)	Flow (cfs)	Turbine Output (hp) ²	Generator Output (MW)	Turbine Efficiency
500	210	6,793	4.43	57.0%
500	485	22,707	16.3	82.5%
500	725	36,618	26.5	89.0%
500	940	50,678	36.7	95.0%
500	1000	53,629	38.8	94.5%
425	185	4,908	3.20	55.0%
425	440	17,404	12.5	82.0%
425	650	27,592	20.0	88.0%
425	850	38,132	27.8	93.0%
425	1010	45,797	33.4	94.0%
425	1155	50,700	37.0	91.0%
275	310	5,080	3.3	52.5%
275	475	10,082	7.0	68.0%
275	625	14,728	10.5	75.5%
275	770	19,587	14.1	81.5%
275	890	22,640	16.4	81.5%

¹ Units can operate at lower flows than indicated in the table.

² hp = horsepower.

2.1.7 Tailrace

The powerhouse and hollow jet valve discharge directly to the Tuolumne River. Tailwater elevation during turbine operation varies from a low of about 300 ft to a high of about 304 ft under normal operating conditions. The tailwater elevation at the outlet works tunnel is also at approximately 300 ft under low flow conditions.

2.1.8 Switchyard

The Project switchyard is located atop the powerhouse at elevation 340 ft. The switchyard provides power delivery and electrical protection to the TID and MID transmission systems. The

switchyard includes isolated phase buses, circuit breakers, and four transformers that raise the 13.8 kilovolt (kV) generator voltage to 69 kV transmission voltage. Transformers 1 through 3 are rated at 55 MVA and Unit 4 at 44 MVA. While Units 1, 2, and 4 are directly connected to TID's system and Unit 3 to the MID system, the switchyard has been configured to allow interconnection across the systems when needed. This system, when operating in an interconnected fashion, acts as a pathway for electricity flows across the two systems, providing system benefits to both districts. Recognizing this pathway, the Districts on May 4, 2010 filed a request with FERC to amend the Don Pedro license to remove certain transmission lines from their license. FERC granted the amendment on November 11, 2010 (133 FERC ¶62,136).

2.1.9 Gasburg Creek Dike

The spillway structures for Don Pedro Dam discharge into Twin Gulch, a small intermittent drainage, which discharges back into the Tuolumne River. To prevent spillway discharges into Twin Gulch from entering the adjacent Gasburg Creek drainage, the Districts constructed the Gasburg Creek Dike. The dike is located in a low saddle that separates Twin Gulch drainage from Gasburg Creek drainage, approximately midway down the Twin Gulch waterway. The 75-foot-high Gasburg Creek Dike consists of an earth and rock fill dam with an impervious core. The dike is equipped with a slide-gate controlled 18-in diameter outlet conduit. The top of Gasburg Creek Dike is at elevation 725 ft.

2.1.10 Dikes A, B, and C

There are three small reservoir rim embankments along the reservoir, Dikes A, B, and C. These embankments are constructed in low saddles on the reservoir rim with top elevations of 855 ft. Dike A is located between the main dam and the spillway. Dikes B and C are located east of the main dam.

2.1.11 Station Service

Station service power is provided by primary and secondary station service power transformers. The primary unit is a 69kV/12kV step-down transformer that feeds a 12kV line. The 12kV line feeds three secondary 12kV/480kV step-down transformers. The first two secondary transformers service the spillway motor control centers. The third services the powerhouse. There is a 45 kVA diesel generator that serves as an emergency backup for station service power. There is also a portable propane power unit that can power the gate hoists for the radial gates in an emergency.

2.2 Proposed Project Facilities

The Districts are proposing to construct several new Project facilities, which will become permanent features of the Don Pedro Project, and are necessary components of proposed PM&E measures. Infiltration galleries 1 and 2 and the fish counting and barrier weir are constructed features to be incorporated into the designated Don Pedro Project Boundary. The fall-run Chinook salmon restoration hatchery, as well as certain PM&E measures which are primarily river habitat improvements covering broad reaches of the lower Tuolumne River, are not

intended to be within the Project Boundary. A complete description of the environmental benefits of each proposed facility and their necessary role in providing these benefits is analyzed and explained in Exhibit E, Section 5.

2.2.1 Infiltration Galleries 1 and 2

The Districts are proposing to install and operate two in-river infiltration galleries (IGs) at approximately RM 25.9 just downstream of Fox Grove Park on the lower Tuolumne River. IG-1 was previously installed by TID in 2001 during the restoration of Special-run Pool-9 (SRP-9) at RM 25.8 located below the Geer Road Bridge. IG-2 would be installed just upstream of IG-1. Both IGs would have a flow capacity of approximately 100 cfs and be connected via steel pipe to a pump station located on the south bank of the river. Water withdrawn at the IGs would become part of TID's water supplies by being transported to TID's Ceres Canal or other non-Project facility. MID would receive a credit in Don Pedro Reservoir for its share of the water diverted by TID at the IGs. The location and general site layout of IG-1 and IG-2 are shown in Figure 2.2-1. The proposed IGs serve as PM&E measures and are needed for Project purposes allowing additional summer flows to be provided to the primary *O. mykiss* reach of the lower Tuolumne River without reducing water supplies to the Districts. The IGs would be located within the Project Boundary associated with the fish counting and barrier weir described below. The IGs would be operational starting June 1, except in years experiencing high flows, and extend through October 15. As explained further in Exhibit E, the IGs would be turned off during certain summer weekends and holidays to provide greater recreational boating opportunities throughout the lower Tuolumne River from RM 25.5 to the confluence with the San Joaquin River (SJR).

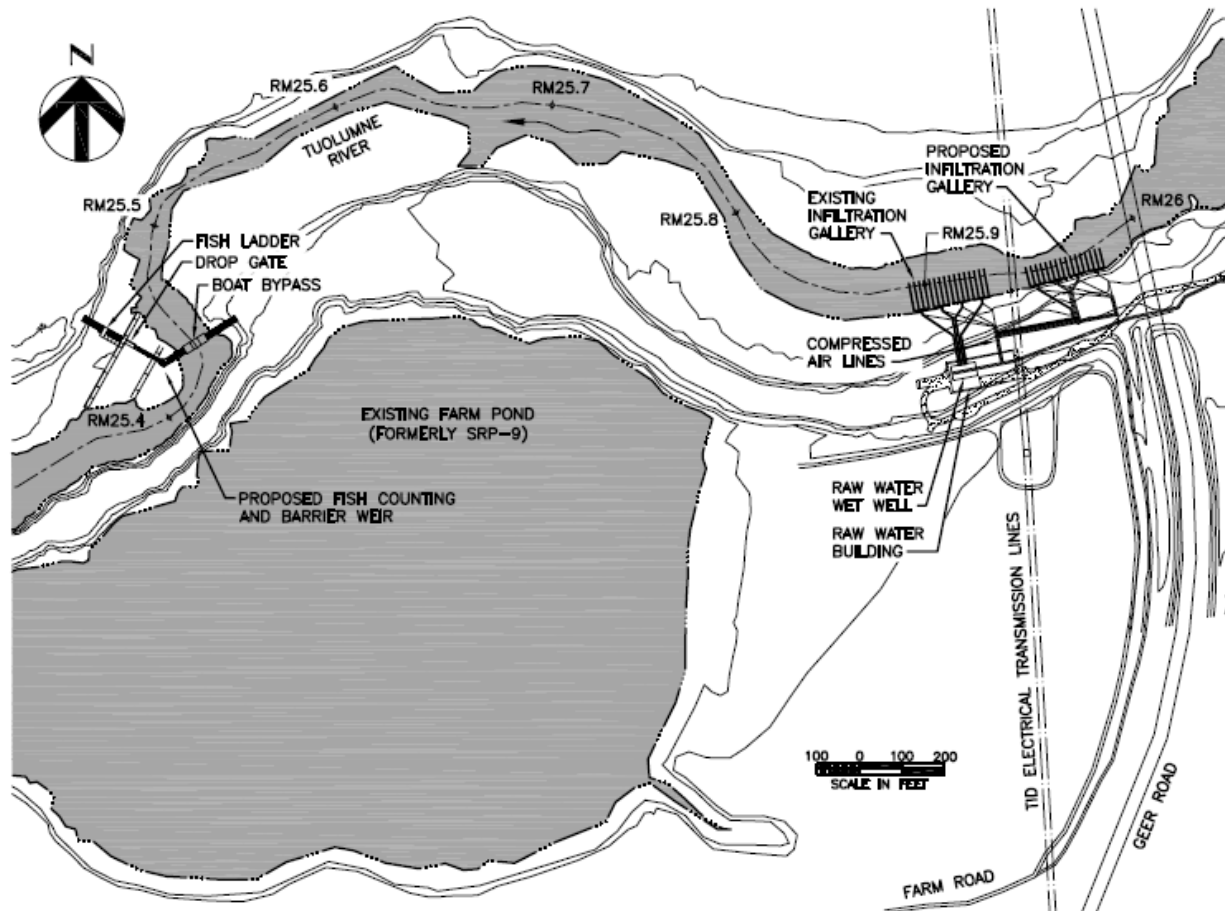


Figure 2.2-1. Location and general site layout of Infiltration Gallery 1 (existing), Infiltration Gallery 2 (proposed), and the fish counting and barrier weir (proposed).

2.2.2 Fish Counting and Barrier Weir

Losses of fry and juvenile salmon to predation by non-native predators pose a significant adverse effect to the fall-run Chinook population of the Tuolumne River. Based on results of sampling with rotary screw traps (RSTs) at RM 30 (Waterford) and RM 5 (Shiloh), losses of young salmon are extreme, primarily the result of predation by non-native largemouth, smallmouth, and striped bass, species which were previously introduced into California waters by CDFW and its predecessors for recreational fishing. The fish counting and barrier weir would be located at RM 25.5 approximately 0.4 miles below the Geer Road Bridge. This location is near the downstream end of the gravel-bedded reach of the lower Tuolumne River, and approximately one mile upstream of the current location of the seasonally-installed fish counting weir. The barrier weir serves distinct Project purposes including a permanent fish counting facility and a facility for excluding non-native predator fish species access to the primary salmon and *O. mykiss* fry and juvenile rearing reaches of the Tuolumne River. The ability to exclude access of striped bass to these upriver reaches is especially important to reduce predation on fry and juvenile salmon, and is a critical component of the Districts' proposed predator control and suppression program. The weir site layout and its associated designated Project Boundary are depicted in Figure 2.2-1 and shown in detail in Exhibits F and G, respectively. The small weir would have a normal head

differential of about five feet, be fitted with a Denil-type fishway and counting window, and have a bypass structure allowing non-motorized craft to pass without portage (Figure 2.2-2). There would also be a boat take-out and put in for non-motorized craft at the site on river right. Further information about the environmental benefits, costs, and impacts of the fish counting and barrier weir are provided in Exhibit E.



Figure 2.2-2. Photograph of the fish barrier weir installed on the Feather River, below Oroville Dam. The fish counting and barrier weir proposed for the Tuolumne River will be a similar type of barrier weir.

2.2.3 Fall-Run Chinook Salmon Restoration Hatchery

The Districts are proposing to design and construct, in cooperation with the California Department of Fish and Wildlife CDFW, a fall-run Chinook restoration hatchery to be located upstream of Basso Bridge at RM 50.7, about 1.5 miles downstream of the Districts' La Grange Diversion Dam. The purpose of the hatchery would be to improve the viability of the Tuolumne River fall-run Chinook salmon population through supplementation and genetic management. While the current regulatory status and general abundance of fall-run Chinook in the Tuolumne River are not in peril and the population is not listed under the Endangered Species Act, there are specific concerns to be addressed which may benefit from near term planning and action. Researchers, notably Lindley et al. 2007, have identified that the long-term viability of anadromous fish populations should consider several factors, including population demographics (e.g. abundance, population growth, distribution) and genetic integrity (McElhany et al. 2000). Conventional hatchery management programs have focused primarily on production and abundance within the respective river as a key indicator of health. Managing the health of the Tuolumne River fall-run Chinook population based solely on abundance may not be sufficient to protect the Tuolumne River fall-run Chinook population.

The Tuolumne River fall-run Chinook population is increasingly becoming dominated by hatchery strays errantly entering the Tuolumne River, when their origin is from another basin hatchery (i.e. Merced, Mokelumne, and Coleman [Battle Creek] hatcheries). These strays inflate population counts, alter the genetic integrity of the Tuolumne River origin fall-run Chinook, and may result in degradation of the natural population. Lindley et al. (2007) caution that reproducing hatchery fish that are not actively managed may be a potentially serious threat to a local in-river population where traits are shifted away from local populations towards broader distributions (Emlen 1991; Lynch and O’Hely 2001; Ford 2002; Goodman 2005).

The rate of out-of-basin hatchery straying into the Tuolumne River was highlighted in a recent otolith study conducted by the Districts (TID/MID 2016). The microchemistry of salmon earstones or otoliths can be examined to determine if the individual was naturally produced in-river or from a hatchery. Combining the outmigration year unmarked hatchery contribution estimates with the known marked fish from subsequent escapement year surveys found that the total estimated hatchery contribution ranged from 39 to 100 percent, with a mean of 67 percent and generally increased hatchery contribution in later years. Additionally, preliminary findings from the Tuolumne River fish counting weir indicate that close to 25 percent of the 2015 and 2016 escapement years’ fish were ad-clipped, this being similar to the 25 percent ad-clip Constant Fractional Marking (CFM) Program used at CDFW hatcheries.

The Districts’ proposed hatchery would be capable of being operated in accordance with guiding principles and operational parameters developed in collaboration with hatchery technical experts. The Tuolumne Restoration Hatchery is planned as a restoration-oriented, adaptively managed facility based on salmonid-specific genetic and ecological principles to maximize genetic diversity, enhance natural life-history strategies and to improve post-release survival of local origin Tuolumne River fall-run Chinook. The goal of hatchery management would be to enhance the phenotypic diversity (e.g. behavioral life-history) and population size of the self-sustaining, naturally-reproducing salmon population in the lower Tuolumne River. Fall-run Chinook salmon used as broodstock would be collected locally from the lower Tuolumne River at the counting weir at RM 25.5.⁴ Temporary holding and screening would be associated with adult collections, with unwanted individuals (e.g., strays from other hatcheries) returned to the river. Broodstock selection will likely be the most significant operational activity modulating program success and must be a focus of biological planning processes. Juveniles would be released from the hatchery facility at various life-stages and across release strategies in order to facilitate performance evaluations. Production and release goals underlying the fall-run Chinook program are based on supporting documents (e.g., NMFS [2014]) and scientific best-practices.

The facility would be located on river-right near the present CDFW offices and property (Figure 2.2-3). Water directly from the Tuolumne River would be provided to the hatchery. The Districts propose to fund CDFW’s operation of the hatchery for a period of 20 years. The hatchery’s role of supplementation would be reevaluated at that time and either cease operations or continue depending on the health of the Tuolumne River fall-run Chinook population.

⁴ Location of broodstock collection subject to consultation with CDFW.



Figure 2.2-2 Proposed location of fall-run Chinook salmon restoration hatchery.

3.0 EXISTING AND PROPOSED RECREATION FACILITIES

The Project currently has three developed recreation areas, and primitive and semi-primitive lakeshore camping occurs on limited sections of the rest of the shoreline (Figure 3.0-1). The Project provides both floating and shoreline restrooms in addition to those at the developed recreation areas. Facilities also include hazard marking, regulatory buoy lines, and other open water-based features including houseboat marinas and a marked water ski slalom course. The recreation facilities included at the Project are operated by the Don Pedro Recreation Agency (DPRA). The DPRA, which is operationally a department within TID, is sponsored and governed by agreement between the Districts and CCSF. Table 3.0-1 lists the facilities.

Table 3.0-1. Summary of recreation facilities and other on-site amenities at Don Pedro Project's developed recreation areas.¹

Amenities	Moccasin Point Recreation Area	Blue Oaks Recreation Area	Fleming Meadows Recreation Area
Camping Units - Total	96	195	267
With Water and Electric Hookups	18	34	90
Vehicle Parking Spaces with Striped Spaces	256	185	943
ADA Vehicle Parking Spaces	5	3	23
Square Yards of Parking Area without Marked Spaces	513	7,500	52,986
Picnic Areas - Total	2	1	2
Group Picnic Sites	1	1	1
Boat Launch Ramp	1	1	1
Fish Cleaning Stations	1	1	1
Toilet Buildings	8	11	14
Toilet Buildings with Hot Showers	3	5	5
Concession Store	Yes	No	Yes
Swimming Lagoon	No	No	Yes
Marina	Yes	No	Yes
Amphitheatre	No	No	Yes
Houseboat Mooring	Yes	No	Yes
Boat Rentals	Yes	No	Yes
Houseboat Rentals	Yes	No	Yes
Boat Repair Yard	No	Yes	No
Gas and Oil	Yes	No	Yes
Sewage Dump Station	Yes	Yes	Yes

¹ Adapted from RR-01 Study Report (TID/MID 2013).

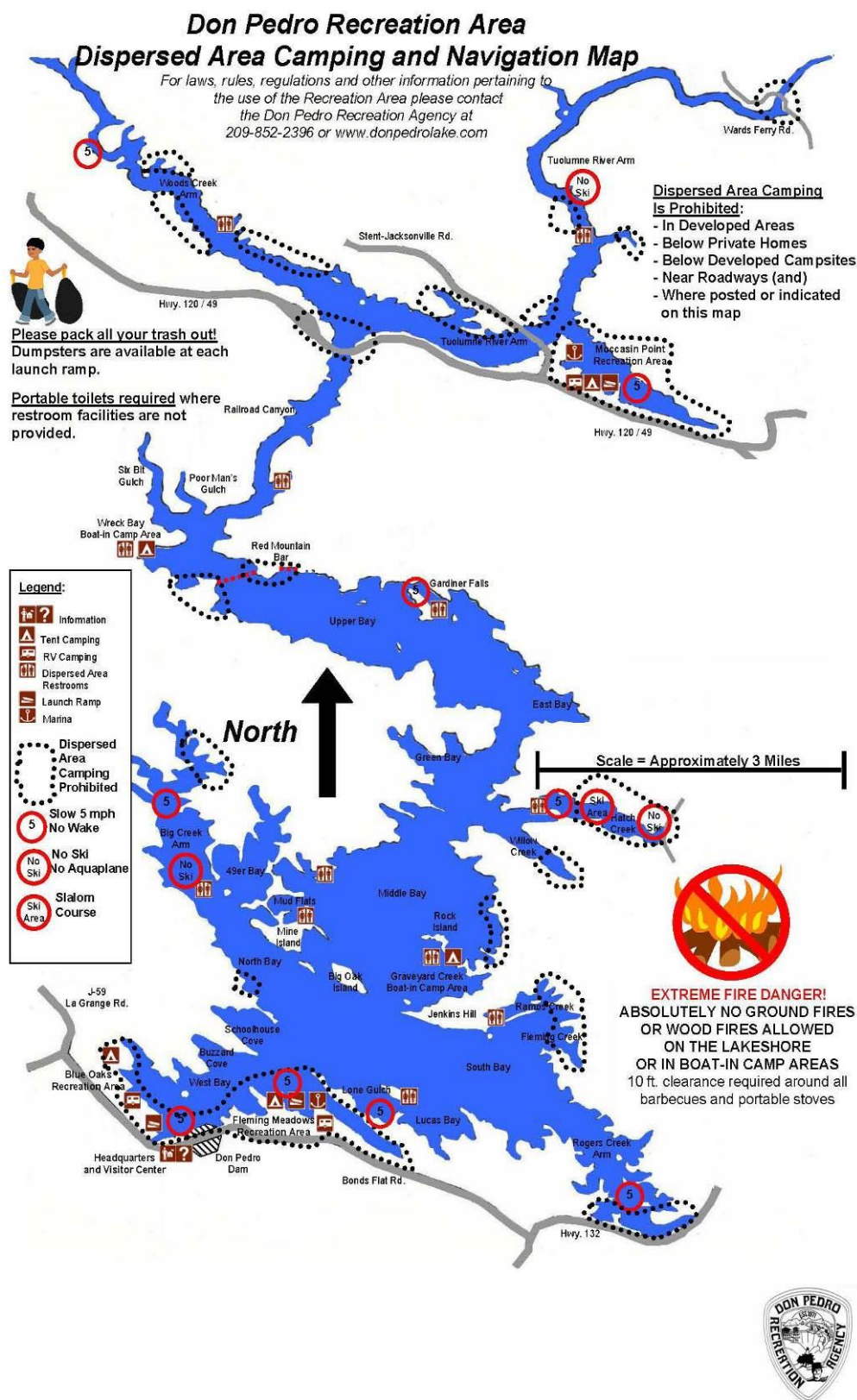


Figure 3.0-1. Location of Don Pedro Project developed recreation facilities.

3.1 Existing Recreation Facilities

3.1.1 Fleming Meadows Recreation Area

Fleming Meadows Recreation Area is the largest of the Project's developed recreation areas, and lies just east of the main dam at the southwestern portion of the Don Pedro Reservoir referred to as West Bay. The recreation area includes the following facilities and amenities:

- 267 campsites,
- 90 full hookup campsites,
- one boat launch facility,
- individual and group picnic areas,
- concessionaire facilities (one houseboat dock, one full-service marina, camp store, snack shack),
- swimming lagoon and picnic area, and
- restrooms and showers.

3.1.2 Blue Oaks Recreation Area

The Blue Oaks Recreation Area is located west of the main dam also in the West Bay area. Recreation amenities include:

- 34 partial hookup campsites,
- 195 tent campsites,
- one boat launch facility, and
- houseboat repair yard.

3.1.3 Moccasin Point Recreation Area

The Moccasin Point Recreation Area is situated near the upstream end of the reservoir on the southeast trending Moccasin Arm of the reservoir. This recreation area's facilities and amenities include:

- 18 full hookup campsites,
- 96 tent campsites,
- two picnic areas,
- one boat launch ramp, and
- one concessionaire facility and full-service marina.

Amenities also include the Moccasin Point Lake View Trail. This one-mile trail offers recreationists a shaded hike and views of Moccasin Bay. Branching off of this main trail, the

Manzanita Lookout Trail is a short loop through manzanita and oak trees that also provides views of Moccasin Bay (DPRA 2017).

3.1.4 Boat-in and Dispersed Recreation Areas

In addition to the three developed recreation areas, DPRA operates and maintains one remote, boat-in camping area (Wreck Bay), which consists of six campsites each with a picnic table. DPRA also operates and maintains 15 developed toilet-only facilities, of which 10 are floating toilets and five are dispersed shoreline toilets. The 10 floating toilets are located in the following general locations: Big Creek arm, Gardiner Falls cove, Hatch Creek arm, Middle Bay, Railroad Canyon, Rogers Creek arm, Tuolumne River arm, and Woods Creek arm. Dispersed toilet buildings are located at Graveyard Creek, Lucas Bay, and Mud Flats. The dispersed toilet buildings do not have any roads or parking associated with the facilities.

3.2 Proposed Recreation Facilities

3.2.1 Ward's Ferry Whitewater Boating Take-Out Facility

The upper Tuolumne River extending from approximately the upper end of the Don Pedro Project Boundary at RM 80.8 to the USFS Lumsden Campground at RM 97 is a popular whitewater boating trip of the Wild & Scenic⁵ section of the Tuolumne River. Ward's Ferry Bridge, located at RM 78.5, spans the Tuolumne River within the Don Pedro Project Boundary and is the customary downstream terminus and river-exit for commercial whitewater boating operators, as it is the first exit opportunity below the whitewater reach. The Ward's Ferry Bridge sits in a narrow, canyon section of the Tuolumne River. Commercial outfitters currently extract their equipment and numerous boats from the river, after boaters disembark, from a vantage point atop the bridge by using truck cranes that locate on the bridge roadway. As many as three truck cranes are on the roadway at the same time, disrupting traffic, posing potentially hazardous driving conditions, and in violation of county road ordinances. The congestion is a result of the fact that river flows suitable for whitewater boating are provided by the hydropower operations of CCSF's Holm powerhouse located near the mouth of Cherry Creek at RM 103.6 of the Tuolumne River. The Holm powerhouse is a peaking hydro plant and in the summer months generally provides peaking flows from about 7:00 am to noon. Whitewater boaters must capture these flows, so river entry at Lumsden Campground, and therefore, river exit at Ward's Ferry, occur over relatively short intervals, resulting in congestion problems at Ward's Ferry. Since Ward's Ferry is downstream of the whitewater reach, if rafters fail to arrive at Ward's Ferry before the peaking flow dissipates at approximately 4 pm, there is insufficient flow to carry the rafts to Ward's Ferry in a reasonable timeframe. In that event, the rafters must paddle or be towed to Ward's Ferry.

The recreation-related concerns at Ward's Ferry Bridge are not related to the operations of the Don Pedro Project. However, the Districts are proposing, as an enhancement to river recreation and to help ameliorate bridge and road safety concerns, to build on river left just upstream of the bridge a platform sized and suitable to support two to three truck cranes and associated vehicles, allowing equipment and boat extraction to occur without blocking the Ward's Ferry Bridge

⁵ Congress designated a portion of the Tuolumne River as Wild & Scenic by PL98-425 on September 28, 1984.

roadway, all as depicted in Figures 3.2-1, 3.2.2, and 3.2.3. Truck access to the platform would be via the county road near the left side bridge abutment. The exiting restroom facility would be relocated. Further discussion of this take-out facility is provided in Exhibit E and functional design drawings are provided in Exhibit F of this AFLA.



Figure 3.2-1. Location of proposed Ward's Ferry whitewater boating take-out facility.

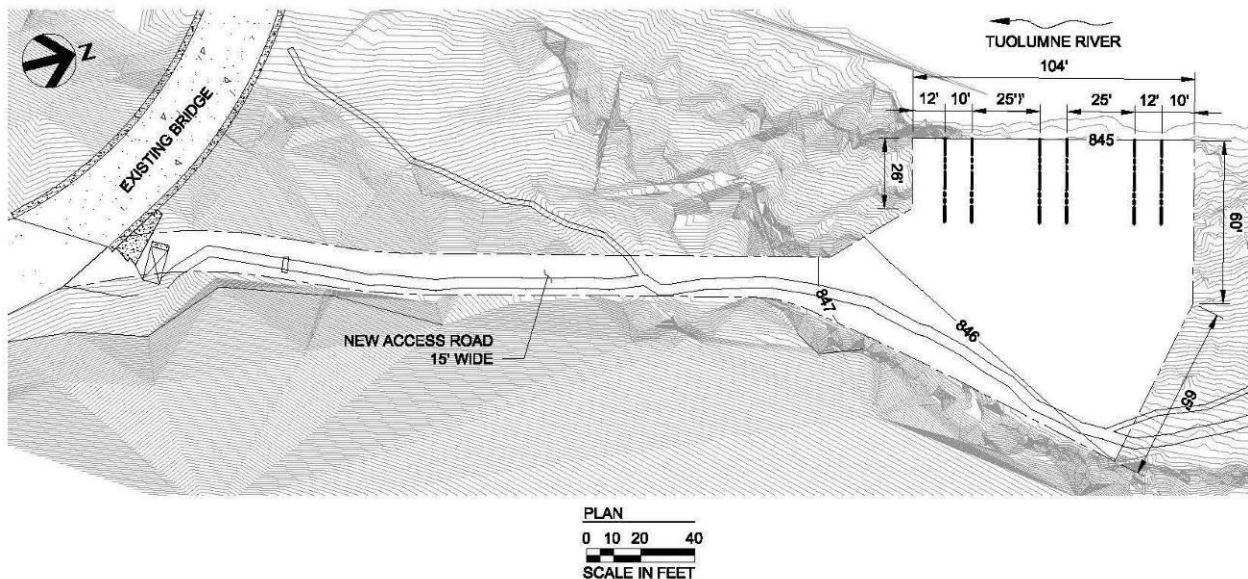


Figure 3.2-2. New access road for proposed Ward's Ferry whitewater boating take-out facility.

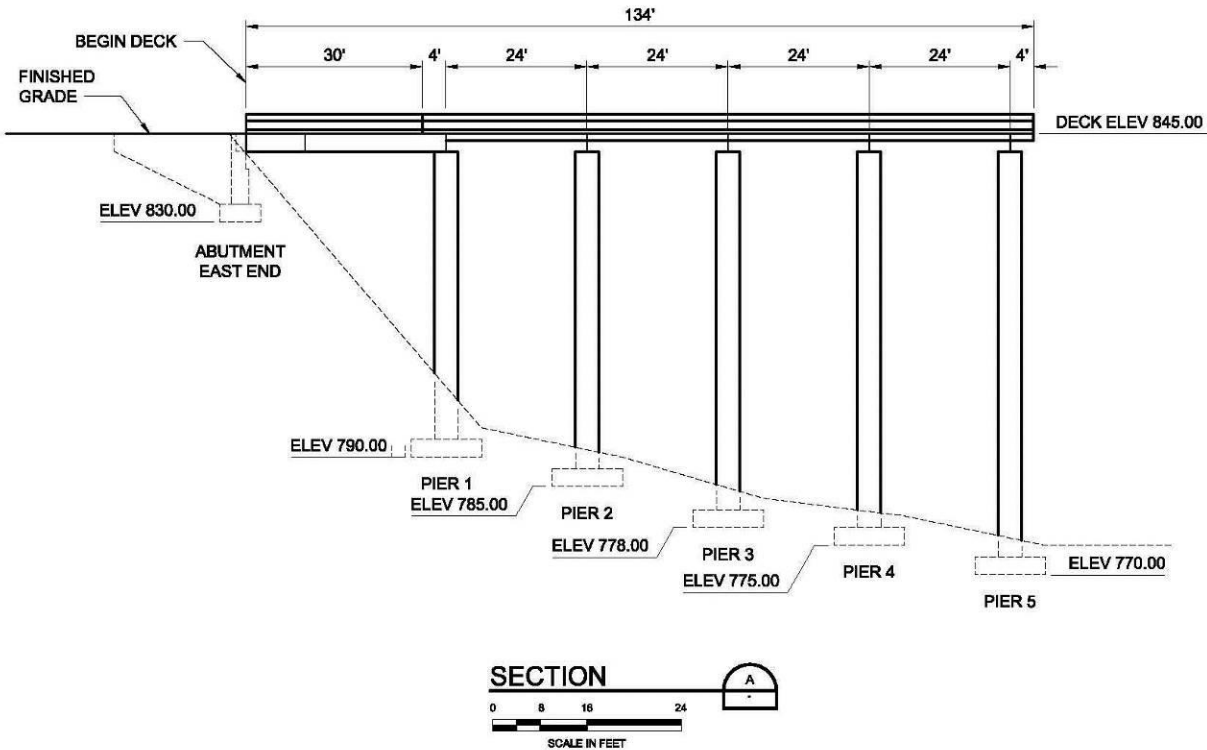


Figure 3.2-3. Section drawing of proposed Ward's Ferry whitewater boating take-out facility.

3.2.2 Boating Take-Out/Put-In at RM 25.5

As a component of the fish counting and barrier weir described previously in this Exhibit A, the Districts will provide a boat take-out/put-in facility suitable for non-motorized craft on river right at this location at RM 25.5 (Figure 2.2-1). Other recreation related facilities will be a parking and picnic area open to the public during daylight hours. Final design of these facilities will be completed in conjunction with the final design of the fish counting and barrier weir following issuance of the new FERC license approving the construction of these facilities.

4.0 DESCRIPTION OF LANDS WITHIN THE CURRENT PROJECT BOUNDARY

4.1 Existing Project lands

The current FERC Project Boundary consists of lands necessary for the safe operation and maintenance of the Don Pedro Project and other purposes, such as recreation, shoreline control, and protection of environmental resources. The Tuolumne River watershed covers approximately 1,960 mi² upstream of its confluence with the San Joaquin River in the Central Valley of California and approximately 1,533 mi² at the Don Pedro Dam. The upper watershed is sparsely populated and is dominated by Yosemite National Park and Stanislaus National Forest lands.

Of the approximately 18,370 acres of land within the current Project Boundary, 13,568 acres are owned jointly by the Districts, and the remaining 4,802 acres are federal lands located within the BLM Sierra Resource Management Area. Much of the 4,802 acres of federal lands are located below the normal maximum water surface elevation (830 ft) of Don Pedro Reservoir. Federal lands within the Project Boundary are designated as withdrawn lands for power purposes (BLM 2008) and are managed by the Districts as authorized under the FERC license.

As noted above, the existing recreation facilities are operated by the DPRA. DPRA is responsible for managing the use of all lands within the Project Boundary. The Districts maintain, and DPRA implements, a detailed and extensive land use policy consisting of rules and regulations governing uses of the lands and waters within the Project Boundary. The land use rules and regulations prohibit the construction or installation of any land improvements or water access along the Don Pedro shoreline and prohibit motorized off-road vehicle use within the Project Boundary. The end result of the Districts' land use policies is that over 90 percent of the Don Pedro shoreline is retained in its natural state. This benefits both wildlife and botanical resources.

As mentioned in Section 3 of this exhibit, Congress designated portions of the upper Tuolumne River as Wild & Scenic by PL98-425 on September 28, 1984. In May 1988, the USFS issued the Tuolumne Wild and Scenic River Management Plan (USFS 1988). Among other things, in Chapter 8 of that plan, the USFS identified what it considered to be the river corridor for the wild and scenic reach Congress had designated. The management plan generally identified the corridor as encompassing lands within one-quarter mile of the wild and scenic river. Chapter 8 also identifies specific parcels of land that were considered to be within the corridor and provided five maps showing the corridor boundary. The lands within the Tuolumne Wild and Scenic Management Plan (USFS 1988) overlap the 1966 licensed FERC Project Boundary. Specifically, the USFS identifies in the management plan that the lands and waters of T1N R16E, Section 31: S1/2N1/2, N1/2S1/2 are classified as "wild". However, a portion of the area designated as "wild" are Project lands. The proper designation of the wild and scenic corridor in this area would be: Section 31: SE1/4N1/2, NE1/4S1/2.

Congress was clear in PL98-425 that prior authorized uses were not to be affected in any way by the wild and scenic designation. In relevant part, PL98-425 states: "*Nothing in this section is*

*intended or shall be construed to affect any rights, obligations, privileges, or benefits granted under any prior authority of law including chapter 4 of December 19, 1913, commonly referred to as the Raker Act and including any agreement or administrative ruling entered into or made effective **before the enactment of this paragraph.***” (emphasis added).

4.2 Proposed New Project Lands

As described in Sections 2.2.1 and 2.2.2, the Districts are proposing certain new Project facilities to be included within the Don Pedro Project, but not located within the current Project Boundary. The lands associated with the proposed Project facilities, which are to be located in the general vicinity of RM 25.4 to 25.9, are generally shown in Figure 4.2-1 and in more detail in Exhibit G of this AFLA. The total new lands comprise approximately 33 acres, none of which are federal lands.

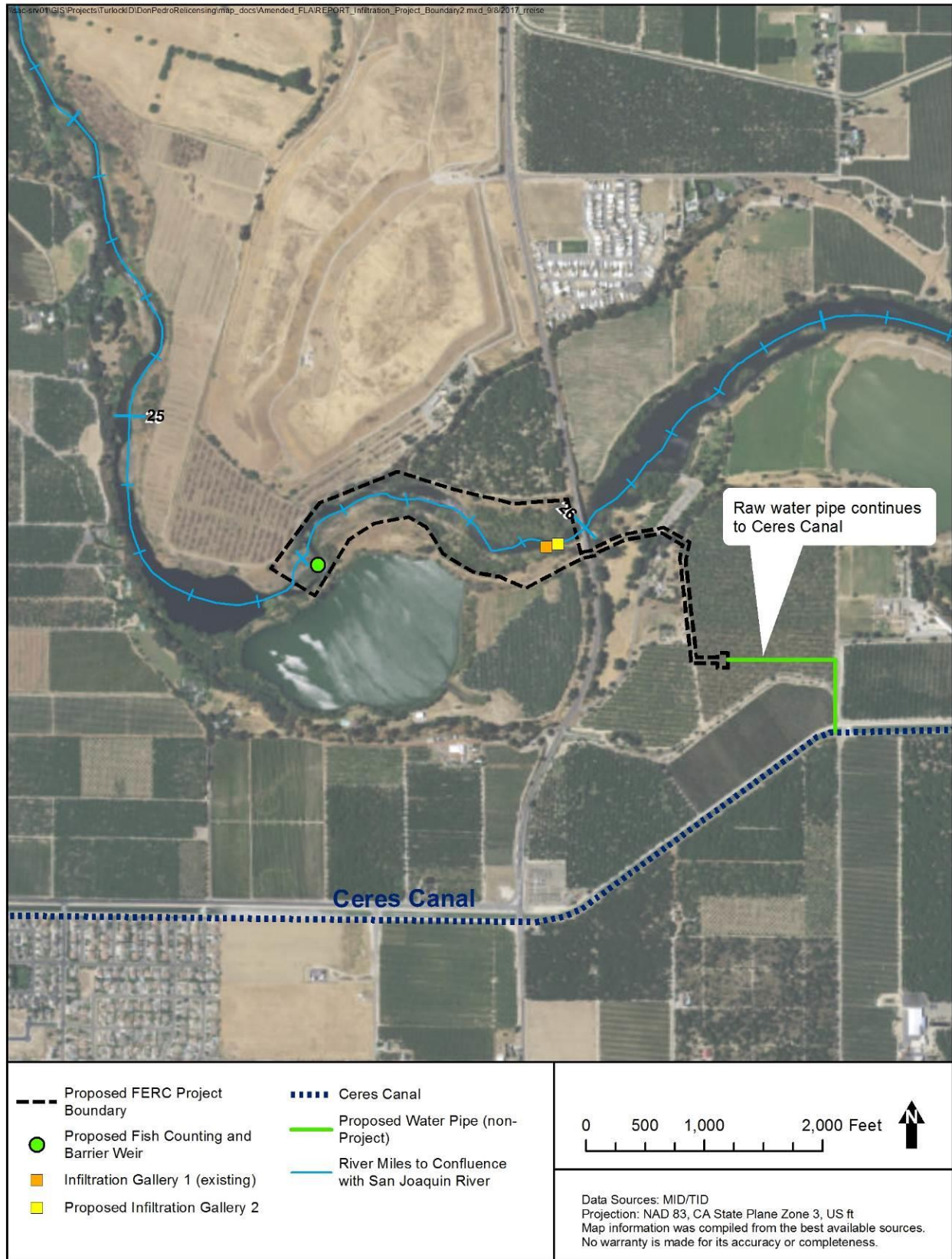


Figure 4.2-1. New lands to be included in the Project Boundary.

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