SECTION 4.0

DESCRIPTION OF THE PROPOSED ACTION

This section describes the existing Project and YCWA's proposed changes to the existing Project (i.e., YCWA's proposed Project).

4.1 Existing Project Facilities

The existing Project includes three developments – New Colgate, New Bullards Bar Minimum Flow and Narrows 2 - each of which is described below. Existing Project facilities are shown in Figure 1.1-2 in Section 1.1 of Exhibit E of the Amended FLA.

The existing Project can store approximately 966,473 ac-ft of water (gross storage), and from 2008 through 2016, generated an average of 1,089,106 megawatt hours per year (MWh/yr) of power annually. The existing Project's FERC total installed capacity is 361.9 MW and YCWA's calculated dependable capacity is 247,331 kilowatts (kW). Table 4.1-1 and Table 4.1-2 summarize key information for Project powerhouses and reservoirs, respectively.

Table 4.1-1. Key information regarding Yuba River Development Project powerhouses.

Powerhouse	Unit	Turbine Type	Rated Head (ft)	Rated Hydraulic Capacity (cfs)		Generation Capacity (kW)		Average Annual Energy (MWh/yr)[3]
				Minimum	Maximum	Nameplate Rating[1]	Dependable[2]	
New Colgate	1	Pelton	1,306	0	1,715	157,500	247,261	942,278
New Colgate	2	Pelton	1,306	0	1,715	157,500		
New Bullards Bar Minimum Flow	1	Pelton	561	0	5	150	0	1,054
Narrows 2	1	Francis	236	600	3,400	46,750	70	145,773
Total	**4**	--	--	--	--	**361,900**	**247,331**	**1,089,106**

Notes: cfs = cubic feet per second; kW = kilowatt; MWh/yr = megawatt-hours/year

[1] From Table 5.2-6 in Exhibit D of the Amended FLA.

[2] From Table 5.2-7 in Exhibit D of the Amended FLA (i.e., historical dependable capacity). Using its Water Balance Operations Model, YCWA estimates dependable capacity to be 230,309 kW (Table 5.2-8 in Exhibit D of the Amended FLA).

[3] From Table 5.2-1 in Exhibit D of the Amended FLA (i.e., historical average annual generation from 2008 through 2016). Using its Water Balance/Operations Model, YCWA estimates average annual energy generation to be 1,418,045 MWh (Table 5.2-2 in Exhibit D of the Amended FLA for WY 2070 through WY 2010).

Table 4.1-2. Key information regarding Yuba River Development Project reservoirs and impoundments.

Project Reservoir	NMWSE[1] (ft)	Gross Storage[2] (ac-ft)	Usable Storage[2] (ac-ft)	Surface Area[2] (ac)	Maximum Depth[2] (ft)	Shoreline Length[2] (mi)	Drainage Area[3] (sq mi)
Our House Diversion Dam Impoundment	2,030	280	None	14	65	0.7	144.8
Log Cabin Diversion Dam Impoundment	1,970	90	None	5	40	0.4	29.1
New Bullards Bar Reservoir	1,956	966,103	961,103	4,790	636	71.9	466.6
Total	--	**966,473**	**961,103**	**4,809**	--	--	--

[1] NMWSE = Normal Maximum Water Surface Elevation

[2] Storage between NMWSE and the invert of the 72-inch hollow jet low level outlet.

[3] At the dam, and drainage areas are not additive.

4.1.1 New Colgate Development

The New Colgate Development consists of the following features:

1. Our House Diversion Dam is a 130-foot (ft) radius, double curvature, concrete arch dam located in Sierra County on the Middle Yuba River 12.6 mi upstream of its confluence with the North Yuba River. The dam is 70 ft high with a crest length of 368 ft and a crest elevation of 2,030 ft, and has a drainage area of 144.8 square miles (sq mi). The dam (Figure 4.1-1) has a spillway; a fish release outlet valve used for releasing minimum flow requirements in the existing FERC license, and a low level (5-ft diameter) outlet valve.[1] The spillway, with an invert elevation of 2,030 ft is ungated and has a maximum capacity of 60,000 cubic ft per second (cfs). The fish release outlet valve has an invert elevation of 1,990 ft, and an engineer's estimated maximum capacity of 59 cfs when the pool is at the invert (2,015 ft) of the Lohman Ridge Diversion Tunnel. The fish release outlet is controlled by a hand-operated 24-inch (in) valve on the downstream end of the outlet. The low level outlet has an invert elevation of 1,987 ft, and an engineer's estimated maximum capacity of 463 cfs[2] when the pool is at the invert of the Lohman Ridge Diversion Tunnel. The low level outlet is controlled by a slide gate, which is operated by a two-person portable gasoline powered engine, on the upstream face of the dam.

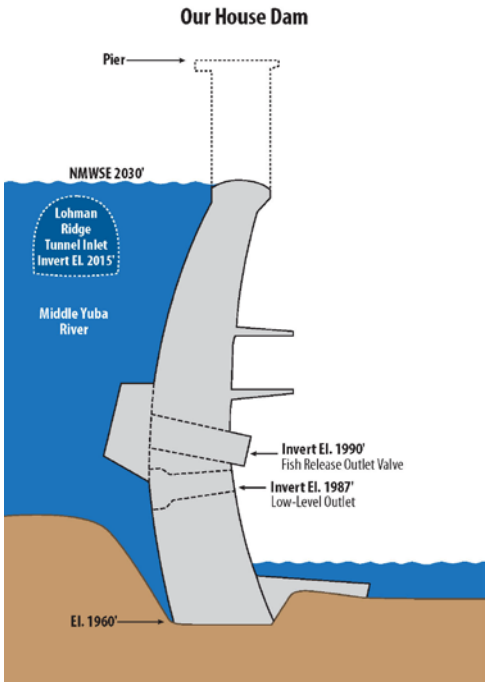

Figure 4.1-1. Our House Diversion Dam features.

2. Our House Diversion Dam Impoundment is a 280 ac-ft impoundment formed by Our House Diversion Dam.

3. Lohman Ridge Diversion Tunnel is a 12.5-ft high by 12.5-ft wide tunnel that conveys a maximum flow of 860 cfs through its 19,410 ft (90% unlined and 10% lined) length from the Middle Yuba River to Oregon Creek. The invert of the tunnel intake is at elevation 2,015 ft, which is 15 ft below the normal maximum water surface elevation (NMWSE) for Our House Dam (i.e., water can only be diverted through the tunnel when the impoundment's water surface elevation (WSE) is 2,015 ft or greater).

[1] For the purpose of the application, the slide gate that controls the Our House Diversion Dam low level outlet is referred to as a "valve."
[2] YCWA plans to rate the outlet.

4. Log Cabin Diversion Dam is a 105-ft radius, concrete arch dam located in Yuba County on Oregon Creek 4.3 mi upstream of the confluence with the Middle Yuba River. The dam is 42.5 ft high with a crest length of 300 ft, a crest elevation of 1,970 ft, and a drainage area of 29.1 sq mi. The dam (Figure 4.1-2) has a spillway, a fish release outlet valve used for releasing minimum flow requirements in the existing FERC license, and a low level (5-ft diameter) outlet valve.[3] The spillway, with an invert elevation of 1,970 ft is ungated and has a maximum capacity of 12,000 cfs. The fish release outlet valve has an invert elevation of 1,947 ft and an engineer's estimated maximum capacity of 18 cfs when the pool is at the invert (1,952 ft) of the Camptonville Diversion Tunnel. The outlet is controlled by a hand-operated valve on the downstream end of the outlet. The low level outlet has an invert elevation of 1,935 ft, and an engineer's estimated maximum capacity of 348 cfs when the pool is at the invert of the Camptonville Diversion Tunnel. The low level outlet is controlled by a slide gate, which is operated by a two-person portable gasoline powered engine, on the upstream face of the dam.

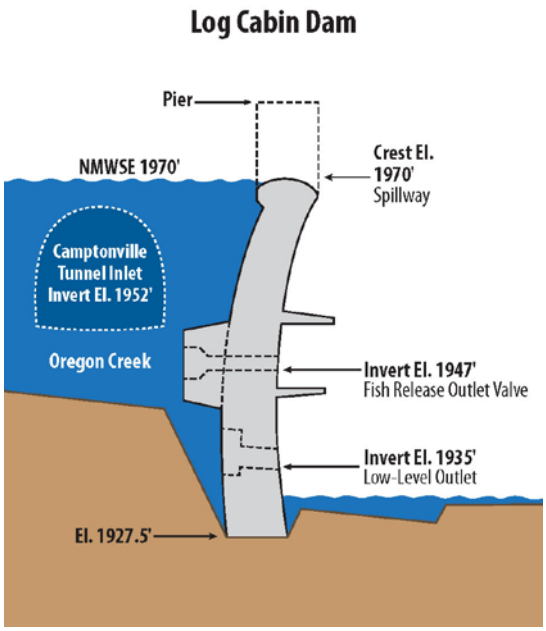

Figure 4.1-2. Log Cabin Diversion Dam features.

5. Log Cabin Diversion Dam Impoundment is a 90 ac-ft impoundment formed by Log Cabin Diversion Dam.

6. Camptonville Diversion Tunnel is a 6,107-ft long tunnel that has the capacity to convey 1,100 cfs of water from Oregon Creek to New Bullards Bar Reservoir on the North Yuba River. The first 4,275 ft of the conduit is an unlined, horseshoe-shaped tunnel 14.5 ft wide by 14.5 ft high, which (for the last 1,832 ft) becomes a lined, horseshoe-shaped tunnel 11.7 ft wide by 13 ft high. The tunnel invert elevation is 1,952 ft, which is 18 ft below the NMWSE for Log Cabin Diversion Dam (i.e., water can only be diverted through the tunnel when the impoundment's WSE is greater than 1,952 ft).

7. New Bullards Bar Dam is a 1,110-ft radius, double curvature, concrete arch dam located on the North Yuba River about 2.4 mi upstream of its confluence with the Middle Yuba River. The dam is 645 ft high with a maximum elevation of 1,965 ft. The dam includes one low-level outlet – a 72-in Hollow Jet Valve (invert elevation 1,444.5 ft) with a maximum design capacity of about 3,500 cfs at full reservoir pool, and an actual capacity of 1,250 cfs (i.e., actual release capacity is limited to 1,250 cfs because of valve vibrations at higher release rates). The dam includes an overflow-type spillway with a width of 106 ft and a crest elevation of 1,902 ft. Control gates on the spillway consist of

[3] For the purpose of the application, the slide gate that controls the Log Cabin Diversion Dam low level (5-ft diameter) outlet is referred to as a "valve."

three Tainter Gates measuring 30 ft wide and 54 ft tall, which are hoisted by 10 horsepower drum hoists. The maximum design capacity of the spillway is 160,000 cfs. Figure 4.1-3 provides a longitudinal schematic of New Bullards Bar Dam.

8. New Bullards Bar Reservoir is a storage reservoir on the North Yuba River formed by New Bullards Bar Dam. At NMWSE (1,956 ft), New Bullards Bar Reservoir extends about 15.3 river miles (RM) upstream on the North Yuba River, has an estimated gross storage capacity of 966,103 ac-ft, a surface area of 4,790 ac, a shoreline of about 71.9 mi, and a drainage area of 488.6 sq mi.

9. New Colgate Power Tunnel Intake is a structure on the upstream face of New Bullards Bar Dam composed of a curtain wall, trashrack and two intakes, one with an invert elevation of 1,808 ft and the other with an invert elevation of 1,627.5 ft. The upper intake is not used per the direction of Cal Fish and Wildlife (Figure 4.1-3).[4]

10. New Colgate Power Tunnel and Penstock is a 5.2 mi long conveyance facility composed of four different types of conveyance structures: an unlined horseshoe-shaped tunnel 26 ft square; a lined horseshoe-shaped tunnel 20 ft wide and 14.5 ft high; a lined circular tunnel 14 ft in diameter; and 2,809 ft of steel penstock with a diameter ranging from 9 ft to 14.5 ft. The tunnel and penstock have a maximum flow capacity of 3,500 cfs (Figure 4.1-1).

11. New Colgate Powerhouse and Switchyard is a mostly underground, steel reinforced, concrete powerhouse located adjacent to the Yuba River. The powerhouse contains two vertical-shaft Voith Siemens Pelton type turbines with a total actual measured capacity of 340 MW under a design head of 1,306 ft and a measured flow of 3,430 cfs. The New Colgate Switchyard is located adjacent to New Colgate Powerhouse (Figure 4.1-3).

12. New Bullards Bar Reservoir Recreation Facilities, 16 recreation facilities[5], which include: 1) Hornswoggle Group Campground; 2) Schoolhouse Campground; 3) Dark Day Campground; 4) Cottage Creek Campground[6]; 5) Garden Point Boat-in Campground; 6) Madrone Cove Boat-in Campground; 7) Frenchy Point Boat-in Campground; 8) Dark

[4] In 1993, YCWA convened a Temperature Advisory Committee to obtain more refined recommendations for the operation of New Bullards Bar Reservoir's multi-level intake. The committee was composed of YCWA, USFWS, and Cal Fish and Wildlife representatives. After reviewing temperature model data and the operating options, USFWS and Cal Fish and Wildlife recommended that water releases from New Bullards Bar Reservoir be as cold as possible at all times. YCWA immediately implemented this recommendation and, since 1993, all controlled releases of water from New Bullards Bar Reservoir through New Colgate Powerhouse into the Yuba River have been from the deeper port (elevation 1,620 ft) of the New Bullards Bar Power Intake.

[5] The names of the Project developed recreation facilities will be slightly different under YCWA's proposed Condition RR1, Implement Recreation Facilities Plan, in Appendix E2 of this Amended FLA to make the naming of the facilities consistent with the Forest Service's current facility naming guidelines based on the amenities provided at each facility. For example, in the new license, the existing Dark Day Picnic Area will be Dark Day Picnic Site and Sunset Vista Point will be Sunset Vista Observation Site.

[6] In 2010, the facility was destroyed in a fire. The only site amenities that remain are the vault restroom building and the Klamath stoves. Following extensive consultation, YCWA and the PNF determined that the area would be better utilized to meet current recreational demand for small groups (i.e., double and triple campsites). YCWA and the PNF agreed on a conceptual layout for small group campsites, to be known as the Cottage Creek Campground. The campground will be constructed in two phases: Phase 1 is planned for construction in 2017 or 2018, and Phase 2 will be constructed approximately 10 to 15 years later following re-vegetation of the more severely burner portion of this area.

Day Picnic Area; 9) Sunset Vista Point; 10) Dam Overlook; 11) Moran Road Day Use Area; 12) Cottage Creek Boat Launch;[7] 13) Dark Day Boat Launch[8]; 14) Schoolhouse Trail; 15) Bullards Bar Trail[9]; and 16) floating comfort stations. All of the recreation facilities are located on NFS land, with the exception of the Dam Overlook, Cottage Creek Boat Launch and small portions of the Bullards Bar Trail, which are located on land owned by YCWA. All of the developed recreation facilities are located within the existing FERC Project Boundary, except for a few short segments of the Bullards Bar Trail to the east of the Dark Day Boat Launch.

13. Streamflow Gages, two streamflow gages, one each located downstream of Our House Diversion Dam (USGS gage 11408880) and downstream of Log Cabin Diversion Dam (USGS gage 11409400).

14. Roads, 15 existing Primary Project Road segments for a total length of 4.61 mi, and 12 recreation-related road segments for a total length of 3.84 mi (Exhibit A of the Amended FLA).

4.1.1.1 New Bullards Bar Minimum Flow Development

The New Bullards Bar Minimum Flow Development consists of the following facilities and features:

1. New Bullards Bar Minimum Flow Powerhouse Penstock, a 70-ft long, 12-in diameter steel penstock with a maximum flow capacity of 6 cfs (Figure 4.1-3). The penstock bifurcates off the New Bullards Bar Dam low level outlet upstream of the 72-in Hollow Jet Valve.

2. New Bullards Bar Minimum Flow Powerhouse, a single Pelton wheel turbine with a capacity of 150 kW at a flow of 5 cfs (Figure 4.1-3).

3. New Bullards Bar Minimum Flow Transformer, a 225 kVA, 480/12,000 Volt transformer located adjacent to the New Bullards Minimum Flow Powerhouse.

4. Streamflow Gages, one streamflow gage, located downstream of New Bullards Bar Dam (USGS gage 11413517).

The New Bullards Bar Minimum Flow Development does not include any recreation facilities, Primary Project Roads, or recreation roads.

[7] Emerald Cove Marina provides visitor services at Cottage Creek Boat Launch, including houseboat and boat rentals, boat slips and moorings, fuel and a general store. The marina is operated under a lease from YCWA by a private company.

[8] As of the time of this filing, following extensive consultation, YCWA and the Forest Service have agreed on a re-organization of the existing parking areas to increase the parking capacity by 34 spaces (14 single vehicle spaces and 20 vehicle-with-trailer spaces). Completion of this project is expected in the next 3 to 5 years.

[9] The Project recreation facilities included one campground that is no longer part of the Project. Burnt Bridge Campground was closed initially by the Forest Service in 1979 due to low use levels. FERC, in an August 19, 1993 Order, which approved YCWA's Revised Recreation Plan, directed YCWA to remove all improvements and restore the Burnt Bridge Campground to the condition it was in prior to development of the facility. YCWA consulted with the Forest Service and all that remains of Burnt Bridge Campground today is the circulation road and vehicle spurs; all other facilities were removed.

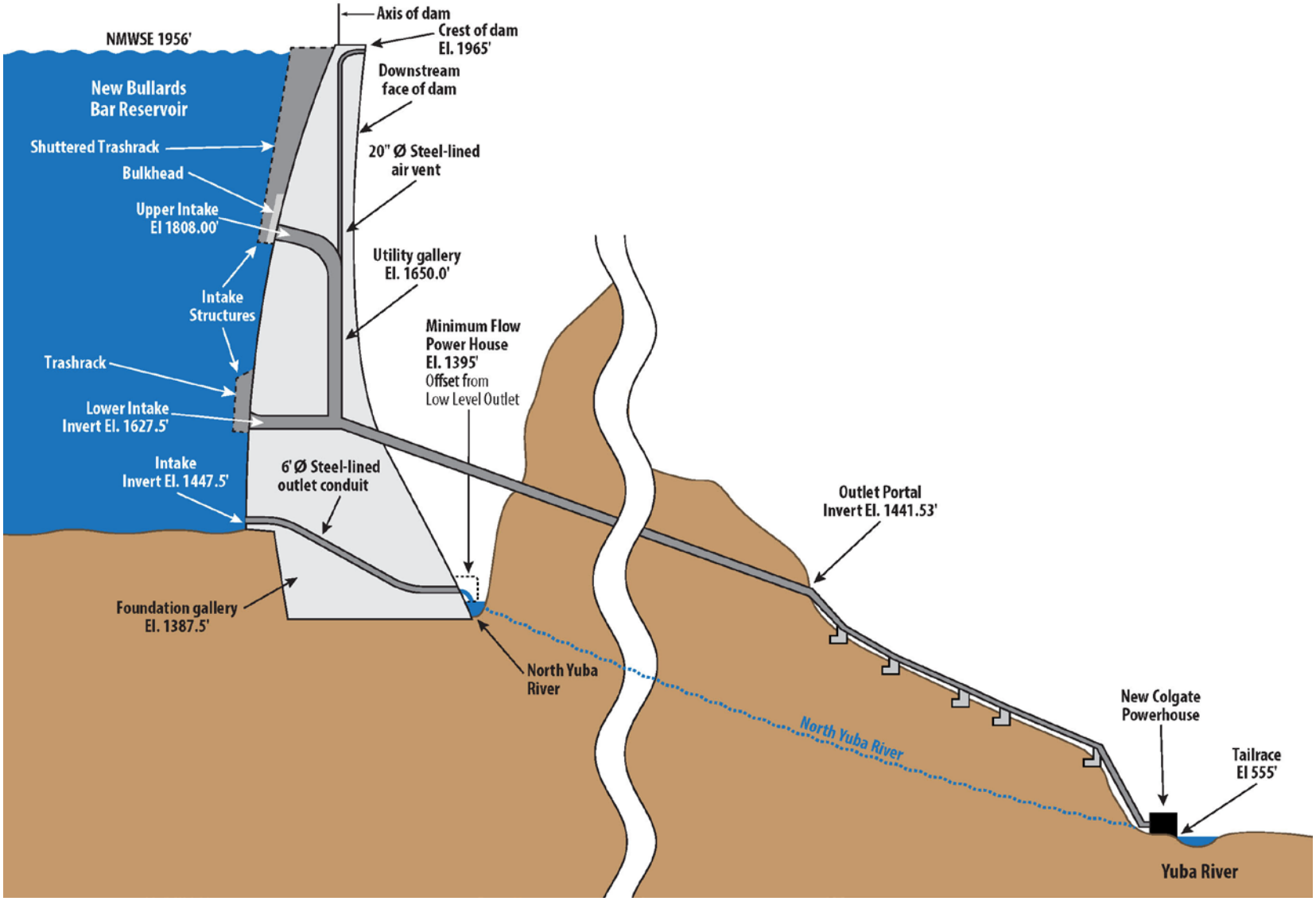

Figure 4.1-3. Longitudinal schematic of New Bullards Bar Dam on the North Yuba River and New Colgate Power Tunnel and Powerhouse on the Yuba River.

4.1.1.2 Narrows 2 Development

The Narrows 2 Development consists of the following features:

1. Narrows 2 Powerhouse Penstock is a tunnel that is 20 ft in diameter and concrete lined in the upper 376 ft, and 14 ft in diameter and steel lined for the final 371.5 ft. The penstock has a maximum flow capacity of 3,400 cfs. The penstock bifurcates above the turbine spiral scroll case. One branch conveys water to the Narrows 2 Full Bypass, which is described below. The other branch conveys water to the Narrows 2 Powerhouse and Partial Bypass, which are described below. Figure 4.1-4 provides a longitudinal schematic of the Narrows 2 Powerhouse Penstock and Powerhouse.

2. Narrows 2 Full Bypass (Full Bypass) is a valve and penstock branch off the Narrows 2 Penstock, which can discharge[10] up to 3,000 cfs of water at full head into the Yuba River immediately upstream of the Narrows 2 Powerhouse through a 72-in diameter fixed-cone valve in a concrete structure. The Full Bypass was installed in 2008 to maintain minimum flows during times of full shutdown[11] of the Narrows 2 Powerhouse, and is also used during flow transitions between the Narrows 2 Powerhouse and PG&E's Narrows 1 Powerhouse (Figure 4.1-4).

3. Narrows 2 Powerhouse and Switchyard is an indoor powerhouse located about 200 ft downstream of Englebright Dam. The powerhouse consists of one vertical axis Francis turbine with a capacity of 55 MW at a head of 236 ft and flow of 3,400 cfs. Releases from the powerhouse draft tube are subsurface. The Narrows 2 Powerhouse Switchyard is located adjacent to the powerhouse.

4. Narrows 2 Partial Bypass (Partial Bypass) includes a pipe off the Narrows 2 Powerhouse turbine scroll case, which can discharge up to 650 cfs of water at full head into the Yuba River through a 36-in valve located on the downstream face of the powerhouse above the draft tube outlet. The Partial Bypass was built as part of the original design when the Narrows 2 Powerhouse was constructed.

5. Streamflow Gages, none[12].

6. Roads, four existing Primary Project Road segments for a total length of 2.27 mi.

The Narrows 2 Development does not include any recreation facilities or recreation roads.

[10] For the purpose of this Applicant-Prepared Draft EFH Assessment, "discharge" means the estimated flow through a facility at a designated location in terms of cfs. A discharge may be measured or estimated, and may also be referred to as a "release."

[11] For the purpose of this Applicant-Prepared Draft EFH Assessment, a "shutdown" refers to a facility going from some level of operations to no operations. Shutdowns may be "planned" (i.e., scheduled with some advanced planning) or "forced" or "unplanned" (i.e., results from an emergency, such as equipment failure).

[12] The Narrows 2 Development does not include any streamflow gages. YCWA uses two non-Project gages to monitor compliance with streamflow requirements. These gages are: USGS Gage 11418000, Yuba River Below Englebright Dam, Near Smartsville, and USGS Gage 1142100, Yuba River Near Marysville. The Smartsville gage is owned, operated, and maintained by PG&E. The Marysville gage is owned by YCWA and operated by USGS.

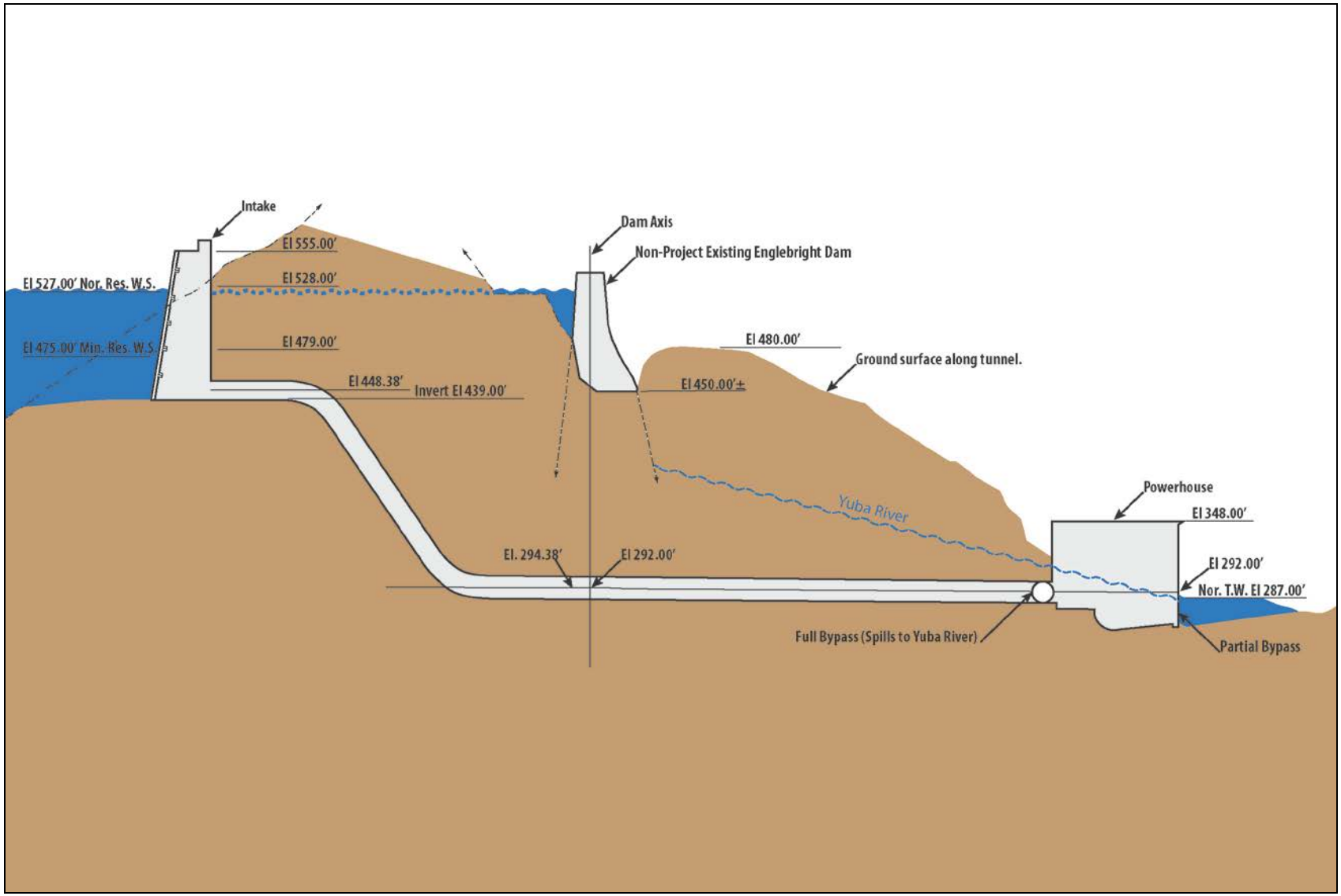

Figure 4.1-4. Longitudinal schematic of Narrows 2 Powerhouse Penstock and Powerhouse.

4.1.2 Existing Project Boundary

The FERC Project Boundary is intended to consist of all lands necessary for the safe operations and maintenance of the Project and other purposes, such as recreation, shoreline control, and protection of environmental resources. For the Yuba River Development Project, the existing boundary encompasses 7,815.2 ac of land in Yuba, Nevada and Sierra counties, California. The existing FERC Project Boundary includes a zone of area that encloses all Project facilities and features. The width of the zone around a facility or feature varies depending on the type of Project facility or feature and the activities associated with it.

A total of 56.5 percent of the land (4,416.7 ac) within the FERC Project Boundary is NFS lands, and 0.2 percent (16.1 ac) is USACE lands. Three-tenths percent of the land (20.1 ac) is State of California-owned land. YCWA owns 40.3 percent of the land (3,149.3 ac) within the existing boundary. The remaining 2.7 percent of the land (213.0 ac) within the existing FERC Project Boundary is in private ownership.

4.1.3 Existing Project Safety

The Project has been operating for more than 45 years under the existing license and during this time FERC staff has conducted operational inspections focusing on the continued safety of the structure, identification of unauthorized modifications, efficiency and safety of operations, compliance with the terms of the license, and proper maintenance. In addition, the Project has been inspected and evaluated every 5 years by an independent consultant and a consultant's safety report has been submitted for FERC's review. YCWA has a strong commitment to employee and public safety, which is reflected in its written safety procedures, training program, and safety record.

4.1.4 Existing Project Operations

One of YCWA's major considerations each year is anticipated water availability. YCWA begins estimating water availability each year in January and continually updates the estimate throughout the spring runoff period. When estimating available water supply, YCWA considers current reservoir storage and California Department of Water Resources (DWR) Bulletin 120 forecasts of unimpaired flow at the Smartsville gage on the lower Yuba River and the Goodyears Bar gage on the North Yuba River. Estimates of available water supply and other water needs are compared to estimates of required releases, consumptive demands within YCWA, and target levels for fall carryover storage in New Bullards Bar Reservoir.

Typically, YCWA operates New Bullards Bar Reservoir by capturing winter and spring runoff from rain and snowmelt. The North Yuba River inflow to New Bullards Bar Reservoir is augmented by diversions from the Middle Yuba River to Oregon Creek through the Lohman Ridge Tunnel, and by diversions from the Lohman Ridge Tunnel and Oregon Creek into the

reservoir through the Camptonville Tunnel.[13] Consequently, New Bullards Bar Reservoir normally reaches its peak storage at the end of the spring runoff season, and then is gradually drawn down until its lowest elevation in early to mid-winter. The reservoir does not undergo significant daily changes in elevation.

New Bullards Bar Reservoir has mandatory reserved flood storage space criteria from mid-September through the end of May that limit maximum authorized storage (See Section 4.1.5.1). The Our House and Log Cabin diversion dam impoundments have no appreciable storage, and YCWA operates them to divert water to New Bullards Bar Reservoir in the winter and spring during high flow periods. The Our House and Log Cabin diversions often do not operate when inflows diminish, and they release all inflows into the streams below at those times.

During the spring of each year, YCWA makes a determination of anticipated runoff into New Bullards Bar Reservoir relying upon snow course measurements and forecasts of runoff provided by DWR. YCWA also makes estimates of water needs for local water deliveries and for releases to meet required instream flows for the current water year (WY). Based on these forecasts, an end-of-September storage is estimated. If the forecasted end-of-September storage is higher than a pre-determined target (650,000 ac-ft),[14] releases are increased above the required flows to draw reservoir storage down to the target level. The target storage is an operational measure used to drive releases in relatively wet years, and supports water releases for out-of-basin transfers under the Lower Yuba River Accord (Yuba Accord).[15]

In addition to the target storage, there is a minimum storage at the end-of-water year to provide carryover storage requirement for drought protection purposes. If forecasted end-of-September storage falls below an end-of-September carryover storage target, agricultural deliveries may be reduced to ensure adequate water supply for the following year. Reservoir carryover storage is used to make up the difference between the available surface water supply provided by the current year's runoff and system demands (e.g., diversion demands, instream flow requirements, and system operational losses) under drought conditions.

In wetter years, YCWA operates New Bullards Bar Reservoir to an end-of-September target storage level for the Yuba Accord of 650,000 ac-ft, as well as other target storage levels for various times in mid-winter and spring that are parts of power generation operations and flood control operations.

The New Bullards Bar Minimum Flow Powerhouse is operated as a "base load" facility where flows are set at a constant rate to provide the required instream flows downstream of New Bullards Bar Dam.

[13] The average total inflows to New Bullards Bar Reservoir from the North Yuba River and diversions from the Middle Yuba River and Oregon Creek are about 1,200,000 ac-ft per year, and annual inflow has ranged from a low of 163,000 ac-ft in 1977 to a high of 2,800,000 ac-ft in 1982.

[14] An end-of-September storage of 650,000 ac-ft would ensure adequate storage to meet full irrigation demands and dry-year flow requirements for a 99 percent exceedance drought in the following year.

[15] The end-of-September target storage drives New Bullards Bar Reservoir operations in 56 percent of years under the Base Case scenario.

The New Colgate Powerhouse is a highly versatile facility, and is used for a combination of peaking and base generation. Depending upon energy demand, the New Colgate Powerhouse generation can be fluctuated in less than 10 minutes from a minimum of 2 MW with only one unit operating to maximum load of 340 MW with both units operating, if both units are ramped up at the same time. This ability to rapidly fluctuate a significant amount of generation, together with substantial storage available in New Bullards Bar Reservoir, and its central geographical location, makes the New Colgate Powerhouse important and unique to the Northern California power grid.

For most of the year, New Colgate Powerhouse is operated as a peaking facility, or to provide ancillary services such as spinning reserves or regulation. Under peaking operations, releases through the powerhouse are concentrated to hours of the day when power is most valuable or when power demand is higher (such as weekdays from mid-morning through early evening, largely corresponding to warmer times of the day and/or peak workday and early evening hours). Under ancillary services operations, the generating station is ramped upwards or downwards quickly, to respond to power system load changes on a near-real-time basis, and generating station output and flows may vary substantially minute-to-minute. The New Colgate Powerhouse also often operates under a combined peaking/ancillary service protocol, with one unit operating in peaking mode and the other unit responding to ancillary service requirements. During some of the late 1990s and early 2000s, New Colgate Powerhouse operations were focused on weekday peak generation. More recently, power generation has shifted to a schedule driven by a balance of peak period generation and providing ancillary services to the region.

Frequently, New Colgate Powerhouse provides a significant percentage of the required ancillary service for grid regulation of the region, as dispatched by the California Independent System Operator (ISO), the entity responsible for maintaining grid reliability in California. Peaking operations dominate power generation operations at New Colgate Powerhouse. However, under high flow conditions, some or all of the available capacity is used for base load generation, generating inexpensive power while excess water must be moved through the system anyway.

4.1.4.1 Narrows 2 – Flow Transitions[16]

YCWA and PG&E coordinate releases from the Project's Narrows 2 Powerhouse, Partial Bypass and Full Bypass and PG&E's Narrows Project in accordance with the streamflow requirements in Article 33 in the existing license for the Yuba River Development Project. Compliance with Article 33 is measured at the Smartsville and Marysville gages.

YCWA records flow at 15-minute intervals through the Narrows 2 Penstock using an acoustic velocity meter (AVM) attached to the penstock upstream from the Full Bypass/Narrows 2 Powerhouse and Partial Bypass bifurcation, and retains flow data in its HYDSTRA database. Flow in the penstock downstream of the bifurcation is not directly measured. Rather, YCWA estimates flow through the Narrows 2 Powerhouse, Partial Bypass and Full Bypass based on: 1) recorded flow at the AVM; 2) operator logs of when the Full and Partial bypasses are opened and

[16] For the purpose of this Applicant-Prepared Draft EFH Assessment, a "transition" or "change-over" refers to decreasing or increasing the discharge from one facility in coordination with decreasing or increasing flows in another facility. A transition may include a shutdown of one facility.

closed); and 3) records of Narrows 2 Powerhouse generation. Narrows 1 Powerhouse flow data are available from PG&E (YCWA does not measure flow through the Narrows 1 Powerhouse). In addition, YCWA obtains Smartsville flow gage data from PG&E.

4.1.4.1.1 Flow Transition Among Narrows 2 Development Facilities

The transition between Narrows 2 Powerhouse and the Full Bypass can be performed in response to an emergency when a forced outage occurs or during normal operations as part of shutdown of the powerhouse. The following is a description of YCWA's standard operational practices for flow transitions. While the facilities have been operated differently on occasion and may be operated differently in the future, only normal operations are described below.

If the Narrows 2 Powerhouse is operating and a Narrows 2 Powerhouse shutdown occurs because of a forced outage (i.e., unit trip), then the powerhouse turbine wicket gates are closed automatically and there is an automatic opening of the Full Bypass so that flow through the bypass is the same as the flow was through the powerhouse before the outage. The opening is started after a 3-minute safety delay during which time a horn is sounded at the exterior of the Full Bypass to warn persons in the area of an imminent release through the Full Bypass. This operation is automated and does not require any manual actions. YCWA estimates the time from when a Narrows 2 Powerhouse forced outage occurs to the time the Full Bypass is fully opened to the desired level typically is about 5 minutes, depending on the flow level (i.e., 2 minutes after the warning horn stops).

Once a Narrows 2 Powerhouse outage is cleared (i.e., the powerhouse is ready to resume operation), the Narrows 2 Powerhouse unit is synchronized to the electrical grid, then the Full Bypass is closed either remotely (i.e., by PG&E from its Wise, California, Switching Center or by YCWA through its Supervisory Control and Data Acquisition [SCADA] system) or manually on-site in increments synchronized with increased load and resulting releases through the Narrows 2 Powerhouse.

If the Narrows 2 Powerhouse is operating and a planned powerhouse shutdown occurs, the transition from the Narrows 2 Powerhouse to the Full Bypass occurs as described above. This can be done either remotely by YCWA or PG&E, or manually on-site. This transition usually takes longer (i.e., 10 to 15 minutes) for a planned outage because there is no emergency and steady instream flows are maintained.

Since installation of the Full Bypass in January 2007, the Partial Bypass typically has been used only for a few specific reasons, which include: 1) maintenance on the Full Bypass when generation is not possible; 2) obtaining safe foot access upstream of the Full Bypass when generation is not possible; and 3) supplemental flow releases at lower levels than the long-term reliability operating ranges of the Full Bypass or Narrows 2 Powerhouse.

Except for flow transitions, YCWA does not operate the Full or Partial bypasses when Narrows 2 Powerhouse is operating (i.e., water is passing through the turbine and generating electricity) and, except in very rare instances, does not operate both bypasses at the same time.

4.1.4.1.2 Transition Between Narrows 2 Powerhouse and Narrows 1 Powerhouse

YCWA and PG&E have negotiated a new agreement for the coordinated operations of the Narrows 1 and Narrows 2 powerhouses for the period beginning on May 1, 2016 (after expiration of YCWA's previous power purchase agreement with PG&E on April 30, 2016). The new agreement does not make any major changes in the historic coordinated operations of the two powerhouses. A minor change is that when the required release below Englebright Dam is in the range of the full capacity of the Narrows 1 Powerhouse (about 730 cfs) to 900 cfs, rather than releasing at the full capacity of Narrows 1 Powerhouse and releasing the remainder of the flow through the Partial or Full bypass, the required downstream release is in this range and the full amount of flow will be released from the Narrows 2 Powerhouse and no flow will be released from the Narrows 1 Powerhouse. This change eliminates bypasses of flow within this flow range.

Under the coordinated operations agreement, PG&E and YCWA coordinate to schedule the amounts of water that will flow through the Narrows 1 and 2 powerhouses. The flows at Narrows 2 Powerhouse can be adjusted remotely by YCWA through its SCADA system and at PG&E's Narrows 1 Powerhouse by PG&E from its Wise Switching Center, or manually on-site. Dispatching decisions are based on a number of factors, which could potentially change on an hourly or daily basis. These include: minimum flow requirements;[17] water demand; conditions in the California electricity market; capacity and condition of the Narrows 2 and Narrows 1 powerhouse turbines, generators and bypasses; transmission line conditions; and a desire to minimize Englebright Reservoir and Yuba River elevation fluctuations.

The following is a description of YCWA's and PG&E's standard operational practices for flow transitions between the Narrows 1 and Narrows 2 powerhouses. While the facilities have been operated differently on occasion and may be operated differently in the future, only normal operations are described below.

If the Narrows 2 Powerhouse is operating, the Narrows 1 Powerhouse is not operating, and releases below the dam are to be reduced to a range where PG&E can begin to generate electricity and release the majority of the required flow at the Narrows 1 Powerhouse, then YCWA and PG&E synchronize the Narrows 1 Powerhouse unit to the electric grid, while reducing draft from Narrows 2 Powerhouse to compensate for increased releases from the Narrows 1 Powerhouse. As the Narrows 1 Powerhouse load is increased, releases from the Narrows 2 Powerhouse are decreased and the Full Bypass is opened to the flow rate, if any, that is needed to supplement the Narrows 1 Powerhouse release. If the required supplement is less than approximately 230 cfs, then the Partial Bypass is used instead of the Full Bypass. YCWA and PG&E estimate that this transition can take between 10 and 30 minutes to reach the full flow of the Narrows 1 Powerhouse.

[17] The flow requirements in license 1404 and 2246 are not the same. Article 33 in license 2246 contains flow requirements in the Yuba River below the Narrows 2 facilities, and compliance with these requirements are monitored at the Smartsville and Marysville gages. Article 402 in license 1403 contains flow requirements for PG&E's Narrows Project, and the compliance location is the Smartsville gage.

If the Narrows 1 Powerhouse is operating, the Narrows 2 Powerhouse is not operating, and releases below the dam are to be increased, then the transition of releases from the Narrows 1 Powerhouse to the Narrows 2 Powerhouse occurs in reverse of the process described in the preceding paragraph.

The above changes can be made remotely by PG&E from its Wise Switching Center or by YCWA through its SCADA system, or manually on-site.

4.1.4.1.3 Typical Operations of Narrows 2 Facilities

Discharge can occur from the Narrows 1 and Narrows 2 powerhouses based on regulatory requirements, water demands, inflows from releases from New Bullards Bar Reservoir, uncontrolled inflows, management of storage levels in Englebright Reservoir and capability of the turbines, generators and bypasses and Yuba River flows for the protection of fisheries and other reasons. Table 4.1-3 provides a summary of the typical current flow ranges through the Narrows 2 Powerhouse, the Partial Bypass, the Full Bypass and the Narrows 1 Powerhouse. As shown in the table, YCWA typically does not operate the Narrows 2 Partial Bypass when the Narrows 2 Powerhouse turbine is in normal operations. There are many combinations of potential conditions that could require different operating conditions than those indicated in Table 4.1-3. However, only normal operations are described here. Nevertheless, YCWA needs to retain flexibility of operations, based on its experience and familiarity with the equipment, safety, and its need to protect environmental resources.

Table 4.1-3. Typical distribution of flows under normal operations (i.e., excluding brief transition periods) among Narrows 2 Powerhouse (generation only), Partial Bypass, Full Bypass and Narrows 1 Powerhouse.

Range of Flow Releases to Yuba River (cfs)	Narrows 2 Powerhouse Release (generation)[1] (cfs)	Partial Bypass Release[1] (cfs)	Full Bypass Release[1] (cfs)	Narrows 1 Powerhouse Release[2] (cfs)
Up to 730	Typically not used	149	Typically not used	150 - 730
730 – 2,800	730 – 2,800	Typically not used	Used when Narrows 2 Powerhouse not available	0
2,800 – 4,130	2,070-3,400	Typically not used	Used when Narrows 2 Powerhouse not available	Up to 730
> 4,130	3,400	Typically not used	0	Up to 730

[1] The typical operating flow ranges of Narrows 2 facilities are limited by long-term reliability considerations, such as vibration and cavitation of the runner, and are as follows: for the Narrows 2 Powerhouse between 700 and 3,400 cfs (with physical capacity to release as low as 600 cfs); for the Partial Bypass between 0 and 230 cfs (with physical capacity to release as high as 650 cfs); and for the Full Bypass between 150 and 3,000 cfs.

[2] The use of the Narrows 1 Powerhouse in this range is dependent on a number of economic and generator factors and can vary from no flow to the maximum Narrows 1 Powerhouse generation capacity. In this range, Narrows 2 Powerhouse alone or Narrows 1 Powerhouse with Narrows 2 Powerhouse may operate.

Figures 4.1-5 through Figure 4.1-14 show for each WY from 2007 through 2016, actual operations and information consisting of estimated 15-minute discharges from Narrows 1 Powerhouse, Narrows 2 Powerhouse, Partial Bypass and Full Bypass, as well as flow at Smartsville gage and spill over Englebright Dam. In these figures, Narrows 1 Powerhouse and Smartsville gage data are from PG&E, and the Narrows 2 Powerhouse, Partial Bypass and Full Bypass data are based on flow data in the Narrows 2 Penstock acoustic velocity meter and

YCWA operators' log books. Spills over Englebright Dam are based on measured Englebright Reservoir WSE and PG&E's relationship for spills and WSE.

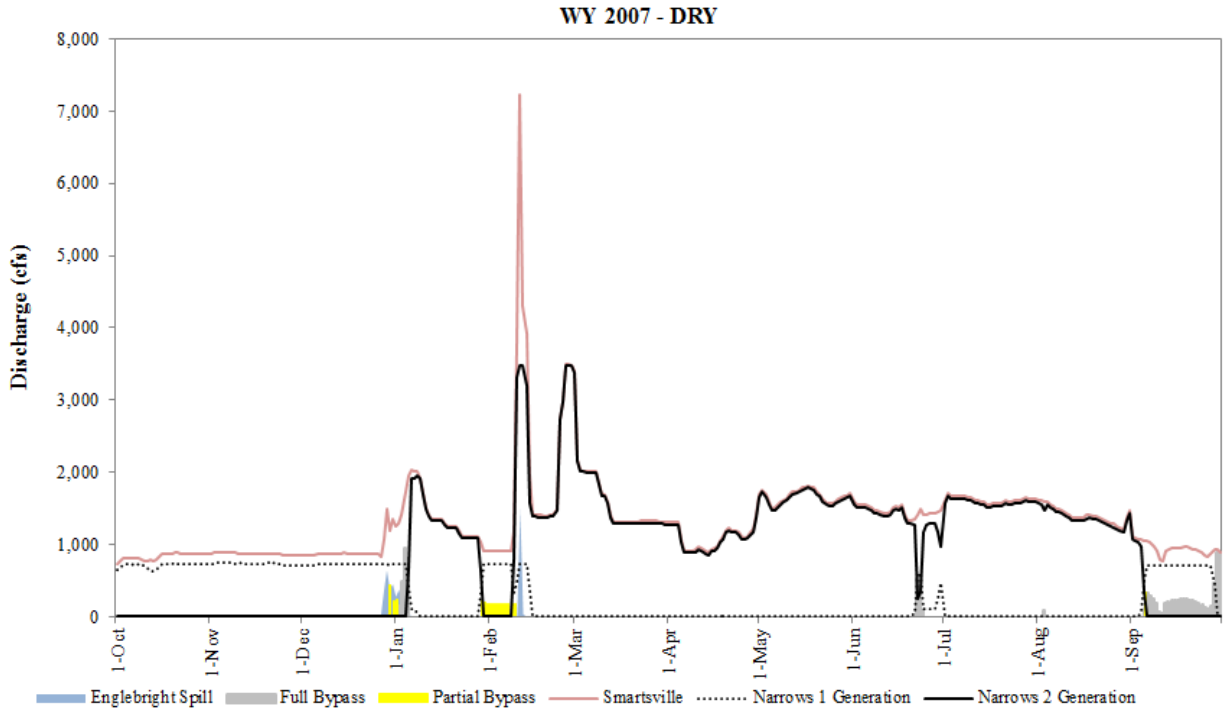

Figure 4.1-5. Historical mean daily discharge from Narrows 1 Powerhouse, Narrows 2 facilities, the Smartsville gage, and Englebright Dam spill in Water Year 2007. The Narrows 2 Powerhouse was shut down during the period of October 1 through December 30, 2006 for the installation of the Narrows 2 Full Bypass. Siphons over Englebright Dam were used to provide flow to the Yuba River in addition to Narrows 1 Powerhouse releases. Accordingly, there is a difference between the flow from the Narrows 1 Powerhouse and Smartsville gage.

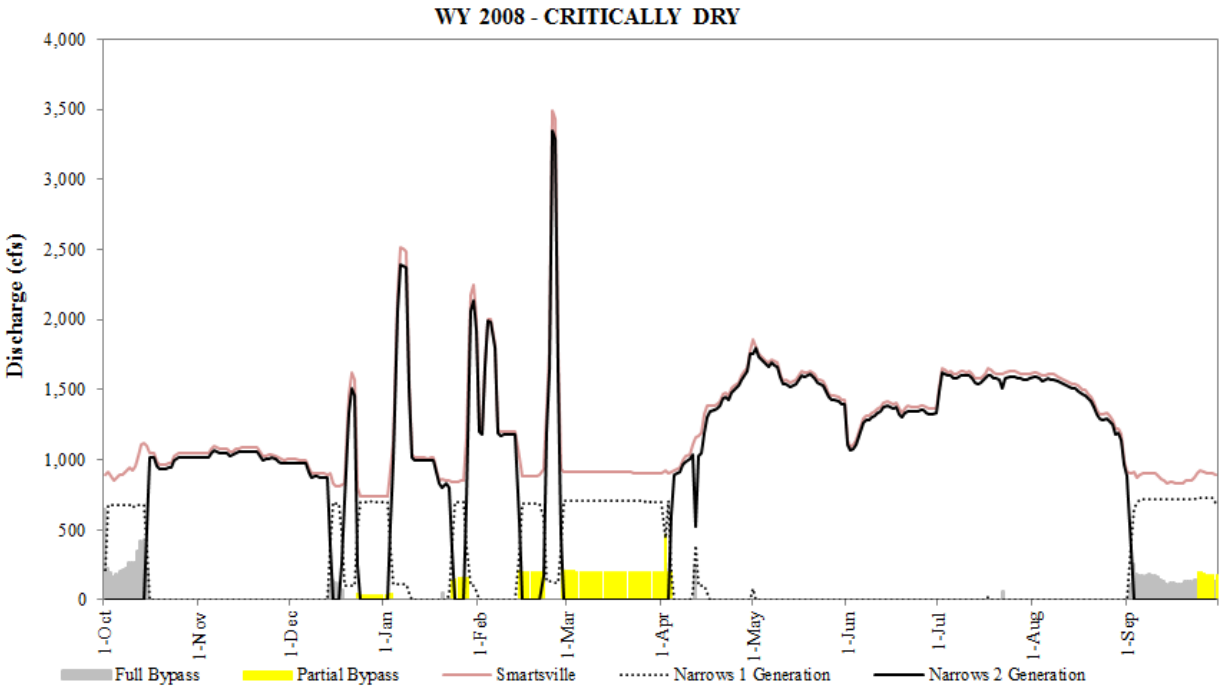

Figure 4.1-6. Historical mean daily discharge from Narrows 1 Powerhouse, Narrows 2 facilities, the Smartsville gage, and Englebright Dam spill in Water Year 2008.

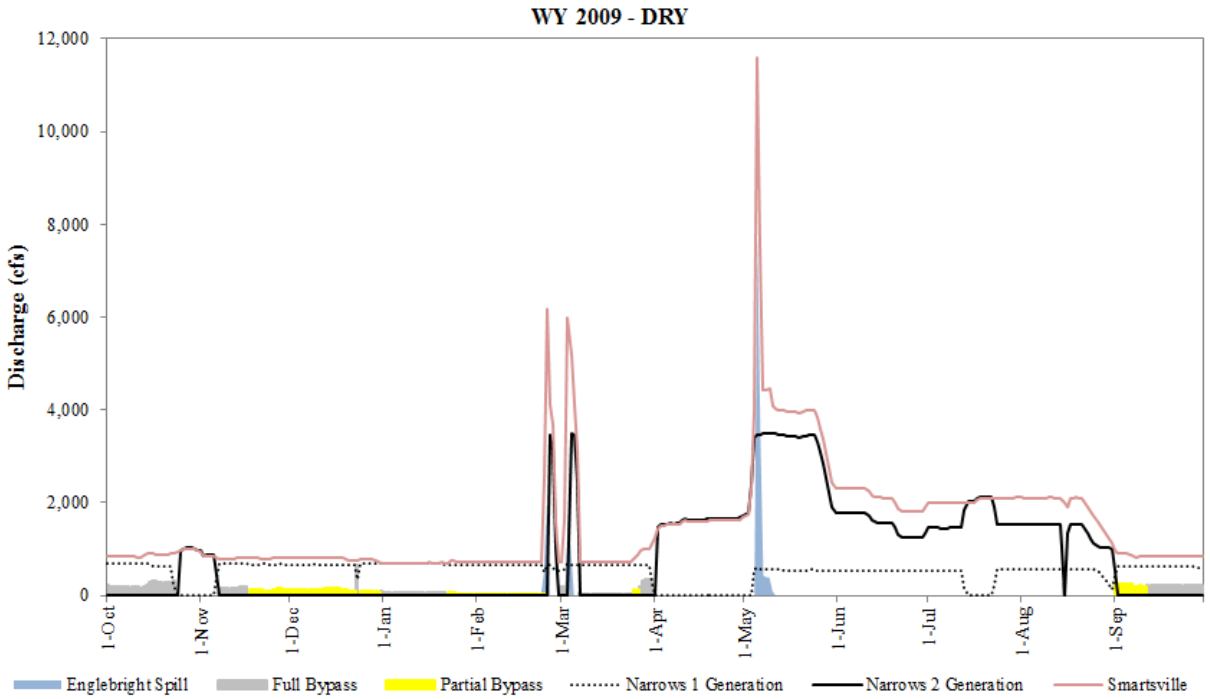

Figure 4.1-7. Historical mean daily discharge from Narrows 1 Powerhouse, Narrows 2 facilities, the Smartsville gage, and Englebright Dam spill in Water Year 2009.

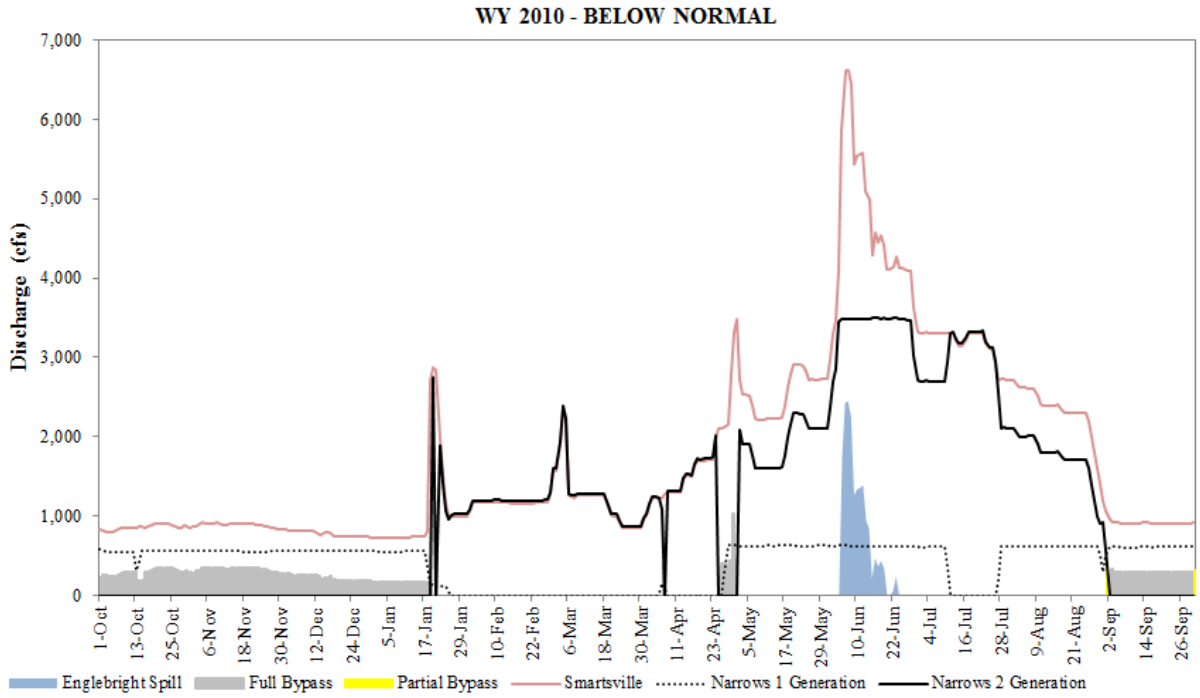

Figure 4.1-8. Historical mean daily discharge from Narrows 1 Powerhouse, Narrows 2 facilities, the Smartsville gage, and Englebright Dam spill in Water Year 2010.

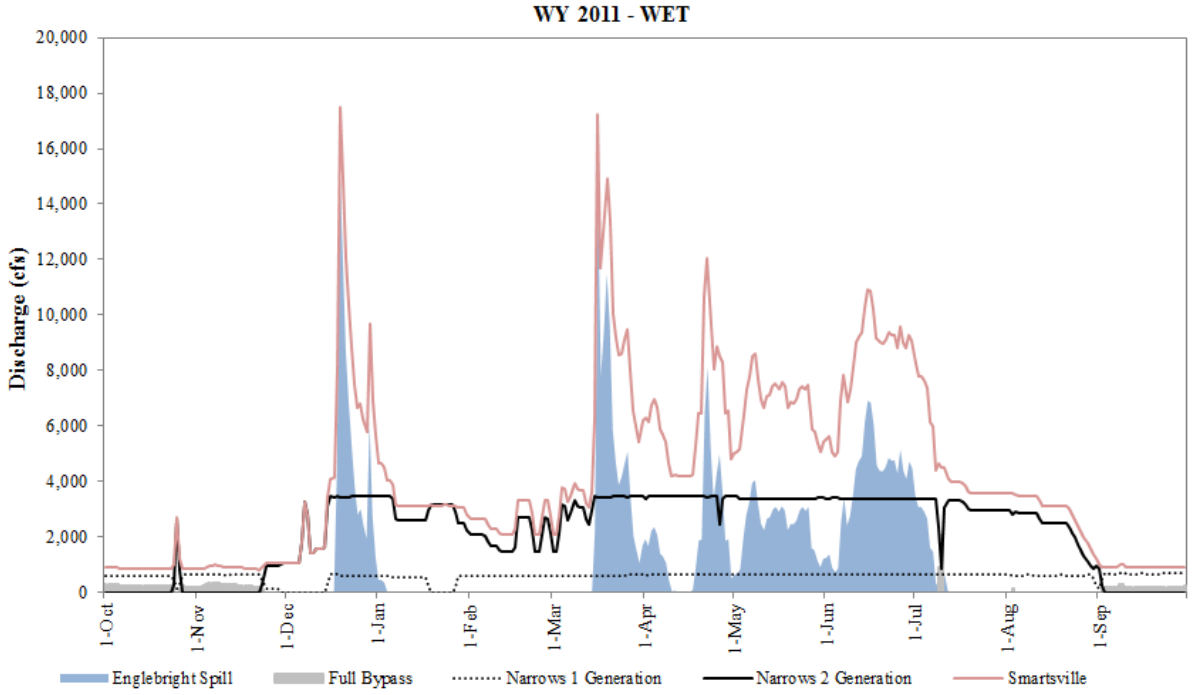

Figure 4.1-9. Historical mean daily discharge from Narrows 1 Powerhouse, Narrows 2 facilities, the Smartsville gage, and Englebright Dam spill in Water Year 2011.

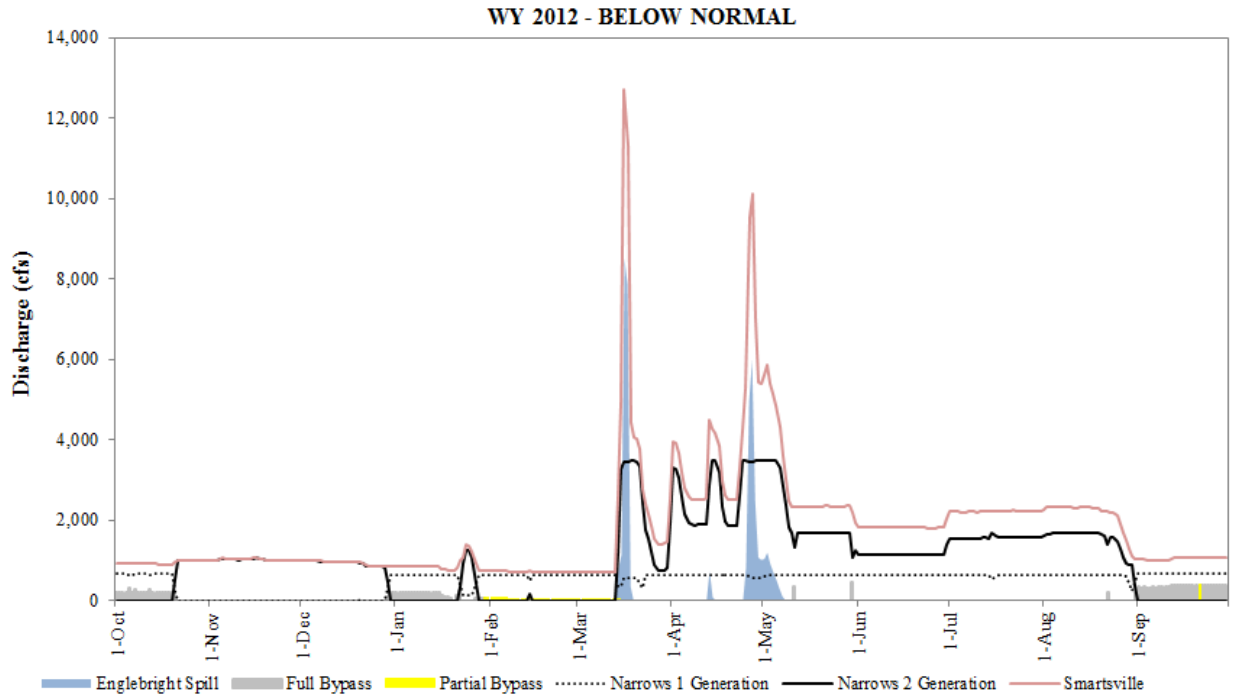

Figure 4.1-10. Historical mean daily discharge from Narrows 1 Powerhouse, Narrows 2 facilities, the Smartsville gage, and Englebright Dam spill in Water Year 2012.

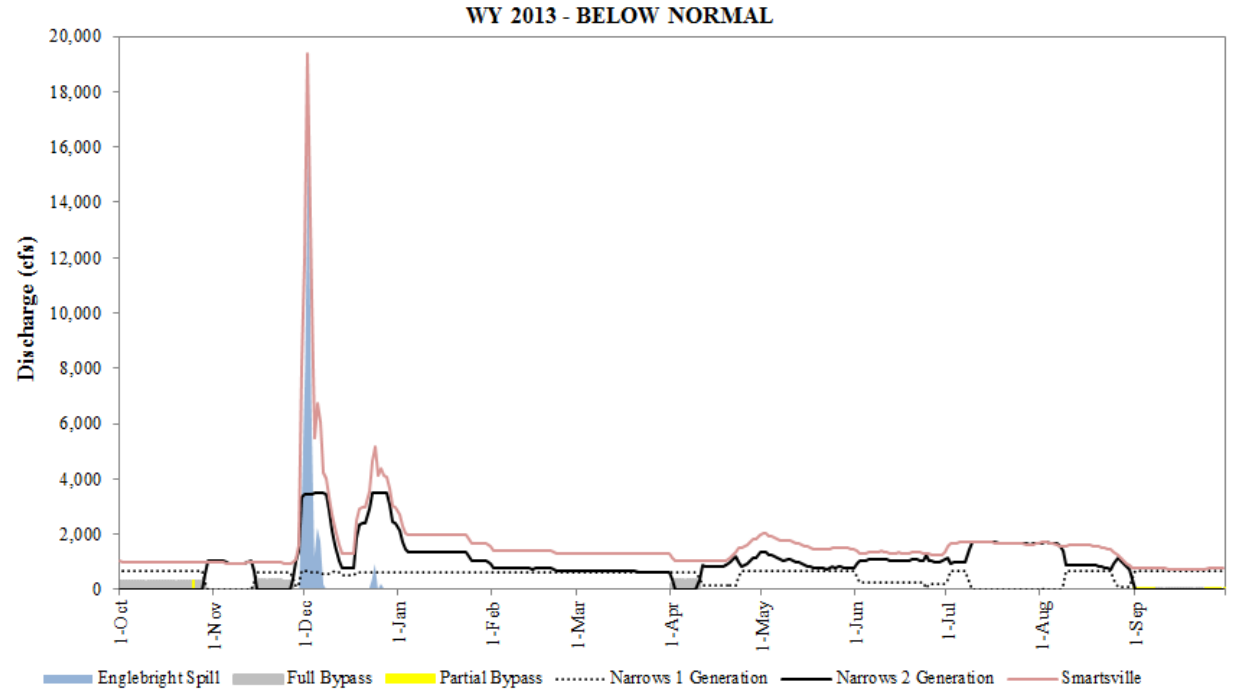

Figure 4.1-11. Historical mean daily discharge from Narrows 1 Powerhouse, Narrows 2 facilities, the Smartsville gage, and Englebright Dam spill in Water Year 2013.

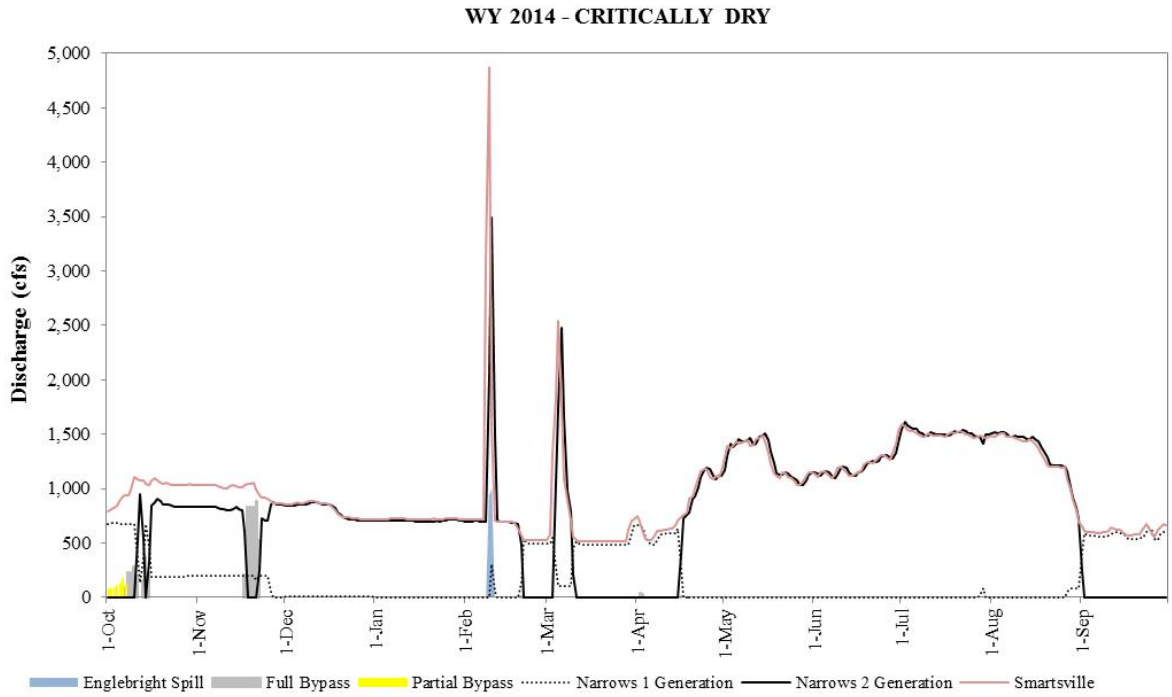

Figure 4.1-12. Historical mean daily discharge from Narrows 1 Powerhouse, Narrows 2 facilities, the Smartsville gage, and Englebright Dam spill in Water Year 2014.

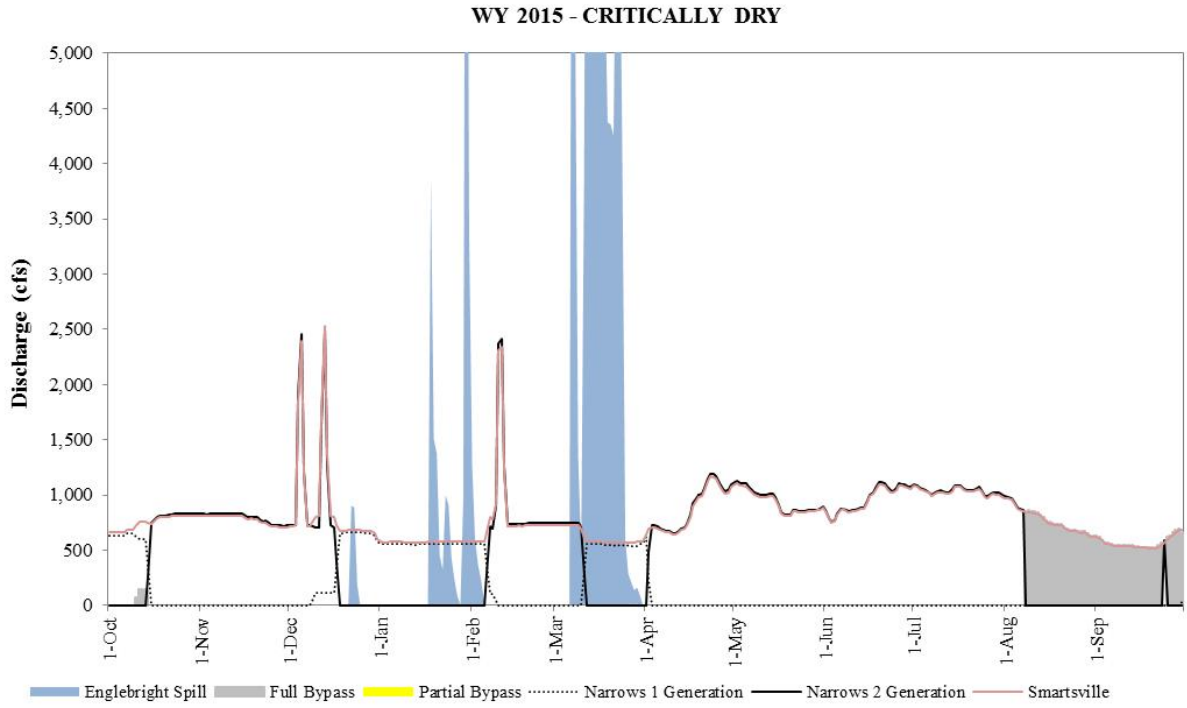

Figure 4.1-13. Historical mean daily discharge from Narrows 1 Powerhouse, Narrows 2 facilities, the Smartsville gage, and Englebright Dam spill in Water Year 2015.

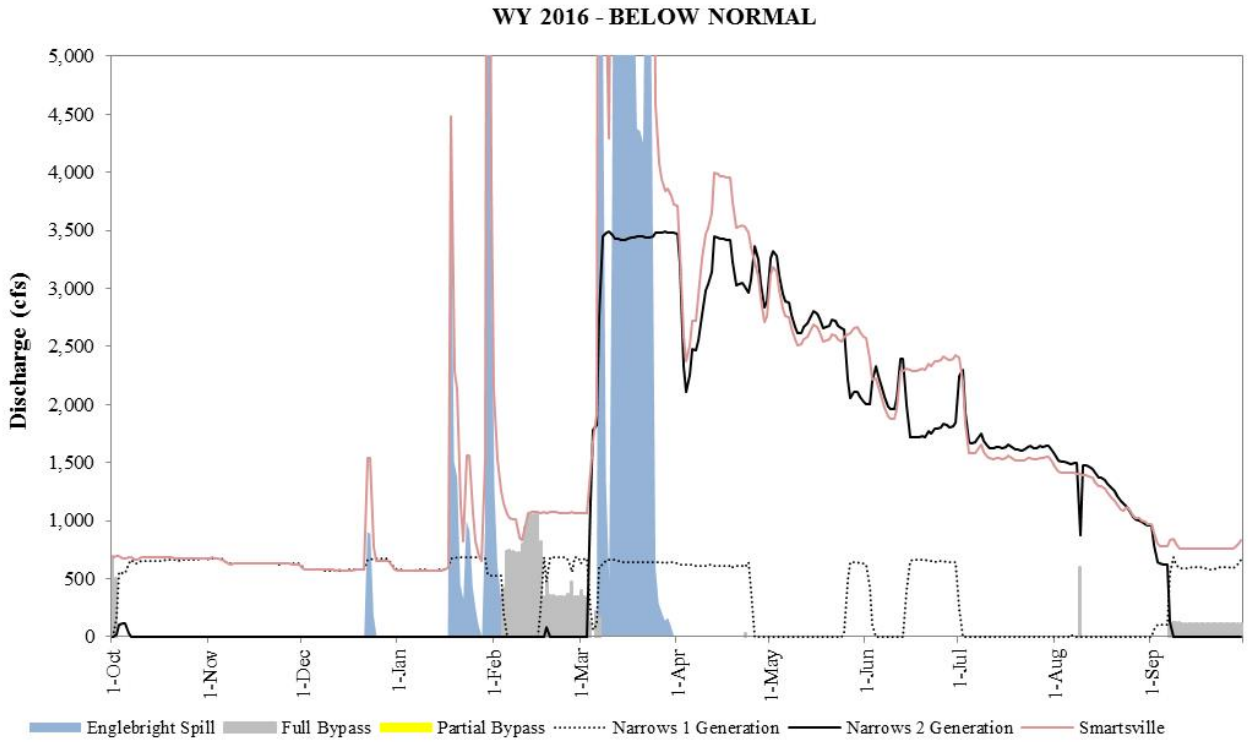

Figure 4.1-14. Historical mean daily discharge from Narrows 1 Powerhouse, Narrows 2 facilities, the Smartsville gage, and Englebright Dam spill in Water Year 2016.

4.1.5 Existing Environmental Measures

4.1.5.1 Measures in Current FERC License

The existing FERC license includes 60 articles. Of these, Licensee considers 19 articles (articles 28, 29, 30, 35, 36, 41, 42, 43, 44, 48, 50, 51, 52, 58, 60, 62, 65, 66, and 67), "expired" or "out of date" because each pertains to a construction activity that has been completed, or a filing related to a construction or other activity that has been completed, or another activity that has been completed. As a result, the existing license contains 41 "active" articles. Of these, Articles 33, 34, 40, and 46 are more germane to Project operations than the other 37 articles. Each of these is provided below as it appears in the existing FERC License.

Article 33. The Licensee shall maintain the following minimum streamflow schedules for maintenance of fish life in the several streams listed:

(a)

(a) Stream	Flow (cfs)[1]	
	April 15 to June 15	June 16 to April 14
Middle Yuba (below Hour House Diversion)	50	30
Oregon Creek (below Log Cabin Diversion)	12	8
North Yuba (below New Colgate Diversion)	5	5

[1] Or natural flow, whichever is less. Maximum 24-hour fluctuations of plus or minus 10 percent are permitted for flows in Middle Yuba below Hour House Diversion and in Oregon Creek below Log Cabin Diversion.

(b)

(b) Stream	Flow (cfs)[1]			Measurement Point
	Jan. 1 to Jun. 30	Jul. 1 to Sept. 30	Oct. 1 to Dec. 31	
Yuba River (below Daguerre Dam)	245	70	400	Over the crest of Daguerre Point Dam and through fishway

[1] Provided that these flows shall be in addition to releases made to satisfy existing downstream water rights.

(c)

Water releases for fish life as specified in paragraphs (a) and (b) of this article shall be subject to the following reduction in any critical dry year, defined as a water year for which the April 1 forecast of the California Department of Water Resources predicts that streamflow in the Yuba River at Smartsville be 50 percent or less of normal:

Yuba River at Smartsville streamflow forecast percent of normal	Reduction in Water Releases for Fish Life, Percent
50	15
45	20
40 or less	30

However, in no event shall releases for fish life below Daguerre Point Dam be reduced to less than 70 cfs. The critical dry year provisions herein shall be effective from the time the aforesaid forecast is available until the April 1 forecast of the following year.

(d)

In addition to maintaining winter minimum water releases for fish life in Yuba River below Daguerre Point Dam, as specified in paragraphs (b) and (c) of this article, the Licensee shall maintain uniform and continuous releases from Englebright Dam within the limits of the following schedule:

Period	Releases (cfs)[1]	Measurement Point
Oct. 16 to 31	600-1,050	New gaging station to be built downstream from the two Narrows powerhouses.
November	600-700	
December	600-1,400	
Jan. 1 to 15	1,000-1,850	
Jan. 16 to Mar. 31	600	

Provided that:

A. Variations from this schedule are permissible during emergencies, uncontrollable flood flows, and critical dry year curtailments.

B. With the exception of emergencies, releases required by U.S. Army Corps of Engineers flood control criteria, releases required to maintain a flood control buffer or for other flood control purposes, bypasses of uncontrolled flows into Englebright Reservoir, uncontrolled spilling, or uncontrolled flows of tributary streams downstream of Englebright Dam, Licensee shall make reasonable efforts to operate New Bullards Bar Reservoir and Englebright Reservoir to avoid fluctuations in the flow of the lower Yuba River downstream of Englebright Dam, and daily changes in project operations affecting releases or bypasses of flow from Englebright Dam shall be continuously measured at the USGS gage at Smartsville, and shall be made in accordance with the following conditions:

   i. Project releases or bypasses that increase streamflow downstream of Englebright Dam shall not exceed a rate of change of more than 500 cfs per hour.

   ii. Project releases or bypasses that reduce streamflow downstream of Englebright Dam shall be gradual and, over the course of any 24-hour period, shall not be reduced below 70 percent of the prior day's average flow release or bypass flow.

   iii. Once the daily project release or bypass level is achieved, fluctuations in the streamflow level downstream of Englebright Dam due to changes in project operations shall not vary up or down by more than 15 percent of the average daily flow.

   iv. During the period from September 15 to October 31, the licensee shall not reduce the flow downstream of Englebright Dam to less than 55 percent of the maximum five-day average release or bypass level that has occurred during that September 15 to October 31 period or the minimum streamflow requirement that would otherwise apply, whichever is greater.

   v. During the period from November 1 to March 31, the licensee shall not reduce the flow downstream of Englebright Dam to less than the minimum streamflow release or bypass established under (iv) above; or 65 percent of the maximum five-day average flow release or bypass that has occurred during that November 1 to March 31 period; or the minimum streamflow requirement that would otherwise apply, whichever is greater.

Article 34. The Licensee shall maintain a minimum pool in New Bullards Bar Reservoir at Elevation 1,730 ft.

Article 40. Consistent with the primary purpose of the power intakes in the New Bullards Bar Dam, the Licensee shall operate, within limits of the project, the multiple-level power intakes in New Bullards Dam to provide water of suitable quality in the Yuba River downstream from the New Narrows Power Plant for the production of anadromous fish as may be prescribed by the Commission upon the recommendations of the Director of the CDFG and the USFWS.

Article 46. The Licensee shall operate the project reservoirs for flood control in accordance with rules prescribed by the secretary of the Army, such rules to be specified in a formal agreement between the Licensee and the District Engineer, U.S. Army Engineers District, Sacramento, California. Said agreement shall be subject to review from time to time at the request of either party; provided, however, that a different procedure of review may be prescribed by formal agreement.

For Article 46, YCWA operates New Bullards Bar Reservoir from September 16 to May 31 to comply with Part 208 "*Flood Control Regulations, New Bullards Bar Dam and Reservoir, North Yuba River, California*," pursuant to Section 7 of the Flood Control Act of 1944 (58 Stat. 890). Under the contract between the United States and YCWA that was entered into on May 9, 1966,

YCWA agreed to reserve in New Bullards Bar Reservoir 170,000 ac-ft of storage space for flood control in accordance with rules and regulations enumerated in Appendix A of the Report on Reservoir Regulation for Flood Control (USACE 1972). The seasonal flood storage space allocation schedule is presented in Table 4.1-4 (specified values are for the end of each month).

Table 4.1-4. New Bullards Bar Reservoir flood storage space allocation in thousands of ac-ft.

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Storage Allocation	170	170	170	170	170	170	70	0	0	0	0	56

In addition to reservation of flood control space in New Bullards Bar Reservoir, the flood control regulations include rules governing ramping rates as well as target maximum flows in the Yuba River downstream of Englebright Dam and in the Feather River downstream of the confluence with the Yuba River.

YCWA also coordinates operations with PG&E's Narrows 1 Powerhouse downstream of Englebright Dam to use storage in Englebright Reservoir to capture winter storm freshets and reduce storm flows on the Yuba River. This operation is accomplished by evacuating storage space in Englebright Reservoir in anticipation of storm peak flows.

4.1.5.2 Measures in Other Licenses, Agreements and Contracts that Affect Operations

In addition to the current FERC license requirements, licenses, agreements and contracts include various streamflow-related requirements, which are summarized below. These licenses, agreements and contracts, and terms and conditions in them, affect Project operations, but are not part of the existing FERC license.

4.1.5.2.1 Lower Yuba River Accord (no expiration date in SWRCB Corrected Order Water Right 2008-0014)

As stated above, YCWA has operated the Project in compliance with the Yuba Accord since 2006. Please see Section 2.3.1 and Section 3.1.5.2.1 in the Applicant-Prepared Draft BA for a description of the Lower Yuba River Accord.

4.1.5.2.2 YCWA's Water Rights for Power (No Expiration Date)

YCWA holds pre-1914 appropriative rights dating from 1897 and post-1914 appropriative water rights confirmed by water-right licenses, for the purposes of operating the Project for hydroelectric power generation. Table 4.1-5 lists the post-1914 appropriative water-right licenses held by YCWA for power generation.

Table 4.1-5. Water right licenses held by YCWA for operation of the Project for power generation.

Priority (date)	SWRCB Designation (application)	SWRCB Designation (license)	Source (Waterbody)	Amount & Place of Diversion or Storage (amount & place)		Season (period)		Place of Beneficial Use (powerhouse)
2/11/1921	2197	435	North Yuba River	700 cfs at New Bullards Bar Dam		1/1 - 12/31		New Colgate Powerhouse
				5,000 ac-ft/yr at New Bullards Bar Dam		about 12/15 to about 7/15		
9/7/1922	3026	436	North Yuba River	10,000 ac-ft/yr at New Bullards Bar Dam		about 12/15 to about 7/15		New Colgate Powerhouse
4/30/1926	5004	777	North Yuba River	15,000 ac-ft/yr at New Bullards Bar Dam		about 12/15 to about 7/15		New Colgate Powerhouse
7/30/1927	5631	11565	Middle Yuba River	810 cfs at Our House Dam	490,000 ac-ft/yr storage in New Bullards Bar Res	1/1-12/31 (dir. div.)	10/15 to 6/30 (stor.)	New Colgate Powerhouse and Narrows 2 Powerhouse
			Oregon Creek	240 cfs at Log Cabin Dam		1/1-12/31 (dir. div.)		
			North Yuba River	1,800 cfs at New Bullards Bar Dam		11/1-7/31 (dir. div.)		
			Yuba River	1,800 cfs at USACE's Englebright Dam		1/1- 12/31		
3/1/1939	9516	3050	North Yuba River	100 cfs at New Bullards Bar Dam		1/1 - 12/31		New Colgate Powerhouse
9/12/1941	10282	5544	North Yuba River	5,335 ac-ft/yr at New Bullards Bar Dam		about 10/1 to about 3/1		New Colgate Powerhouse
								Narrows 2 Powerhouse
2/20/1953	15205	11566	Middle Yuba River	3,200 ac-ft/yr at Log Cabin Dam; storage in New Bullards Bar Res.		5/1- 6/30		New Colgate Powerhouse and Narrows 2 Powerhouse
			North Yuba River	245 cfs and 700 ac-ft/yr at New Bullards Bar Dam		3/15- 6/15 (dir. div.); 5/1- 6/30 (stor.)		
			Yuba River	800 cfs at USACE's Englebright Dam		11/1-7/15		
10/2/1953	15563	11567	Middle Yuba River	30,000 ac-ft/yr at Our House Dam	all storage in New Bullards Bar Res.	10/15 - 6/30		New Colgate Powerhouse and Narrows 2 Powerhouse
			Oregon Creek	1,400 ac-ft/yr at Log Cabin Dam		10/15 - 6/30		
			North Yuba River	146,000 ac-ft/yr at New Bullards Bar Dam		10/15 - 6/30		
			Yuba River	910 cfs at USACE's Englebright Dam		11/1 - 6/30		

YCWA operates the Project consistent with the terms and conditions of the above water rights.

4.1.5.2.3 Water Supply Deliveries

Within the Project Area, YCWA pumps some water directly from New Bullards Bar Reservoir to supply water to the Cottage Creek Water Treatment Plant for domestic and recreational uses adjacent to the reservoir. The amount of this pumping averages approximately 6 ac-ft per year,

which does not affect Project operations. YCWA anticipates that pumping of this small amount of water will continue during the period of the new license.

Downstream of the Project, water is diverted under YCWA's consumptive-use water-right permits to eight water users, which are collectively referred to as the YCWA Member Units. The places of water delivery to YCWA's Member Units are listed in Table 4.1-6. The YCWA Member Unit service areas are shown in Figure 4.1-15.

Table 4.1-6. YCWA's annual contract amounts and places of delivery.

Member Unit	Water Right Based Supply (ac-ft)	Project Based Supply (ac-ft)	Total Contract (ac-ft)
BROWNS VALLEY IRRIGATION DISTRICT PUMPLINE DIVERSION FACILITY			
Browns Valley Irrigation District	24,505	9,500	34,005
SOUTH YUBA CANAL			
Brophy Water District	--	86,870	86,870
South Yuba Water District	--	54,307	54,307
Dry Creek Mutual Water Company	--	17,751	17,751
Wheatland Water District	--	40,230	40,230
HALLWOOD-CORDUA CANAL			
Cordua Irrigation District	60,000	24,000	84,000
Hallwood Irrigation Company	78,000	11,208	89,208
Ramirez Water District		30,389	30,389
Total	**162,505**	**274,255**	**436,760**

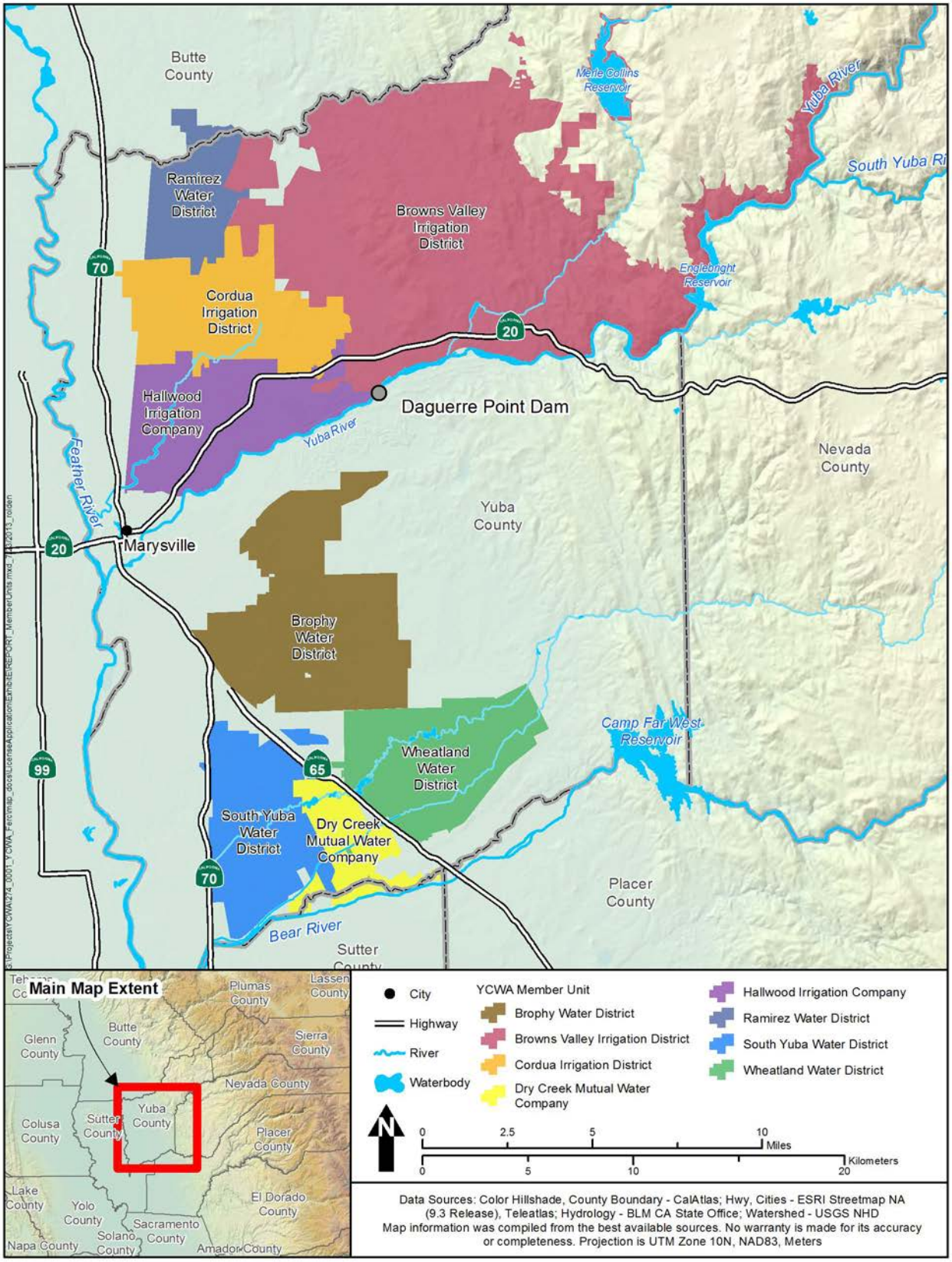

Figure 4.1-15. YCWA's Member Unit service areas.

Browns Valley Irrigation District (BVID) receives water at the Pumpline Diversion Facility, located 1 mile upstream of Daguerre Point Dam. Brophy Water District (BWD), South Yuba Water District (SYWD), Dry Creek Mutual Water Company (DCMWC) and Wheatland Water District (WWD) receive water from the South Yuba Canal (South Canal), which begins on the south side of the Yuba River slightly upstream of the south abutment of Daguerre Point Dam. Cordua Irrigation District (CID), Hallwood Irrigation Company (HIC) and Ramirez Water District (RWD) receive water through the Hallwood-Cordua Canal (North Canal), located on the north abutment of Daguerre Point Dam.

BVID, HIC and CID have their own water rights on the Yuba River. Under settlement contracts with YCWA, BVID, HIC and CID receive surface water supplies as part of Project operations that are based on these Member Unit water rights. All eight of the Member Units receive contracted Project supplies that are not water right based. Dry year deficiency criteria in the BVID, HIC and CID contracts are different from the deficiency criteria in YCWA's contracts with other member units. Provisions in YCWA's water-right settlement contracts preclude deficiencies in water-right based supplies unless DWR April forecast of unimpaired runoff, as measured at the Smartsville gage, is less than 40 percent of average. No deficiencies in such deliveries may be imposed on BVID. Contract shortage provisions are presented in Table 4.1-7.

Table 4.1-7. YCWA's water supply contract shortage provisions.

Category	Trigger for Reduced Contract Allocation [1]	Percentage of Settlement/ Contract Allocation Available
PRE-1914 RIGHTS SETTLEMENT WATER RIGHT BASED SUPPLY		
Browns Valley Irrigation District	All	100%
Cordua Irrigation District Hallwood Irrigation Company	$f \geq 40\%$	100%
	$f < 40\%$	80%
YCWA CONTRACT SUPPLY		
	$f > 85\%$	100%
	$40\% < f \leq 85\%$	75%
	$f < 40\%$	Determined annually by Licensee in its reasonable discretion considering forecasted runoff and operational conditions.

[1] April 1 DWR forecast of unimpaired Yuba River runoff near Smartsville in percentage of 50-year average.

YCWA's contract volumes are based on the gross acreage served by each Member Unit. The maximum "Base Project Water" allocation is computed by multiplying 90 percent of the gross acreage by 2.87 ac-ft per ac. The maximum "Supplemental Water Supply" is computed by multiplying 90 percent of the gross acreage by 2.13 ac-ft per ac. For Member Units that have water rights senior to YCWA's, their contract allocations are based on their water right amounts.

In 2009, YCWA started providing water to the WWD under a water service contract. Until then, water users within WWD relied solely on groundwater for irrigation. The Wheatland Project now conveys surface water, diverted by YCWA at Daguerre Point Dam, to WWD through the South Canal system. The Wheatland Project is being constructed in two phases. Phase 1, which was completed in 2009, provides for delivery of surface water to WWD and the immediate irrigation of approximately 7,750 ac of the approximately 9,200 ac that will be served upon the completion of both phases. Under Phase 1, WWD's contract with YCWA provides for a total

allocation (base and supplemental) of 23,092 ac-ft per year. Phase 2, which is now mostly complete, will allow for a total allocation (base and supplemental) of 40,230 ac-ft per year.

4.1.5.2.4 YCWA Water Transfers

Water transfers are an important component of the Project operations. In the 30 years from 1987 through 2016, YCWA transferred water in 22 years, averaging about 90,950 thousand ac-ft in each transfer year. Details of individual transfers are presented in Table 4.1-8. Stored water transfers were made by YCWA from storage releases from New Bullards Bar Reservoir. Groundwater substitution transfers were made by YCWA in coordination with its Member Units.

Table 4.1-8. YCWA historical sales from 1987 to 2016.

Year	Water Year Type Sacramento Valley 40-30-30 Index	Buyer	Stored Water Transfer (ac-ft)	Groundwater Substitution Transfer (ac-ft)
1987	Dry	California Department of Water Resources	83,100	--
1988	Critical	California Department of Water Resources	135,000	--
1989	Dry	California Department of Water Resources	90,000	--
		California Department of Water Resources for California Department of Fish and Game	110,000	--
1989 (cont.)	Dry (cont.)	City of Napa	7,000	--
		East Bay Municipal Utility District	60,000[1]	--
1990	Critical	City of Napa	6,700	--
		California Department of Water Resources	109,000	--
		Tudor Mutual Water Company/Feather Water District	2,951	--
1991	Critical	State Water Bank	99,200[2]	84,840
		State Water Bank - California Department of Fish and Game	28,000	--
		City of Napa	7,500	--
1992	Critical	State Water Bank	30,000[3]	--
1994	Critical	California Department of Water Resources	--	26,033
1997	Wet	Bureau of Reclamation for Refuge Water	25,000[4]	--
		Sacramento Area Flood Control Agency for American River Fishery	48,857	--
2001	Dry	Environmental Water Account	50,000[5]	--
		California Department of Water Resources	52,912	61,140
2002	Dry	Environmental Water Account	79,742	55,248
		California Department of Water Resources	22,050	--
		Contra Costa Water District	5,000	--
2003	Above Normal	Environmental Water Account	65,000[6]	--
		Contra Costa Water District	5,000	--
2004	Below Normal	Environmental Water Account	100,000[6]	--
		California Department of Water Resources	487	--
2005	Above Normal	Environmental Water Account	60,866	--
2006	Wet	Environmental Water Account	60,000[1]	--
2007	Dry	Yuba Accord Water Purchase Participants	65,000[6,7,8]	--
2008	Critical	Yuba Accord Water Purchase Participants	117,212[6]	48,875
2009	Dry	Yuba Accord Water Purchase Participants	91,100[6,7]	88,901[10]
2010	Below Normal	Yuba Accord Water Purchase Participants	74,179[6,7]	66,211
2012	Below Normal	Yuba Accord Water Purchase Participants	81,681[6,7]	--
2013	Dry	Yuba Accord Water Purchase Participants	112,419[6,7]	64,730[11]
2014	Critical	Yuba Accord Water Purchase Participants	104,663[6,7]	56,984[12]

Table 4.1-8. (continued)

Year	Water Year Type Sacramento Valley 40-30-30 Index	Buyer	Stored Water Transfer (ac-ft)	Groundwater Substitution Transfer (ac-ft)
2015	Critical	Yuba Accord Water Purchase Participants	59,131	30,000
2016	Below Normal	Yuba Accord Water Purchase Participants	60,000	
		Total	**2,108,750**	**582,962**

[1] Sold but not delivered.
[2] In 1991, BVID transferred an additional 5,500 ac-ft to the State Water Bank through conservation.
[3] In 1992, BVID transferred an additional 5,500 ac-ft to the State Water Bank through conservation.
[4] In 1997, the transfer included 5,000 ac-ft from BVID.
[5] In 2001, BVID transferred an additional 4,500 ac-ft to DWR (stored water transfer) and 3,500 ac-ft to the Environmental Water Account (EWA) (groundwater substitution pumping).
[6] In 2002, 2003, 2007, 2008, 2009, 2010, 2012, 2013, 2014, and 2015 BVID transferred an additional 3,100 ac-ft to the Santa Clara Valley Water District through conservation.
[7] Transfers to the Yuba Accord Water Purchase Participants include 60,000 ac-ft of stored water for the EWA.
[8] The 2007 transfer was under Yuba Accord Pilot Program. It also included 60,000 ac-ft of transfer to the EWA purchased in 2006.
[9] Sacramento Valley Index as defined in SWRCB RD-1641.
[10] In 2009, CID transferred an additional 8,322 ac-ft of groundwater substitution transfer to the DWR Drought Water Bank.
[11] In 2013, CID transferred an additional 7,774 ac-ft of groundwater substitution transfer to the DWR Drought Water Bank.
[12] In 2014, CID transferred an additional 1,976 ac-ft of groundwater substitution transfer to the DWR Drought Water Bank.

Historically, before implementation of the Yuba Accord, individual 1-year stored water transfers occurred when the projected end-of-September storage in New Bullards Bar Reservoir was sufficient for YCWA to reasonably ensure full local water supplies from the Project in the following year. In addition, for cross-Delta water transfers to service areas south of the Delta, the Delta must be in balanced water conditions[18] and available conveyance capacity must exist at the State Water Project's Harvey O. Banks Pumping Plant or the Central Valley Project's C.W. Jones Pumping Plant, both located near in Tracy, CA to convey the transfer water to willing buyers. Stored water transfers have typically occurred from July through September. Under the Yuba Accord, transfer releases can occur throughout the year as part of the releases to meet the Accord flow schedules and end-of-September target storage in New Bullards Bar Reservoir, but transfer water is conveyed across the Delta in the summer months.

4.2 YCWA's Proposal

Provided below is a description of YCWA's proposed Project. This section describes YCWA's proposed Project facilities (Section 4.2.1); 2) YCWA's proposed FERC Project Boundary (Section 4.2.2); 3) YCWA's proposed Project operations (Section 4.2.3); and 4) YCWA's proposed environmental measures that would be part of the new FERC license (Section 4.2.4).

4.2.1 Proposed Project Facilities

YCWA does not propose to add to the Project any previously constructed, unlicensed water power structures or facilities.

[18] Balanced water conditions are periods when it is agreed that releases from upstream reservoirs plus unregulated flows approximately equal the water supply needed to meet Sacramento Valley in-basin uses plus required Delta outflows and exports (USBOR and DWR 1986).

4.2.1.1 Generation Facilities

4.2.1.1.1 New Colgate Powerhouse New Tailwater Depression System

Anticipated Facilities

YCWA proposes to add to the Project a new Tailwater Depression System (TDS) at the New Colgate Powerhouse.

The New Colgate Powerhouse generators are driven by six-jet, vertical-shaft Pelton wheel turbines. The turbine runners rotate in the air of the turbine discharge chambers where water can fall freely off the turbine buckets. When the water level in the turbine discharge chamber rises, the foam and backsplash cause uneven resistance to free rotation with resulting vibration. Consequently, the rate of water release must be reduced and, at high stages, the operation of the turbines must cease.

The water level in the turbine discharge chambers rises as the water level in the Yuba River rises during flood events. The flood runoff can come from spillway releases at New Bullards Bar Dam, unregulated flow downstream of the dam and the Middle Yuba River. Above certain water levels at the powerhouse, when Yuba River flow upstream of the New Colgate Powerhouse reaches approximately 11,000 cfs (a WSE of about 555 ft), there is a corresponding reduction in the permissible flow through the New Colgate Powerhouse, which allows the release of water from New Bullards Bar Reservoir through the powerhouse from the power intake, which is at a lower level than the existing spillway elevation. This in turn reduces the ability to move water, which could encroach upon the available flood storage space in the reservoir. For example, if the New Colgate Powerhouse were totally shut down for 72 hours prior to and during a period of peak flood inflow to New Bullards Bar Reservoir, there would be a loss of over 20,000 ac-ft of useable storage.

The New Colgate Powerhouse TDS will introduce compressed air into the turbine discharge chamber to lower the tailwater to a level that does not interfere with turbine operation, thereby allowing continued turbine operation during high flows. The TDS will enhance the ability to regulate flood releases from New Bullards Bar Reservoir and increase the production of energy.

Figures 4.2-1 through 4.2-3 are concept-level plan and profile drawings of the New Colgate Powerhouse TDS. If approved, detailed drawings would be provided to the Commission as appropriate for FERC approval. After construction is completed, detailed as-built drawings would be filed with the Commission as Project Exhibit Drawings.

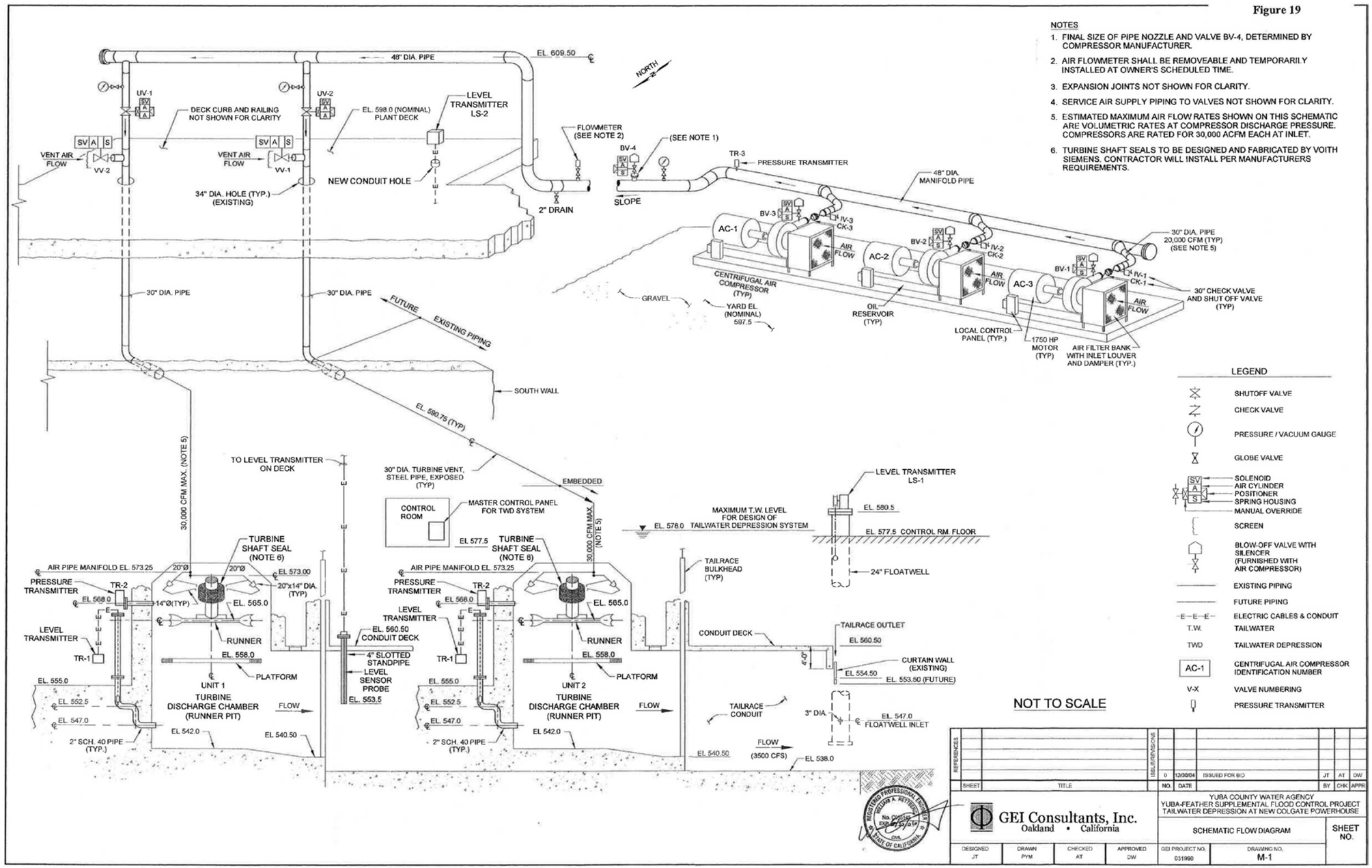

Figure 4.2-1. Concept-level plan schematic flow diagram for YCWA's proposed New Colgate Powerhouse TDS.

Figure 20

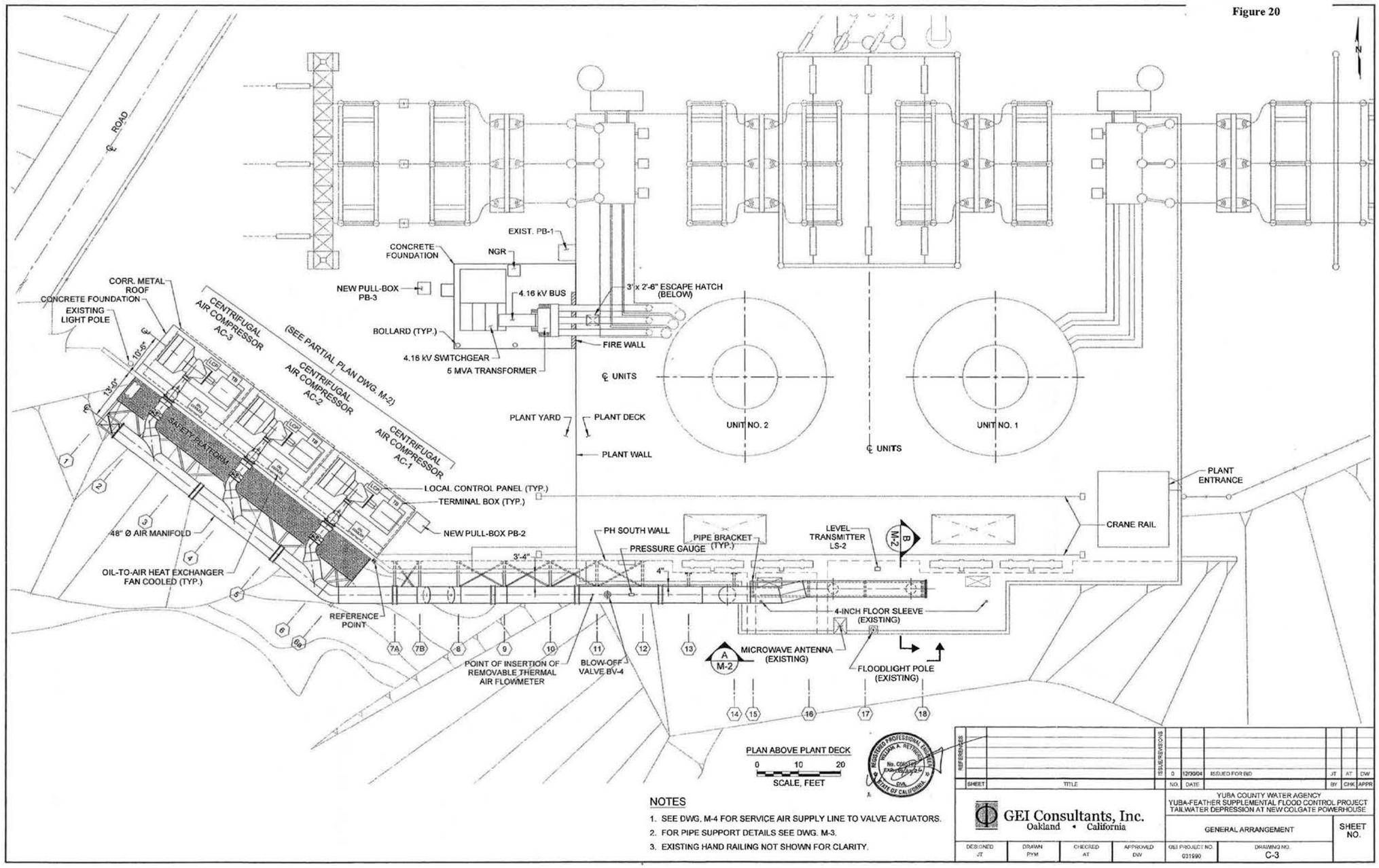

Figure 4.2-2. Concept-level plan for general arrangement for YCWA's proposed New Colgate Powerhouse TDS.

Figure 21

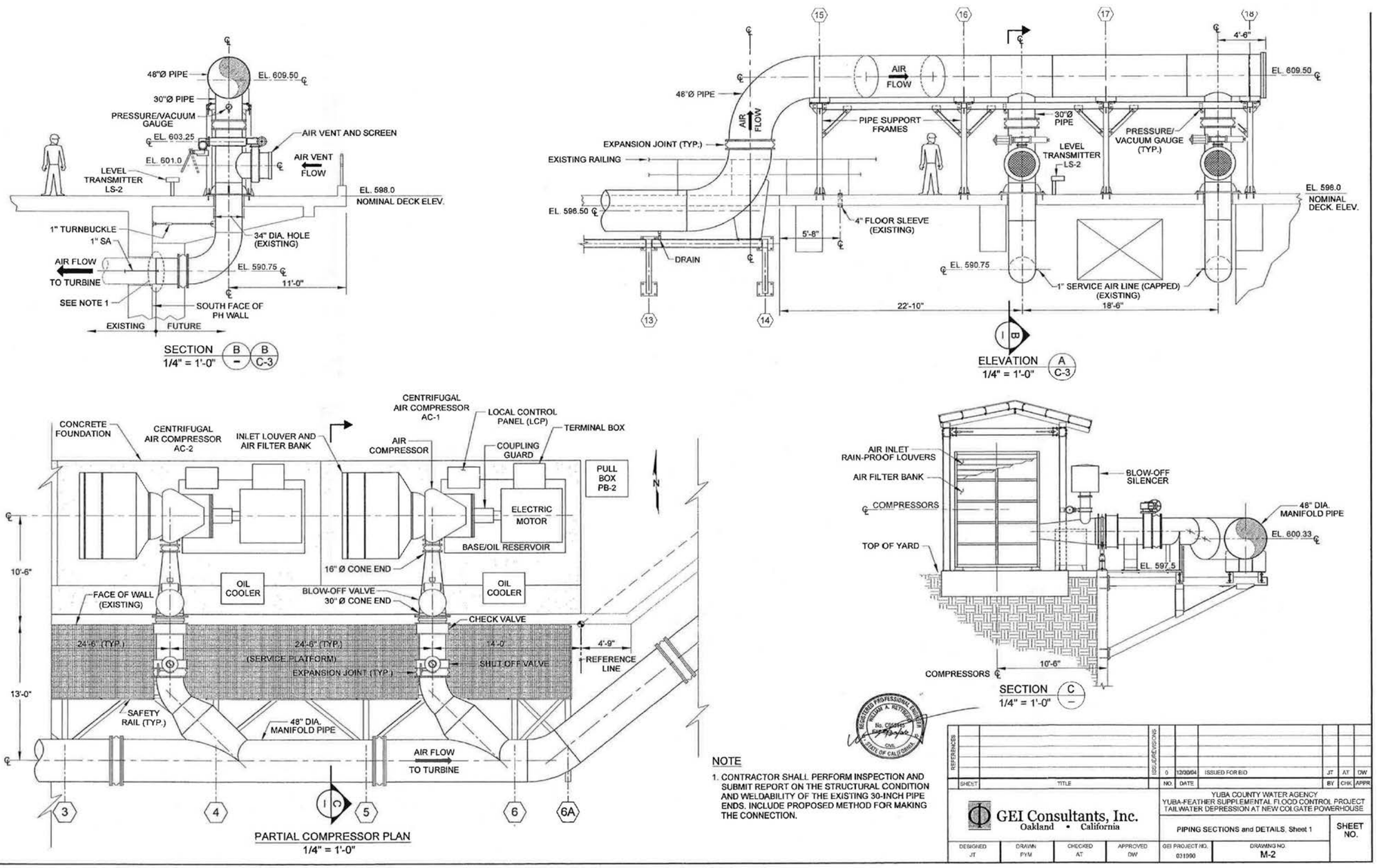

Figure 4.2-3. Concept-level plan for piping sections and details for YCWA's proposed New Colgate Powerhouse TDS.

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Anticipated Operations

The proposed TDS would only operate during high flow events, when the combined releases from New Bullards Bar and flows from the Middle Yuba River would otherwise preclude New Colgate Powerhouse operations. When the WSE of flows in the New Colgate Powerhouse tailrace rises to an elevation of 555 ft, which corresponds to approximately 11,000 cfs of flow upstream of the New Colgate Powerhouse, the first compressor would be started, and would be modulated to fully open as needed. The second compressor would be started when the WSE in the tailrace reaches an elevation of 556 ft (having been lowered by the first compressor startup) and would be modulated to fully open, as needed. If necessary, the third compressor would be started when water level inside the tailrace conduit again reaches an elevation of 556 ft. Modulation of each compressor would maintain a WSE in the tailrace within a range of 554 ft and 556 ft. If only one unit is running, compressed air will still be discharged into both units. If the tailwater elevation continues to rise above elevation 556 ft with all three compressors operating at maximum pressure, plant operators would either reduce unit load, or shut the units down. As the tailwater recedes, the compressors would be shut down in reverse sequence to their startup, as the tailrace elevation drops to elevations below 556 ft. Typical duration of operation of the TDS is expected to be less than or equal to the historical duration of spills at New Bullards Bar Dam, which occurs an average of approximately 21 days per year.

The compressors have been sized to allow the plant to operate under flows similar to those observed in the January 1997 flood event where the maximum river stage at the New Colgate Powerhouse was at an elevation of 578 ft. The powerhouse has been assessed as being "flood proof" for a maximum tailwater elevation of 583 ft (YCWA 2004). There were 16 generation curtailment events between 1971 and 2016 that would have benefitted from the TDS. The cumulative loss of power generation during these 16 events was nearly 250,000 MWh, or approximately 5,560 MWh per year.

Addition of the New Colgate Powerhouse TDS would have an effect on New Bullards Bar Reservoir operations during flood operations. The proposed TDS would increase New Bullards Bar Reservoir release capacity during flood events when spillway capacity is limited by allowing the New Colgate Powerhouse to continue to operate during high flow events through the injection of compressed air into the New Colgate Powerhouse tailrace when the stage of the Yuba River would otherwise prevent generation. Operating the TDS throughout a flood event would allow for increased releases from New Bullards Bar Reservoir, thus reducing New Bullards Bar Reservoir storage during the flood event, and ultimately reducing the peak flood release.

Other than allowing the New Colgate Powerhouse to operate during high flow events, the proposed TDS would not affect Project operations.

The TDS would include oil containment structures around the base of the air compressors capable of capturing the entire volume of oil in the system, and a condensation system for removing oil mist from the compressed air before it is introduced into the turbine chamber.

Anticipated Construction

The anticipated total duration of the construction is 5 months, commencing after issuance of a new license from the FERC, detailed design, approval of detailed construction plans and acquisition of any additional required permits. It is anticipated that the work will not require a separate outage, but can be accomplished during planned outages. Key activities would include the following:

- Site preparation at powerhouse yard and deck, including construction of equipment foundations and relocation of the New Colgate Powerhouse pedestrian bypass
- Installation of blowers, pipe supports, roofing, air piping and valves
- Installation of power supply, including the tap of the 13.8-kilovolt isolated phase bus, transformer, switchgear and cables to the blowers
- Procurement and installation of turbine shaft seals
- Curtain wall modifications
- Installation of bulkhead shaft seal
- Installation of instrumentation and controls
- System testing and startup including construction and removal of temporary test barrier

All work will occur within the proposed FERC Project Boundary.

The construction labor force is estimated to average about 12 persons over the total construction period. Equipment will be transported to the powerhouse via Highway 20, Marysville Road, and Lake Francis Road, all of which are paved and suitable for the anticipated loads. It is anticipated that not more than 30 trailer ("*low boy*") truck roundtrips will be required to bring the blower skids, transformer, other electrical gear, pipe, structural steel and other heavy materials and equipment. About 15 to 20 truckloads of ready-mixed concrete may be needed for equipment pads, foundations and curbs. No changes in road conditions are anticipated as a result of the work.

At the site, typical heavy construction equipment will include an excavator (backhoe), an air compressor, one or two trucks, two truck-mounted cranes, pickup trucks, a construction office trailer and miscellaneous equipment. Smaller equipment will include hoists and platforms, concrete placing and drilling equipment, a welding machine, pipe fitting equipment, and other miscellaneous equipment customary to the electrical, mechanical and structural crafts.

No borrow areas are anticipated to be required because the work does not entail significant earthwork. It is expected that the available space within the fenced plant area will be sufficient for laydown and staging of materials and equipment. All work will be confined to the powerhouse, yard and immediate vicinity. No undisturbed areas are anticipated to be disturbed as a result of the work.

4.2.1.2 Non-Generation Facilities

4.2.1.2.1 New Bullards Bar Dam New Auxiliary Flood Control Outlet

Anticipated Facilities

YCWA proposes to construct a new Auxiliary Flood Control Outlet on New Bullards Bar Dam, to be located south of the existing New Bullards Bar Dam spillway in the upper left abutment area of the dam. The primary benefit of the new Auxiliary Flood Control Outlet is increased flood management. This increased flexibility in flood management would allow a significant reduction in flood flows and reduced flood stage at Marysville and the Feather River confluence. It would also anticipate potential FERC requirements for increased spillway capacity at New Bullards Bar Dam in response to Potential Maximum Flood (PMF) calculation revisions or climate change modeling. As configured at this time, the new outlet would have a discharge capacity at the bottom of the New Bullards Bar flood pool (elevation 1,918 ft) and at the NMWSE of approximately 45,000 cfs and 66,000 cfs, respectively. The outlet would include:

- An excavated approach channel to the intake structure, with right and left wing walls.
- A reinforced-concrete intake control structure at the end of the approach channel containing intake gates and hydraulic hoists. The intake would be a 70-ft-wide reinforced-concrete structure extending from the approach channel invert at elevation 1,865 ft to a deck at elevation 1,970 ft. It would be located in a rock excavation at the downstream end of the approach channel. The intake structure would have three 17-ft-wide, 30-ft-high gate openings separated by 4.5-ft wide concrete piers. The gates would be roller-type gates operated by hydraulic cylinders. The gates would be operated using hydraulic cylinders installed on the top deck.
- Intake area site works including a fenced, paved parking area adjacent to the intake structure deck, access to Marysville Road, and riprap erosion protection of the finished slopes.
- A 540-ft-long concrete-lined conveyance tunnel. The tunnel would be concrete-lined and horseshoe-shaped, with net opening dimensions of 25 ft in height by 26 ft in width.
- A concrete outlet structure including the tunnel outlet portal, a 60-ft-long open channel and 27-ft-long flip-bucket energy dissipater at the end of the open channel, which would deflect the discharging water jet away from the foundation area and toward the river canyon. The flip-bucket structure would be founded and bolted to rock to resist the hydrodynamic forces and vibrations. A cutoff would be provided to protect the flip bucket foundation from scour. The area between the flip bucket and the river would be cleared of all vegetation, overburden and loose weathered rock down to sound rock.
- A 2,900-ft-long construction access road from an existing forest road to the outlet structure.
- Power supply to the intake for operation and control of the gates.

Figure 4.2-4 shows concept-level plan and profile drawings of the new Auxiliary Flood Control Outlet. If approved, detailed drawings would be provided to the Commission as appropriate for FERC approval. After construction is completed, detailed as-built drawings would be filed with the Commission as Project Exhibit Drawings.

Anticipated Operations

The proposed new Auxiliary Flood Control Outlet would allow for releases from New Bullards Bar Dam when the WSE is below the existing New Bullards Bar Dam spillway in anticipation of large storm events, and would increase New Bullards Bar Dam's exiting release capacity during high flow events. The proposed Auxiliary Flood Control Outlet would be operated under two situations:

- The new Auxiliary Flood Control Outlet would be operated if a large storm event is forecasted to occur within the near future, and the combination of New Bullards Bar Reservoir storage and the contributing watershed to New Bullards Bar Reservoir are in a state in which the storm event would necessitate very large releases from New Bullards Bar Reservoir. Under this scenario, the proposed Auxiliary Flood Control Outlet would be used to make releases from New Bullards Bar Reservoir in anticipation of the storm event, to reduce the subsequent required peak release from the reservoir.

- If a large storm event is forecasted to occur within the near future, and there is a concern that the required peak release from New Bullards Bar Dam would coincide with the peak release from Oroville Reservoir, the proposed Auxiliary Flood Control Outlet would be used to make releases from New Bullards Bar Reservoir in anticipation of the storm event so the peak flow from New Bullards Bar Reservoir would occur at an earlier time than it would otherwise would have occurred to allow for better management of flood operations from Oroville Reservoir.

While the Auxiliary Flood Control Outlet is included in the simulation of the proposed Project in the Operations Model, only its increased release capacity during spill events is included in the proposed Project simulation. YCWA flood management operations of anticipatory releases through the Auxiliary Flood Control Outlet or flood management-related releases when storage is below the USACE flood reservation space are not included in modeling of the proposed Project. Those operations would be determined based on a number of real-time factors, including upstream snow-pack and forecasted storm intensity that are not included in the Operations Model. Modeling of the proposed Project to augment the existing New Bullards Bar Dam spillway capacity indicates the Auxiliary Flood Control Outlet could be used each time New Bullards Bar Reservoir spill operations are needed, but the existing capacity is adequate for all low-to-medium intensity storm events so the release from the dam can be made through either outlet. The modeling results show that the Auxiliary Flood Control Outlet additional release capacity and release capacity at a lower water-surface elevation would only be needed during very large storm events, or in roughly 8 out of 41 years. Any pre-emptive releases associated with the Forecasted Coordinated Operations program would likely be made using the Auxiliary Flood Control Outlet in even fewer occurrences than the 8 in 41 years.

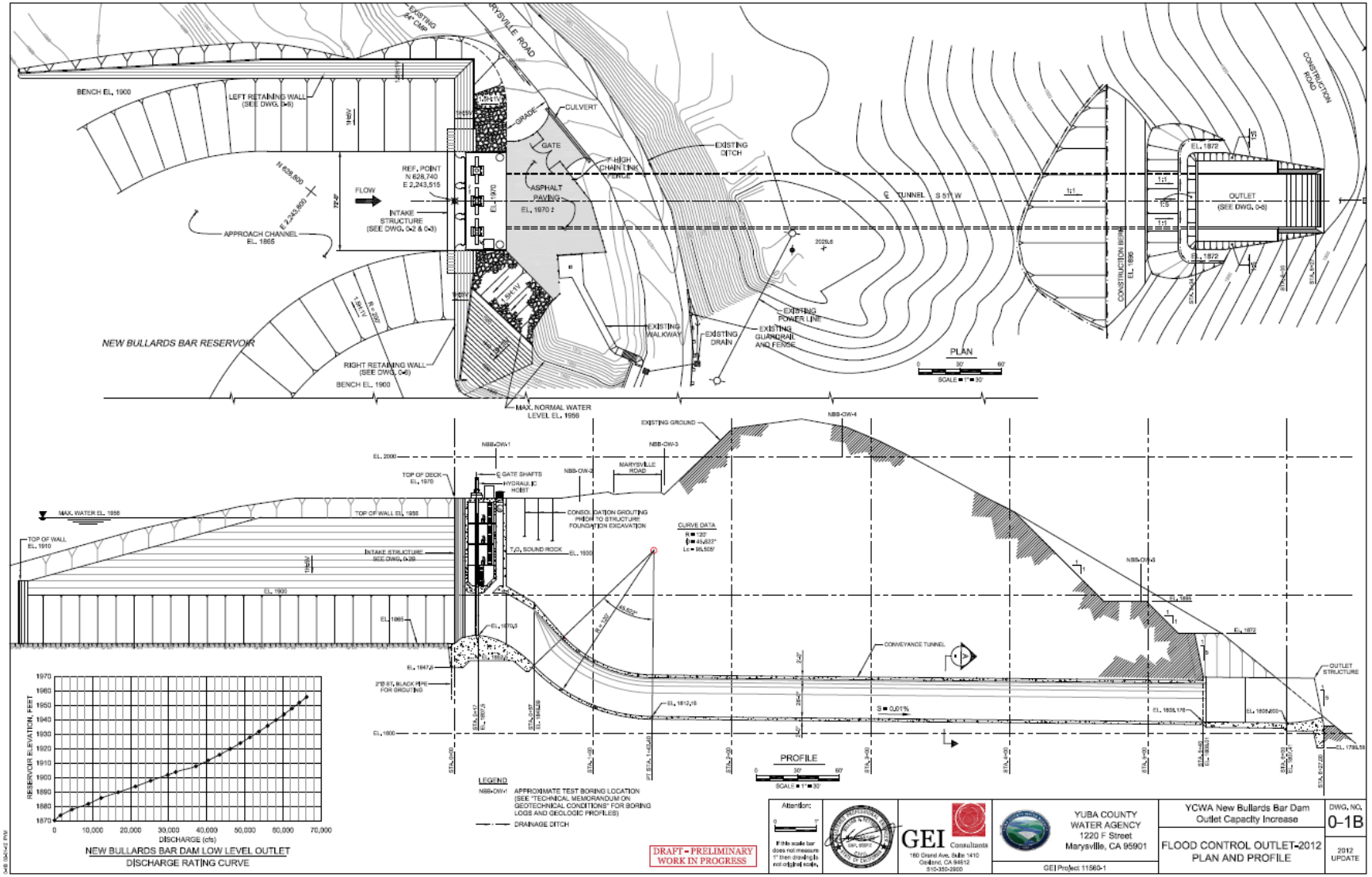

Figure 4.2-4. Concept-level plan and profile for YCWA's proposed New Bullards Bar Dam Auxiliary Flood Control Outlet.

Other than reducing the peak flow rate during storms, or shifting the peak release to an earlier time, the proposed Auxiliary Flood Control Outlet would not affect Project operations.

Anticipated Construction

Outlet construction would require excavation in the upper left abutment area of the dam site. To serve tunnel construction, a construction access road would be built from the left abutment area down to the outlet area. Tunnel construction would likely start from the downstream portal and would continue toward the upstream portal using conventional, staged and drill-and-blast excavation methods. Temporary tunnel support would be installed during excavation as needed.

It is anticipated that excavation for the intake structure would be performed concurrently with access road construction and/or tunnel excavation. A natural cofferdam (i.e., *in-situ* soil and rock) would be left in place in the inlet approach channel to protect the construction work and prevent uncontrolled release of reservoir water through the excavation area and tunnel. The natural cofferdam would likely need stabilization and buttressing measures to ensure the site is adequately protected from the reservoir.

After the concrete intake structure is completed, the over-excavated areas would be backfilled with structural fill, and riprap would be placed on the slopes that may be exposed to wave erosion.

The natural cofferdam would be left in place until the tunnel and intake structure are completed and the gates installed. Removal of the cofferdam and construction of the approach channel and inlet training walls would be performed during a low reservoir period (late summer/fall).

Work on all components of the Project including the approach channel, intake structure, tunnel, and outlet structure, would be completed with only temporary disruptions of normal traffic patterns along Marysville Road due to movement of heavy construction equipment (e.g., excavators, haul trucks, concrete trucks and cranes). Some short duration (i.e., 5- to 15-minute) road closures may be required when setting up or unloading large equipment.

<u>Construction Laydown Areas</u>
Laydown/staging areas are temporary facilities utilized during construction activities. Temporary construction facilities would likely include construction offices, worker and equipment parking, equipment maintenance yard, warehouse, fuel tank and fueling pad, aggregate processing plant, concrete batch plant including portable plant, bulk material silos (cement, fly ash), admixtures and aggregate piles, and temporary storage of other construction materials.

Potential laydown areas include: 1) east of visitor parking area adjacent to spillway on YCWA land (~4 acres on YCWA land); 2) flat area on north side of Marysville Road west of quarry on NFS land (~15 acres on NFS land); 3) flat area on south side of Marysville Road south of quarry on private land (~20 acres on private land); 4) southeast of dam along dirt forest road on YCWA land (~16 acres on YCWA land); 5) alongside Marysville Road, east of quarry (~6 acres on YCWA and private land); 6) east side of Marysville Road, east of quarry (1.5 acres on YCWA

and private land); and 7) west side of parking area on right abutment on YCWA land (~2 acres on YCWA land).

Construction Disposal Areas

Disposal areas will be required for the permanent placement of excess excavated materials obtained during construction activities. Material placed in the disposal areas would consist of soil and rock from required excavation, including tunnel muck. Woody debris may also be placed in disposal areas. Material not suited for onsite disposal (e.g., petroleum products, trash and waste) would be hauled to an approved offsite disposal facility.

The estimated total quantity of excavated material, including an appropriate bulking factor, is approximately 300,000 cubic yards (yds^3). The materials obtained from required excavations would primarily consist of soil and metavolcanic rock. Materials from excavation may, in part, be suitable for utilization as backfill, road and yard surfacing, concrete aggregate, and riprap. Some sorting, stockpiling and processing of excavated materials will be required to make them suitable for various intended uses. Excess materials, as well as materials that are unsuitable for reuse in construction, will be placed in the disposal areas.

Potential disposal areas include: 1) east of visitor parking area adjacent to spillway on YCWA land (~4 acres with a capacity of ~80,000 yds^3); 2) old quarry on NFS land and private land (~8 acres and 100,000 yds^3); 3) flat area on north side of Marysville Road west of quarry on NFS land (~15 acres and 100,000 yds^3); 4) flat area on south side of Marysville Road south of quarry on private land (~20 acres and 100,000 yds^3); and 5) southeast of dam along dirt forest road on YCWA land (~16 acres and 100,000 yds^3).

Construction Traffic Considerations

The construction labor force is estimated to average about 30 to 40 persons over an assumed 2-year construction period. Peak manpower could be close to double this number depending on the contractor's schedule. Personnel and equipment would reach the site via Highway 20 or 49 and Marysville Road, which are paved and suitable for the anticipated loads.

Schedule

A possible construction sequence, involving an approximately 5-year construction period is summarized below. The primary long-lead items are the fabricated steel roller gates together with the hydraulic cylinder operators and hydraulic power units. Construction would not begin until after a new FERC license is issued, final designs and construction plans are approved and all necessary permits obtained. Schedule highlights are as follows:

- At this time, it is anticipated that environmental compliance and permitting will take a total of 3 years, and the design will occur concurrently with permitting. Therefore, the total time for these two activities is 3 years. Actual field construction will take no more than 2 years.
- Mobilization would include the setup of construction offices, an aggregate crushing plant and a concrete batch plant; the development of disposal and laydown areas; and the

construction of the access road to the outlet. It is anticipated that these activities may take about 3 months.

- The schedule assumes that YCWA would bid the roller gate package separately from the construction package to expedite the gate procurement. However, the construction contractor could be assigned the procurement contract upon award of the construction contract. The gate procurement cycle, from prime contract award to gate delivery at the site is expected to take 14 months.
- Tunnel excavation would begin after completion of the access road, working from the downstream portal towards the inlet. Rock from tunnel excavation would be hauled to the disposal area, or to a stockpile in a laydown area for later use as concrete aggregate. It is expected that tunnel excavation may take about 4 months.
- Intake structure excavation would be conducted concurrently with construction of the access road and tunnel excavation. The intake excavation is expected to take about 2 to 3 months.
- After tunnel excavation, the reinforced-concrete tunnel lining would be constructed working from the inlet area towards the downstream portal. Once the upstream portion of the tunnel is lined, construction of the intake structure could begin, and could be constructed concurrently with the rest of the tunnel lining. It is anticipated that the tunnel lining and construction of the transition/intake structure would take about 4 to 5 months and 5 to 6 months, respectively.
- The reinforced-concrete outlet channel and flip bucket structure would be constructed after the tunnel lining is completed. This activity is anticipated to take about 3 to 4 months.
- The roller gates would be installed after completion of the intake structure construction. Gate installation is anticipated to take about 2 to 3 months to complete.
- Excavation of the approach channel would be performed once the intake structure is in an advanced stage of completion and the reservoir level is sufficiently low. After the approach channel is excavated, the reinforced concrete training walls and slope protection would be constructed. These activities would take about 4 months to complete.

The above summary schedule assumes that the financing plan for the project is in place before award of the construction contract. Also, seasonal schedule constraints that may be imposed by environmental mitigation requirements are not reflected in the summary above.

Figure 4.2-5 is a concept-level map of the construction area, as anticipated at this time.

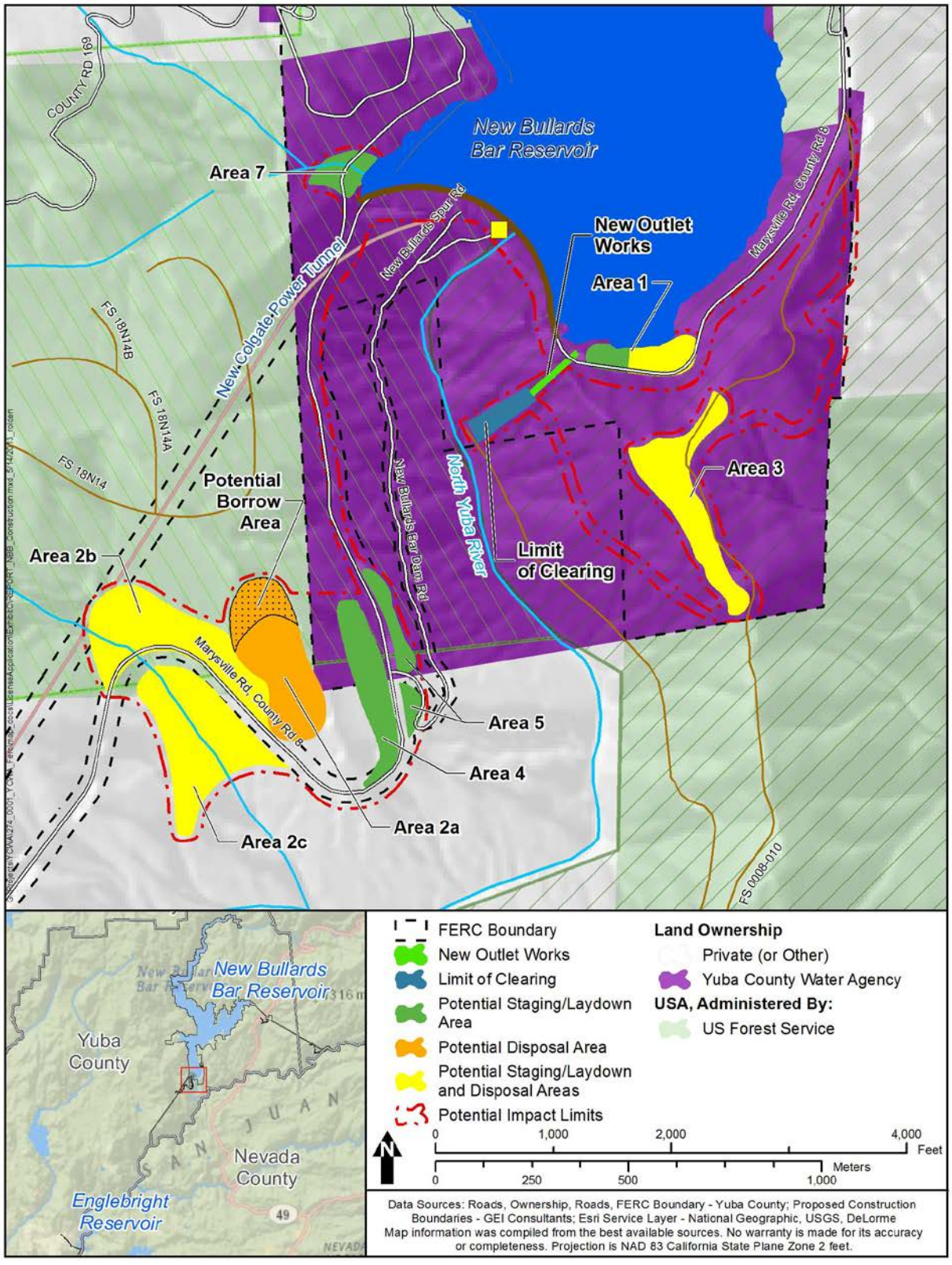

Figure 4.2-5. Concept-level map of construction area for YCWA's proposed New Bullards Bar Auxiliary Flood Control Outlet.

4.2.1.2.2 Modifications to Our House Diversion Dam and Log Cabin Diversion Dam Fish Release Outlets

YCWA proposes to change minimum flows on the Middle Yuba River downstream of Our House Diversion Dam from the requirement in the existing license of 30 - 50 cfs to 40 - 120 cfs, and to change minimum flows on Oregon Creek downstream of Log Cabin Diversion Dam from the requirement in the existing license of between 8-12 cfs to 6-43 cfs (YCWA Proposed Condition AR1, *Maintain Minimum Streamflows Below Our House Diversion Dam and Log Cabin Diversion Dam*, in Appendix E2 of the Amended FLA). Further, YCWA proposes to include in the new license a requirement to control spill at Our House Diversion Dam by releasing up to 600 cfs (YCWA's Proposed Condition AR2, *Control Project Spills at Our House Diversion Dam*, in Appendix E2 of the Amended FLA), and to control spill at Log Cabin Diversion Dam by releasing up to 100 cfs (YCWA's Proposed Condition AR12, *Control Project Spills at Log Cabin Diversion Dam*, in Appendix E2 of the Amended FLA). The proposed flows will exceed the capabilities of the existing fish release outlets (i.e., maximum existing valve capacities are 59 cfs at Our House Diversion Dam and 18 cfs at Log Cabin Diversion Dam). YCWA proposes to increase the capacity at each of these outlets to accommodate the new requirements.

At Our House Diversion Dam, a 68-inch diameter outlet pipe with control valve is proposed to be installed at the same invert elevation as the existing fish release outlet. At Log Cabin Diversion Dam, a 38-inch diameter outlet pipe with control valve is proposed to be installed at the same invert elevation as the existing fish release outlet. The new 68-inch diameter outlet at Our House Diversion Dam is expected to result in an outlet capacity of 611 cfs at minimum head (i.e. upstream water level at tunnel invert elevation of 2015.0 ft); the new 38-inch diameter outlet at Log Cabin Diversion Dam is expected to result in an outlet capacity of 106 cfs at minimum head (i.e. upstream water level at tunnel invert elevation of 1952.0 feet). The existing fish release outlets at Our House and Log Cabin diversion dams will remain in place and be able to release at the their existing capacities (i.e., 59 and 18 cfs, respectively). The new fish release outlets at the dams will not affect the existing low level outlets at the dams.

Figures 4.2-6 and 4.2-7 are concept-level plan and profile drawings of the modifications to the existing fish release outlets. Construction is described in Exhibit C of the Amended FLA. If approved, detailed drawings would be provided to the Commission as appropriate for FERC approval. After construction is completed, detailed as-built drawings would be filed with the Commission as Project Exhibit Drawings.

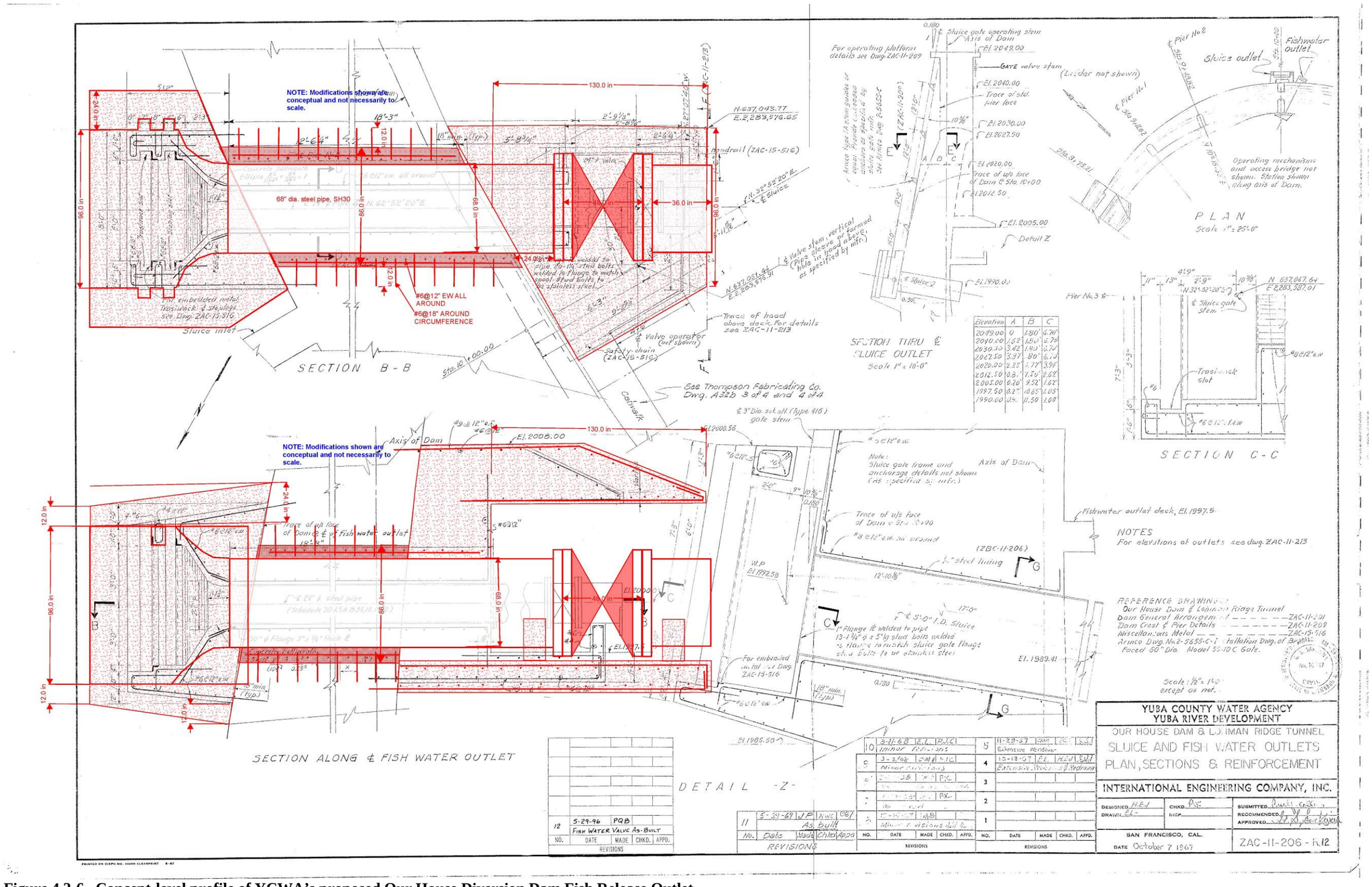

Figure 4.2-6. Concept-level profile of YCWA's proposed Our House Diversion Dam Fish Release Outlet.

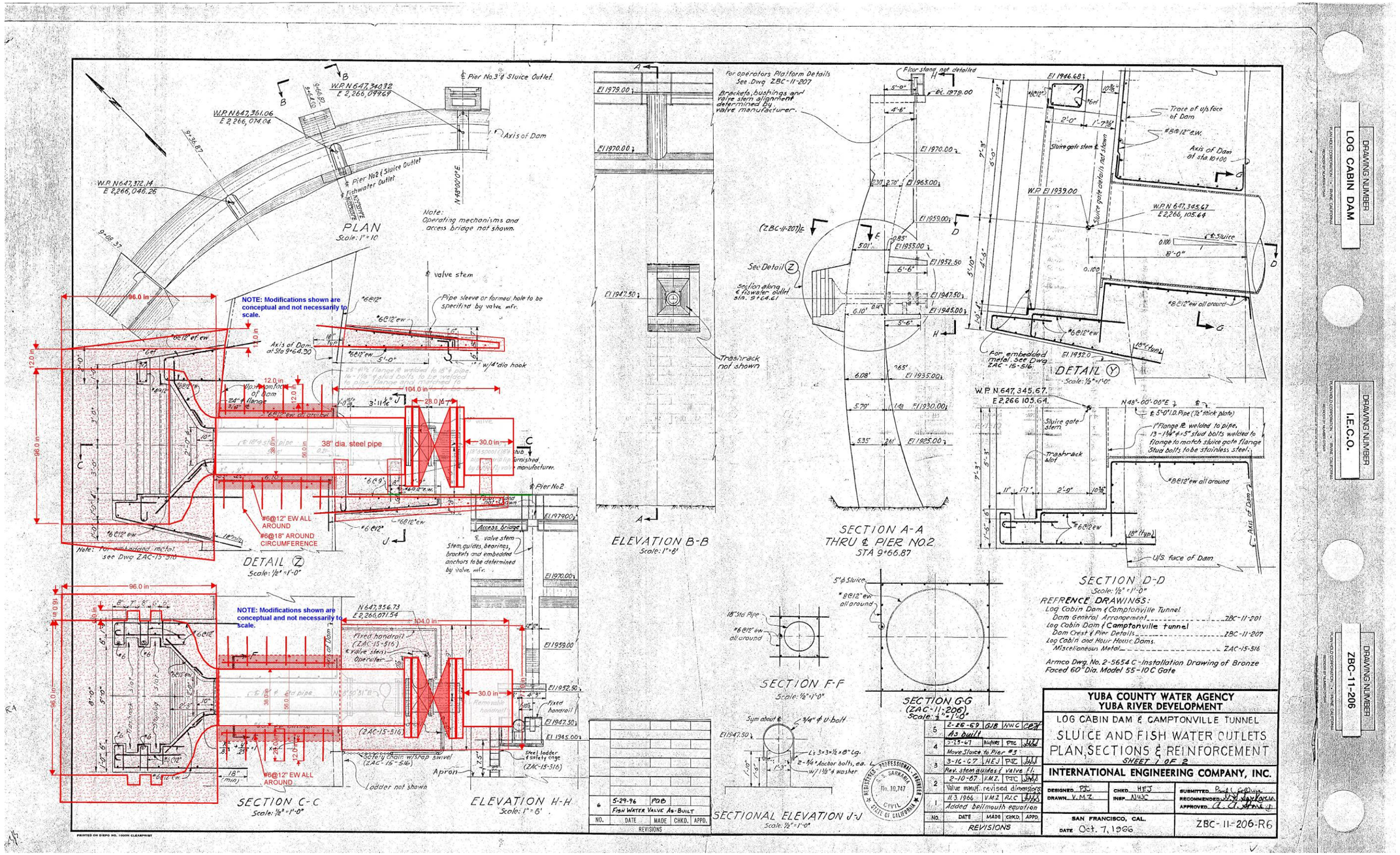

Figure 4.2-7. Concept-level profile of YCWA's proposed Log Cabin Diversion Dam Fish Release Outlet.

Anticipated Operations

YCWA anticipates that the new low level outlets would only be used to provide for controlled releases from the dams in excess of the existing fish release valves.

Anticipated Construction

All work would occur within the proposed FERC Project Boundary, where temporary facilities and laydown locations are available adjacent to each site. The work would occur in late summer when the minimum flow release from each dam is generally low and equal to inflow into the impoundment. YCWA would open the low level outlet to allow the WSE in the impoundment to drop below the intake to the fish release outlet. A crane would be brought on-site and used to install temporary construction platforms and needed formwork for concrete modifications and installation of the new civil work. A new upsized fish release pipe and associated valve system would be installed at each facility, with the centerline of the new pipe at the same centerline elevation as the existing fish release outlet (i.e., no disturbance to the existing fish release outlet). The concrete facilities needed at the inlets and outlets of the new fish release outlets would be similar to those for the existing fish release outlets, upsized for the larger pipes accordingly. The penetration through the dams for the new fish release outlets would be achieved by coring multiple small diameter overlapping bores through the dam to form a circular opening large enough to accommodate the new outlet pipe and associated localized structural reinforcement rebar and plating. At the new fish release inlets, conical transition and stop-log slots would be installed; at the outlets, valve support platforms and valve stem guides would be constructed.

The construction labor force is estimated to average about 10 persons over the total construction period. Equipment will be transported to the diversion tunnel via Highway 20, Marysville Road, and Highway 49, all of which are paved and suitable for the anticipated loads. It is anticipated that not more than 10 trailer ("*low boy*") truck roundtrips will be required to bring the mechanical, electrical and other heavy materials and equipment to the project site. No more than 20 truckloads of ready-mixed concrete may be needed for equipment supports and foundations. No changes in road conditions are anticipated as a result of the work.

At the sites, typical heavy construction equipment will include a crane, a concrete coring machine, air compressors, dump trucks, heavy-duty trucks, a floating barge, and miscellaneous equipment. Smaller equipment will include hoists and platforms, scaffolding, concrete placing and drilling equipment, a welding machine, and other miscellaneous equipment customary to the electrical, mechanical and structural crafts.

No borrow areas are anticipated to be required because the work does not entail significant earthwork. For construction at the Log Cabin Dam, it is expected that the available space on the access roads to the dam areas will be sufficient for laydown and staging of materials and equipment. For construction at the Our House Dam, it is expected that the available space to the north east, adjacent to the river-right abutment to the dam will be sufficient for laydown and staging of materials and equipment. For both sites, all work will be confined to the dam outlet area and immediate vicinity. No undisturbed areas are anticipated to be disturbed as a result of the work at either sites.

At this time, it is anticipated that environmental compliance and permitting will take a total of 6 months for each diversion dam and the design will occur concurrently with permitting. Actual field construction will take no more than 6 months. While each site can be modified concurrently, the total time for these two activities is estimated to be 2 years.

4.2.1.2.3 Modifications to Lohman Ridge Diversion Tunnel Intake

Anticipated Facilities

YCWA proposes to periodically close the Lohman Ridge Diversion Tunnel on the Middle Yuba River (YCWA's Proposed Condition AR11 in Appendix E2 of the Amended FLA). There is an existing gate on the tunnel intake, but it is not appropriate for closing and opening the tunnel during high flows. YCWA proposes to replace the gate with a more efficient gate structure.

Inlet modifications necessary to add a new regulating gate and relocate the existing bulkhead gate would require the following activities:

- Extending the deck and approach walls of the existing inlet upstream 4 to 5 feet
- Constructing a hoist deck to achieve gate and bulkhead lift clearances
- Modifying the existing bulkhead slot to accommodate a regulating gate
- Constructing a new bulkhead slot within the new inlet extension
- Constructing a new trashrack and debris rake at the front of the extended inlet

The inlet extension would be constructed to be much like the existing inlet (i.e., made of concrete). Based on using a screw-drive for the regulating gate and a wire rope hoist for the bulkhead gate, both hoists would be located on a raised platform approximately 17 ft above the inlet deck elevation or approximately 5 to 6 ft above the current upper access road elevation. Locating the hoists at this elevation allows for both gates to be lifted fully above the current deck for maintenance and inspection. A debris rake would be added to the inlet deck just above the trashrack.

Figure 4.2-8 is a concept-level plan and profile drawing of the modification. Construction is described in Exhibit C of the Amended FLA. If the proposal is approved, detailed drawings would be provided to the Commission as appropriate for FERC approval. After construction is completed, detailed as-built drawings would be filed with the Commission as Project Exhibit Drawings.

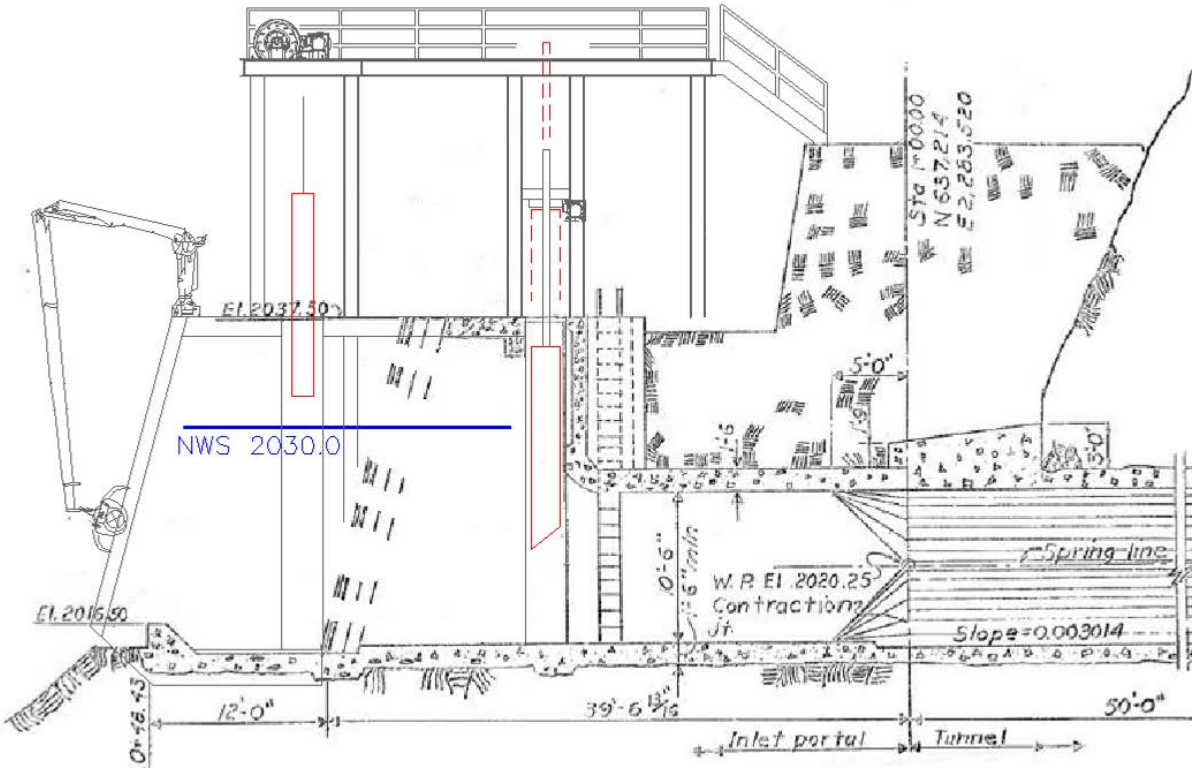

Figure 4.2-8. Concept-level details of YCWA's proposed Lohman Ridge Inlet Control Gate and Debris Rake.

Anticipated Operations

YCWA anticipates that the new Lohman Ridge Diversion Tunnel Intake gage would be used to open or close the tunnel.

Anticipated Construction

All work would occur within the proposed FERC Project Boundary, where temporary facilities and laydown locations are available adjacent to the site. The work would occur in late summer when the minimum flow releases are low and equal to inflow into the impoundment. YCWA would open the low level outlet to allow the WSE in the impoundment to drop below the intake to the diversion tunnel. A crane would be brought on-site and used to install temporary construction platforms and needed formwork for concrete modifications and installation of the new civil work. A new inlet control gate and debris rake would be installed. Penetrations through the existing tunnel inlet deck for the new gate and debris rack would be developed using concrete drilling and cutting tools. Mechanical and electrical control devices will be installed on the tunnel inlet deck.

The construction labor force is estimated to average about eight persons over the total construction period. Equipment would be transported to the diversion tunnel via Highway 20,

Marysville Road, and Highway 49, all of which are paved and suitable for the anticipated loads. It is anticipated that not more than 10 trailer ("*low boy*") truck roundtrips would be required to bring the mechanical, electrical and other heavy materials and equipment to the project site. No more than five truckloads of ready-mixed concrete may be needed for equipment pads and foundations. No changes in road conditions are anticipated as a result of the work.

At the site, typical heavy construction equipment will include an excavator (backhoe), an air compressor, a heavy-duty truck, a truck-mounted crane and miscellaneous equipment. Smaller equipment will include hoists and platforms, concrete placing and drilling equipment, a welding machine, and other miscellaneous equipment customary to the electrical, mechanical and structural crafts.

No borrow areas are anticipated to be required because the work does not entail significant earthwork. It is expected that the available space within the tunnel intake area will be sufficient for laydown and staging of materials and equipment. All work will be confined to the tunnel intake and immediate vicinity. No undisturbed areas are anticipated to be disturbed as a result of the work.

At this time, it is anticipated that environmental compliance and permitting will take a total of six months and the design will occur concurrently with permitting. Actual field construction will take no more than six months. The total time for these activities is estimated to be no longer than 18 months.

4.2.1.2.4 Recreation Facilities

YCWA proposes several enhancements to the existing Project recreation facilities. When constructing Project recreation facilities, YCWA will obtain all necessary permits and approval for survey work, facility design and on-site resource evaluations, including the Forest Service on NFS lands. A description of these enhancements is provided below.

Schoolhouse Campground

YCWA will provide the following enhancements:

- A standardized four-panel entrance station kiosk.
- Appropriate trailhead signage on the facility entrance sign.
- Replacement of existing vault and flush restroom buildings with new restroom buildings, including septic systems.
- Conversion of all the double and triple campsites into single campsites, except for campsite #9 (double site), which will be separated into two single sites.
- An expanded, paved and striped overflow parking area for 10 vehicle plus trailer spaces and 15 single vehicle spaces.
- A native surface, non-motorized, multi-use connector trail to Schoolhouse Trail from the trailhead parking area.

- A 50-PAOT[19] amphitheater across the road from the campground overflow and trailhead parking area with bench seating, a large group fire ring and an electrical hookup.
- Electricity at the entrance station, host site, and each restroom.
- A host site with water and electric hookups and a holding tank.
- A shower building or buildings with a total of four shower stalls.
- Campsite vehicle spurs to accommodate Recreational Vehicles (RVs), as feasible.
- RV hookups (water and electric only) at 10 existing campsites.
- Campground circulation roads to accommodate RVs up to 45 ft.

Dark Day Campground

YCWA will provide the following enhancements:

- A standardized four-panel entrance station kiosk.
- A new replacement two-unit vault restroom building that serves Campsites 5 through 10.
- A tent camping only facility.
- Vegetative screening between campsites.
- Campsites that meet current standards and guidelines.
- Defined campsite access routes from the parking area that avoid travel through the living spaces of other campsites.
- A one-unit vault restroom at Campsite #4.
- A two-unit flush restroom building that serves double campsites (Site #1 through 3) if the site terrain allows for a leach field. If a flush model is not feasible, then replace with a vault model.

Hornswoggle Group Campground

YCWA will provide the following enhancements:

- A standardized four-panel entrance station kiosk.
- A new two-unit flush restroom in place of the existing four-unit flush restroom buildings at the Manzanita and Madrone campsites, including appropriate septic systems.
- A new one-unit vault restroom in place of the existing two-unit vault restroom at the Sugarpine campsite.

[19] PAOT = People At One Time

- A new one-unit vault restroom in place of the existing two-unit vault restroom at the Douglas Fir campsite, including appropriate septic system.
- New one-unit flush restroom buildings, including appropriate septic systems, at the Dogwood and Ponderosa campsites (where restroom buildings do not currently exist).
- A shower building or buildings with a total of four shower stalls.
- Improved turning radii of each existing group campsite spur road to accommodate RVs up to 45-ft-long at all the group campsites, except Site No. 4 (Ponderosa), where an RV size limit will be implemented.
- One new group campsite (25 PAOT), including a paved parking area, one-unit vault restroom, and group camping area with picnic tables, food lockers, fire ring and a pedestal grill.
- Electricity at the entrance kiosk/information board and each restroom.

Cottage Creek Picnic Area

YCWA will complete the second phase of the facility reconstruction on the eastern portion of the campground that was severely burned during the 2010 fire once the area has been sufficiently re-vegetated. The development will consist of four additional small group campsites with the following specifications:

- A total of four additional campsites, including two double campsites and two triple campsites each with a paved vehicle spur and a living space and the following additional specifications:
  - A potable water system extension from the existing system consisting of underground distribution and water hydrants.
  - A two-unit vault restroom building.
  - A paved circulation road with vehicle barriers.
  - Trash facilities, including a dumpster and recycling receptacles.
  - A standardized four-panel entrance station kiosk.
  - A two-panel interpretive display at a location with the best view down canyon within the facility.

Garden Point Boat-in Campground

YCWA will provide the following enhancements:

- A standardized four-panel entrance station kiosk.
- A one-panel interpretive display that includes information about the gold mining history in the Yuba River drainage and the North Yuba River/Bullards Bar area.

- New vault restroom buildings in place of the existing restroom buildings with the most efficient configuration of one- and/or two-unit restroom buildings.
- At least seven new single campsites to replace lost capacity with the closure of Frenchy Point Campground.
- An additional restroom building(s) to meet the needs of the final number of new campsites.
- Solar-powered lighting at the entrance station kiosk.
- Removal of existing Klamath stove facilities and concrete bases.

Madrone Cove Boat-in Campground

YCWA will provide the following enhancements:

- A standardized four-panel entrance station kiosk.
- A one-panel interpretive display that includes information about the gold mining history in the Yuba River drainage and the North Yuba River/Bullards Bar area.
- A new vault restroom building in place of the existing vault restroom building.
- Improved campsites to better meet current standards.
- New campsite retaining walls with durable materials.
- Improved access routes and trails connecting the campsites to the restroom(s) and entrance station.
- Solar-powered lighting at the entrance station kiosk.
- Removal of existing Klamath stove facilities and concrete bases.

Frenchy Point Boat-in Campground

YCWA will decommission the facility due to low use and very difficult topography.

Dark Day Picnic Area

YCWA will provide the following enhancements:

- A standardized three-panel entrance station kiosk.
- At the western picnic site cluster:
  - A total of 10 picnic sites near the NMWSE – each with a picnic table and a concrete grill with self-contained ash box.
  - Rehabilitation of any relocated picnic sites to conditions satisfactory to the Forest Service.

  - Removal of the existing Klamath stoves at each picnic site.
  - Outdoor recreation access routes (ORARs) to the re-located picnic sites from the parking area.
  - Signage directing users from the parking area to the re-located picnic sites via the new trail access routes.
  - Enhanced reservoir views at the re-located picnic sites through selective vegetation management (where practical).
  - A Yuba County ordinance establishing a non-motorized boating only zone on the reservoir adjacent to the western picnic site cluster (if possible with Yuba County).

- At the northern/peninsula picnic site cluster:
  - A total of five picnic sites near the end of the peninsula – each with a picnic table and a concrete grill with self-contained ash box.
  - Rehabilitation of any relocated picnic sites to conditions satisfactory to the Forest Service.
  - Removal of the existing Klamath stoves at each picnic site.
  - ORARs to the re-located picnic sites from the parking area.
  - Signage directing users from the parking area to the re-located picnic sites via the new trail access routes.
  - Enhanced reservoir views at the re-located picnic sites through selective vegetation management (where practical).
- A new four-unit vault restroom building in place of the existing restroom building.
- A parking area with a total parking capacity of 34 single vehicle spaces.
- Trailhead signage for the Bullards Bar Trail at the parking area and along Marysville Road.

Sunset Vista Point

YCWA will provide the following enhancements:

- A standardized three-panel entrance station kiosk.
- Two new picnic sites, each with a picnic table and a concrete grill with self-contained ash box.
- A water hydrant near the new picnic sites.
- An upgraded existing picnic site with a new picnic table and concrete grill with self-contained ash box.
- Enhanced reservoir vistas from each picnic site by selective vegetation management.

- A new two-unit vault restroom building in place of the existing four-unit vault restroom building.
- A paved and striped parking area on the shoreline side of the road.
- A trailhead sign at the start of the Bullards Bar Trail.
- A one-panel interpretive display at the picnic sites.

Dam Overlook

YCWA will provide the following enhancements:

- A parking area for 10 single vehicles with a gravel surface and vehicle barriers.
- A standardized three-panel entrance station kiosk.
- A one-panel interpretive display.

Moran Road Day Use Area

YCWA will provide the following enhancements:

- A standardized four-panel entrance station kiosk.
- A gravel car-top boat ramp with three improved existing turnarounds.
- A parking area with five new single spaces[20]

Cottage Creek Boat Launch

YCWA will provide the following enhancements:

- A standardized four-panel entrance station kiosk.

Dark Day Boat Launch

YCWA will provide the following enhancements:

<u>Overflow Parking Area</u>

- A single, switchback trail connecting the overflow parking area to the boat ramp, including decommissioning and rehabilitation of the secondary, non-switchback trail.
- Trail signage at the start and end of the trail.
- Lighting at the existing restroom.
- A standardized four-panel entrance station kiosk.

[20] Expansion of the parking area may require relocating the existing one-unit vault restroom to provide the five additional single vehicle parking spaces.

Main Parking Area and Boat Ramp

- A standardized four-panel entrance station kiosk.
- Trailhead signage at the parking area.
- An upgraded launch ramp, including straightening, widening, lengthening and courtesy dock enhancements (as feasible).
- Lighting at the restroom, top of the launch ramp and in the parking area.
- A new four-unit vault restroom building in place of the existing four-unit vault restroom.
- A parking area with new pavement and striping.
- Removal of the accessible loading ramp.

In addition, YCWA will evaluate the need to provide additional boat launch parking at or near the Dark Day Boat Launch facility based on site-specific monitoring.

Recreational Trails (Bullards Bar and Schoolhouse Trails)

YCWA will provide the following enhancements:

- Appropriate trailhead identification signage at facility identification signs along Marysville Road and in the facility parking areas.
- Consistent directional signage at all Project trail junctions.

Our House Diversion Dam

YCWA will provide the following enhancements:

- A standardized three-panel entrance station kiosk.
- A temporary restroom (1 unit) every year from October 1 through June 30.
- A river access trail downstream of the diversion dam and weir.
- A wheeled-cart designed for carrying whitewater rafts behind the existing locked gate at the parking area.

New Recreation Facilities

In addition to the improvements to the existing Project recreation facilities, YCWA proposes several new Project recreation facilities. A description of these new facilities is provided below.

Kelly Ridge Campground

YCWA will construct a new campground designed to accommodate small groups (double and triple sites) and RVs on Kelly Road off of Marysville Road. The facility will have the following specific facilities, features and configurations:

- A total of 27 campsites, including 22 double campsites and five triple campsites.
- A host site designed for an RV including a water and electric hookup and a septic holding tank.
- A potable water source and delivery system.
- A shower building with four shower stalls, four flush restroom stalls and associated parking.
- Restroom buildings including (2) 2-unit vault buildings and at least one flush building.
- Paved circulation roads with vehicle barriers and gates.
- Signage including an entrance station kiosk and directional signage.

Shadow Ridge Campground

YCWA will construct a new campground designed to accommodate single families at the former Burnt Bridge Campground site. The facility will include a campground, trailhead parking area, non-motorized shoreline loop trail, a non-motorized interpretive trail and a reservoir overlook. The facility will have the following specific facilities, features and configurations:

- A total of 18 single campsites each with a paved vehicle spur and a living space, fire ring, food locker, picnic table and tent pads.
- A host site designed for an RV with water and a septic holding tank.
- A potable water system, including source (well), underground distribution and water hydrants dispersed throughout the campground.
- (2) two-unit restroom buildings (1 flush and 1 vault model).
- Paved circulation roads.
- A 30-PAOT amphitheater with bench seating and a large group fire ring.
- An entrance station kiosk.
- A trailhead parking area consisting of a gravel parking area (10 vehicles), entrance station kiosk and interpretive display.
- A non-motorized shoreline loop trail around the Shadow Ridge peninsula.
- An out-and-back, non-motorized interpretive trail.

- A reservoir overlook atop the peninsula (at the end of the interpretive trail) with three to five picnic sites; an interpretive display; and appropriate vegetation management and clearing to enhance the views of the reservoir (Moran Cove)

Cottage Creek Picnic Site

Pending access easements from the private land owners along the access road to the site, YCWA will construct a new picnic site with the following facilities and features.

- A gravel parking area for 15 single vehicles; vehicle barriers; two-unit vault restroom; facility identification sign; directional signage; and an entrance station kiosk.
- A shoreline day use area with 10 picnic sites; an accessible shoreline access trail to the reservoir; an interpretive display and a non-motorized boating only zone in the cove accessed by the accessible shoreline trail.
- Signage including an entrance station kiosk and a facility identification sign.
- Improvements to the existing access road (Forest Service Road 18N15) from the intersection with Yuba County Road 169 to the new parking area.

Dark Day RV Dump Station

YCWA will construct a sanitary dump station for RVs on Dark Day Road. The facility will include the following facilities and features.

- A one-lane dump station with an 8,000-gallon holding tank, potable water hydrant, non-potable water tower for cleaning, an overhead light and trash facilities.
- A one-way paved circulation road with an RV-sized pullout after the dump station for exit preparation.
- A turning lane on Dark Day Road for vehicles coming from the Marysville Road direction.
- Signage including an entrance station kiosk and a facility identification sign.

Dark Day Entrance Station

YCWA will include the existing entrance station building along Dark Day Road as a Project facility that supports the Dark Day Facilities. No specific improvements to the entrance stations are planned at this time.

New Colgate Powerhouse River Access

Immediately downstream of New Colgate Powerhouse, YCWA will construct a non-motorized river access trail to the Yuba River, and install an entrance station kiosk and directional signage.

West Shoreline Trail

YCWA will develop a Class 3 shoreline trail on the west shoreline of New Bullards Bar Reservoir connecting the Cottage Creek recreation complex (boat launch, campground and picnic site) and the Shadow Ridge Campground and trails. The trail will be a Class 3 trail designed for non-motorized uses (pedestrian, mountain biking and equestrian uses). YCWA will complete this trail construction in two phases, including Phase 1 from Cottage Creek Boat Launch to Cottage Creek Campground and Cottage Creek Picnic Site (approx. 1.1 mi); and Phase 2 from Cottage Creek Picnic Site to Shadow Ridge Campground (approx. 4.5 mi).

Anticipated Construction

YCWA's proposed Recreation Facilities Plan (Condition RR1) includes a detailed implementation schedule for major rehabilitation, near-term rehabilitation and enhancements at each existing recreation facility. It is important to understand how YCWA developed this schedule. YCWA used the replacement of the existing main line of the recreational facility water delivery system, which is almost entirely underground, as the primary driver of the major rehabilitation schedule of the recreation facilities. The rationale for this approach is primarily the efficiency of the work and to avoid doubling rehabilitation efforts and the resultant significant cost savings. Further, replacement of the underground water system is the single most impactful work project at each facility because the work would affect the most significant (and costly to replace) facilities and amenities within the recreation facilities – the circulation roads, restroom buildings and the septic and leach field systems. As such, YCWA's schedule was developed to complete the main water line replacement and then begin the process of rehabilitating the recreation facilities either concurrently or sequentially following water system replacement while still providing a phased approach to avoid the closure of multiple facilities at the same time. This avoids repeating costly facility major rehabilitation work such as re-paving recently paved roads; moving or altering recently replaced restrooms; and/or re-aligning, extending or relocating recently replaced septic systems and leach fields that might occur if the underground water system work was completed after major rehabilitation of the recreation facilities.

YCWA recognizes that this approach may not precisely align with the priority of rehabilitation work, particularly for some of the older amenities (e.g., restrooms) based on the current condition of all the facilities and that it may require enhanced minor maintenance of these facilities until the major rehabilitation of the facilities can occur. However, overall, YCWA's believes this approach is ultimately the most efficient and practical approach to provide enhanced recreation facilities over the term of the license with the least disruption to the public overall (minimizes the impact and occurrence of closed facilities) and at significant cost savings to YCWA, primarily by avoiding repeated major rehabilitation efforts at the same facilities.

4.2.1.2.5 Proposed Primary Project Roads

YCWA proposes the following Primary Project Roads and Trails (Table 4.2-1) and Recreation Roads (Table 4.2-2).

Table 4.2-1. Primary Project Roads and Trails (non-recreation roads and trails) included in the Yuba River Development Project.

Road Name	Begin	End	Land Ownership	Mile Marker-Start	Mile Marker-End	Total Length (mi)
Our House Diversion Dam Road (TNF Rd 0180-Our House)	Ridge Road	Our House Diversion Dam	Private	0	0.79	0.79
	Forest Service	--	Forest Service	0.79	0.85	0.06
	Private	--	Private	0.85	1.12	0.27
	Forest Service	--	Forest Service	1.12	1.93	0.81
Our House Diversion Dam Road Spur	Our House Diversion Dam Road	Our House Diversion Dam	Forest Service	0	0.03	0.03
Log Cabin Diversion Dam Road	Highway 49	Log Cabin Diversion Dam	Private	0	0.15	0.15
	Forest Service	--	Forest Service	0.15	0.42	0.27
	Private	--	Private	0.42	0.50	0.08
	Forest Service	--	Forest Service	0.50	0.85	0.35
	Private	--	Private	0.85	1.09	0.24
	Forest Service	--	Forest Service	1.09	1.33	0.24
	Private	--	Private	1.33	1.37	0.04
Garden Valley Road	Forest Service	--	Forest Service	0	2.53	2.53
Sunset Vista Point Road Spur	Forest Service	YCWA's Water Storage Tanks	Forest Service	0.66	0.82	0.16
Cottage Creek Shoreline Access Road	Cottage Creek Campground Access Road	New Bullards Bar Reservoir	Forest Service	0	0.08	0.08
New Bullards Bar Dam Road	County Road 8	New Bullards Bar Dam	Private	0	1.09	1.09
New Bullards Bar Dam Road Spur	New Bullards Bar Dam Road	New Bullards Bar Dam	Private	0	0.11	0.11
New Bullards Bar Dam Compliance Flow Gage Trail	New Bullards Bar Dam Road	Stream Gage	Private	0	0.12	0.12
Colgate Tunnel Lane	County Road 139	Penstock	Private	0	0.72	0.72
Colgate Tunnel Muck Road	Colgate Tunnel Lane	Rock Pit	Private	0	0.85	0.85
Colgate Haul Road	County Road 139	Penstock	Private	0	0.23	0.23
Colgate Tunnel Penstock Road	Colgate Tunnel Muck Road	Penstock	Private	0	0.15	0.15
Penstock Access Road #1	County Road 1051	Penstock	Private	0	0.23	0.23
Penstock Access Road #1 Spur	Penstock Access 1	Penstock	Private	0	0.04	0.04
Penstock Access Road #2	County Road 1051	Penstock	Private	0	0.10	0.10
Penstock Access Road #3	County Road 1051	Penstock	Private	0	0.10	0.10
Penstock Access Road #4	County Road 1051	Penstock	Private	0	0.15	0.15
Narrows 2 Powerhouse Road	County Road 222	Narrows 2 Powerhouse	State of California	0	1.50	1.50
	USACE	--	USACE	1.50	2.07	0.57
Narrows 2 Intake Spur	Narrows 2 Powerhouse Road	Narrows 2 Intake	State of California	0	0.14	0.14
	USACE	--	USACE	0.14	0.20	0.06
Narrows 2 Compliance Flow Gage Trail	Narrows 2 Access	Stream Gage	USACE	0	0.18	0.18
	--	--	Private	0.18	0.21	0.03
Total	**33 road segments**					**12.47 mi**

Table 4.2-2. Recreation roads included in the Yuba River Development Project.

Road Name	Associated Recreation Facility	Begin	End	Land Ownership (FS Road #, if applicable)	Mile Marker-Start	Mile Marker-End	Total Length (mi)
Dark Day Access Road	Dark Day Recreation Area	0.33 mi from County Road 8[1]	Entrance to Dark Day Boat Launch and Campground Roads	Forest Service	0	0.23	0.23
Dark Day Boat Launch Road	Dark Day Boat Launch	Forest Service	New Bullards Bar Reservoir	Forest Service	0	0.28	0.28
Dark Day Campground and Picnic Area Road	Dark Day Campground and Picnic Area	Forest Service	Campground	TNF Rd 0008-004	0	0.44	0.44
Schoolhouse Campground Loop Road	Schoolhouse Campground	County Road 8	Campground	TNF Rd 0008-005, 0008-005-001, 0008-005-002 and 0008-003	0	0.97	0.97
Hornswoggle Group Campground Road	Hornswoggle Group Campground	County Road 8	Campground	TNF Rd 0008-006	0	0.33	0.33
Moran Boat Launch Access Road	Moran Boat Launch	Moran Road	New Bullards Bar Reservoir	Forest Service	0	0.20	0.20
				YCWA	0.20	0.29	0.09
Cottage Creek Campground Road	Cottage Creek Campground	County Road 169	Campground	Forest Service	0	0.14	0.14
Cottage Creek Campground Access Road	Cottage Creek Campground	County Road 8	Cottage Creek Campground	YCWA	0	0.47	0.47
				Forest Service	0.47	0.82	0.35
				YCWA	0.82	1.16	0.34
				Forest Service	1.16	1.24	0.08
Cottage Creek Boat Launch Road	Cottage Creek Boat Launch	County Road 169	New Bullards Bar Reservoir	YCWA	0	0.15	0.15
Total	**13 road segments**						**4.07 mi**

[1] Yuba County has confirmed the first 0.33 mi is County Road 181.

The roads listed above in Tables 4.2-1 and 4.2-2 include all Project Roads for operation and maintenance of the proposed Project.[21] For clarity regarding changes to the Project, YCWA's proposed modifications to the existing Primary Project Roads and Trails and Recreation Roads are listed below. Table 4.2-3 shows Primary Project Roads and Trails that have been added, and Table 4.2-4 shows Recreation Roads added and removed.

[21] YCWA's responsibilities as they relate to specific non-Project, general access roads in Yuba County are to be addressed in a Road Maintenance Agreement, which is outside relicensing, between YCWA and Yuba County. YCWA's responsibilities as they relate to specific non-Project, general access roads on NFS land may be addressed in a Road Maintenance Agreement, which is outside relicensing, between YCWA and the Forest Service. In addition, the Road Maintenance Agreement between YCWA and Yuba County will address maintenance of County Road segments that provide primary access to Project facilities, including "driveway" entrances to Project Recreation Roads that fall within a County Road right-of-way. General access roads are maintained jointly and are not Project facilities or features.

Table 4.2-3. Proposed additions to Primary Project Roads and Trails (non-recreation roads and trails) included in Yuba River Development Project by Development.

Road Name	Begin	End	Land Ownership	Mile Marker-Start	Mile Marker-End	Total Length (mi)
NEW COLGATE DEVELOPMENT						
Garden Valley Road	Forest Service	--	Forest Service	0	2.53	2.53
Sunset Vista Point Road Spur	Forest Service	YWCA's Water Storage Tanks	Forest Service	0.66	0.82	0.16
New Bullards Bar Dam Compliance Flow Gage Trail	New Bullards Bar Dam Road	Stream Gage	Private	0	0.12	0.12
Colgate Tunnel Lane	County Road 139	Penstock	Private	0	0.72	0.72
Colgate Tunnel Muck Road	Colgate Tunnel Lane	Rock Pit	Private	0	0.85	0.85
Colgate Haul Road	County Road 139	Penstock	Private	0	0.23	0.23
Colgate Tunnel Penstock Road	Colgate Tunnel Muck Road	Penstock	Private	0	0.15	0.15
Penstock Access Road #1	County Road 1051	Penstock	Private	0	0.23	0.23
Penstock Access Road #1 Spur	Penstock Access 1	Penstock	Private	0	0.04	0.04
Penstock Access Road #2	County Road 1051	Penstock	Private	0	0.10	0.10
Penstock Access Road #3	County Road 1051	Penstock	Private	0	0.10	0.10
Penstock Access Road #4	County Road 1051	Penstock	Private	0	0.15	0.15
NEW BULLARDS BAR FLOW DEVELOPMENT						
None						
NARROWS 2 DEVELOPMENT						
Narrows 2 Compliance Flow Gage Trail	Narrows 2 Access	Stream Gage	USACE	0	0.03	0.03
	--	--	Private	0.03	0.21	0.18
Total	**14 road segments**					**5.59 mi**

Table 4.2-4. Proposed additions to and withdrawals of Recreation Roads associated with the New Colgate Development. YCWA does not propose any changes to Recreation Roads and Trails associated with the New Bullards Bar Minimum Flow Development or the Narrows 2 Development.

Road Name	Associated Recreation Facility	Begin	End	Land Ownership (FS Road #, if applicable)	Mile Marker-Start	Mile Marker-End	Total Length (mi)
PROPOSED ADDITION							
Dark Day Access Road	Dark Day Recreation Area	0.33 mi from County Road 8[1]	Entrance to Dark Day Boat Launch and Campground Roads	Forest Service	0	0.23	0.23
Total	**1 road segment added**						**0.23 mi**
PROPOSED WITHDRAWAL							
Burnt Bridge Campground Loop Road (PNF Rd 18N07)	Burnt Bridge Campground	County Road 129	Campground	Forest Service	0	0.77	0.77
Total	**1 road segment removed**						**0.77 mi**

[1] Yuba County has confirmed the first 0.33 mi is County Road 181.

4.2.2 Proposed Project Boundary

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

- Proposed addition of lands to the existing Project Boundary that are currently utilized with a preponderance of use related to the Project O&M, 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 making corrections to the Project Boundary.
- Proposed changes to the existing FERC Project Boundary around the Project reservoir and impoundments from surveyed coordinates to a contour located above the NMWSE. These changes are proposed, consistent with the preferred method of defining new Project Boundaries as outlined in the FERC Drawing Guide (FERC 2012), as it is a better representation of lands required for Project O&M around the Project reservoir.

- Proposed addition of lands to the existing FERC Project Boundary that are associated with proposed new recreation facility listed in Exhibit E of the Amended FLA under YCWA's proposed resource management measures.

Proposed changes are discussed by Project development below. All proposed changes are described in detail in Section 2.0 of Exhibit G of the Amended FLA.

For the New Colgate Development, YCWA proposes the following changes under the category of corrections to the existing Project Boundary.

- The addition of the areas that encompass 100-ft rights-of-way (i.e., 50 ft on either side of centerline) of nine separate Primary Project Roads used to access and maintain the New Colgate Surge Chamber, New Colgate Powerhouse Penstock and New Colgate Powerhouse. Land in these proposed additions is owned by private land owners and by YCWA.
- The removal of lands around the former Burnt Bridge Campground site with the exception of the lands proposed to be utilized for the construction of the proposed new Shadow Ridge Campground access road and facilities. The lands proposed to remain within the Project Boundary do not include the newly proposed trails associated with the proposed new Shadow Ridge Campground as the alignments are not currently known. The Project Boundary will be amended when the trails have been constructed. Lands in this proposed removal are federal lands managed by the NFS as part of the PNF.
- The removal of the land owned by PG&E to the east of New Colgate Powerhouse (Yuba County Assessor's Parcel Number 048270011000). These lands are not used or needed for Project O&M and are owned and utilized by PG&E for maintenance of PG&E facilities located within the boundaries of that parcel.

- The addition of the area that encompasses USGS gage #11413517 (located at the Old Colgate Diversion Dam) and the Primary Project Trail used to access the gage for Project O&M purposes. Land in this proposed addition is owned by YCWA.
- The removal of the area that encompasses a section of Marysville Road (County Road 8) that is in the existing Project Boundary. Marysville Road is commonly used for many purposes not related to the Project and as such it is not considered a Primary Project Road. Land in this proposed removal is owned by private land owners and by YCWA.
- The addition of the area that encompasses a 20-ft right-of-way (i.e., 10 ft on either side of centerline) around the Primary Project Trail that is used to access USGS gage #11413517 downstream of the New Bullards Bar Minimum Flow Powerhouse. Land in this proposed addition is owned by YCWA.
- The removal of the area north of a 50-ft offset from centerline of Cottage Creek Campground Access Road to the proposed boundary near New Bullards Bar Reservoir's edge except the area surrounding Cottage Creek Campground. Land parcels in this region are not currently used for Project O&M. Land in this proposed removal is a combination of land owned by YCWA and federal land managed by the NFS as part of the PNF.
- The addition of the area that encompasses a 100-ft right-of-way (i.e., 50 ft on either side of centerline) of the section of road that connects Cottage Creek Campground Access Road to Cottage Creek Campground. Land in this proposed addition is owned by private land owners and by YCWA.
- The removal of the area that encompasses the Administration Site to the north of Sunset Vista Point that is used for non-Project related activities by the Forest Service with the exception of the water supply system that provides water to Project recreation sites, which include a 25-ft offset from water distribution tanks and 20-ft right-of-way (i.e., 10-ft on either side of centerline) of water distribution pipe alignments. Also included in the exception, is a short segment of a 100-ft right-of-way (i.e., 50 ft on either side of centerline) of the section of road that provides access to the water storage tanks from the Administration Site. Land in this area is managed by the NFS as part of the TNF.
- The addition of the area that encompasses a 20-ft right-of-way (i.e., 10 ft on either side of centerline) around the Project portion of the New Bullards Bar Trail that follows along the southeast side of the New Bullards Bar Reservoir. Lands in this proposed addition is a combination of federal land managed by the NFS as part of the TNF, and private land owned by YCWA.
- The addition of the area that encompasses a 20-ft right-of-way (i.e., 10 ft on either side of centerline) around the Schoolhouse Trail that provides access to the Bullards Bar Trail from Schoolhouse Campground. Land in this proposed addition is a combination of federal lands managed by the NFS as part of the TNF, Yuba County road right-of-way, and private land owners.
- The addition of the area that encompasses a 20-ft right-of-way (i.e., 10 ft on either side of centerline) around the water distribution pipe alignments that parallel both Marysville Road (County Road 8) and Dark Day Road. The water distribution system provides

water to Project Recreation Sites and is considered a Project Facility. Land in this proposed addition is federal land managed by the NFS as part of the TNF.

- The addition of the area that encompasses the leach field that is a part of the Hornswoggle Group Campground. Land in this proposed addition is federal land managed by the NFS as part of the TNF.
- The addition of the area that encompasses a 100-ft right-of-way (i.e., 50 ft on either side of centerline) of the non-county maintained portion of Dark Day Access Road which provides access to Dark Day Boat Launch, Picnic Area, and Campground. The non-county maintained road starts approximately 0.33 mile from Marysville Road. Land in this proposed addition is federal land managed by the NFS as part of the TNF.
- The addition of the area that encompasses a 100-ft right-of-way (i.e., 50 ft on either side of centerline) of the non-county maintained portion of Garden Valley Road which provides Project maintenance access for the annual removal of debris and maintenance access to Garden Point Boat-In Campground. The non-county maintained road begins just past the gate located approximately at the road's intersection with the Township Line common between Section 5, T18N, R8E, and Section 32, T19N, R8E. Land in this proposed addition is federal land managed by the NFS as part of the TNF.
- The addition of the area that encompasses a 100-ft right-of-way (i.e., 50 ft on either side of centerline) around the Primary Project Road that is used to access USGS gage #11408880 located downstream from Our House Diversion Dam. Land in this proposed addition is federal land managed by the NFS as part of the TNF.

For the New Colgate Development, YCWA proposes the following changes under the category of expanding the existing Project Boundary in anticipation of proposed new recreation facilities:

- The addition of the area that encompasses the proposed new Kelly Ridge Campground. Land in this proposed addition is federal land managed by NFS as part of the TNF.
- The addition of the area that encompasses both the proposed new Dark Day RV Dump Station and the proposed Dark Day Entrance Station. Land in this proposed addition is federal land managed by NFS as part of the TNF.
- The addition of the area that encompasses a 20-ft right-of-way (i.e., 10 ft on either side of centerline) around the proposed new Our House Diversion Dam River Access Trail. Land in this proposed addition is federal land managed by NFS as part of the TNF.

The proposed changes to the FERC Project Boundary for the New Colgate Development do not include the lands that encompass the proposed new West Shoreline Trail as those lands have not yet been identified. YCWA will amend the FERC Project Boundary after the proposed West Shoreline Trail has been constructed.

For the New Colgate Development, YCWA proposes the following changes under the category of redefining the boundary around the Project reservoir and impoundments from surveyed coordinates to a contour located above the NMWSE. A contour 30 ft above NMWSE or 200 horizontal ft from the NMWSE was chosen to define the proposed boundary for each of the three

Project impoundments in areas where the boundary is not already defined to encompass Project facilities and recreation sites. The proposed boundary will encompass between 50 and 200 horizontal ft from reservoir NMSWE except where slopes exceed 60 percent, in which case the boundary would encompass less than 50 horizontal ft. As such the proposed boundary will provide shoreline access from the reservoir of at least 50 ft for all areas except for areas where slopes are unsafe.

- The addition and removal of land such that the Project Boundary around New Bullards Bar Reservoir (where the Project Boundary is not encompassing Project facilities or proposed Project facilities) is defined by the lesser (closer to reservoir NMWSE) of either the topographic contour of 1,985 ft, which is 30 ft above the NMWSE, or 200 horizontal ft from the NMWSE. Land parcels in this proposed change are owned by private land owners and YCWA and federal lands managed by the Forest Service as part of the PNF and TNF.
- The addition and removal of lands such that the Project Boundary around Log Cabin Diversion Dam impoundment where the Project Boundary is not encompassing Project facilities) is defined by the topographic contour of 2,000 ft, which is 30 ft above the NMWSE. Lands in this proposed change are a combination of federal lands managed by the NFS as part of the TNF, lands owned by YCWA, and a small area within a Yuba County road right-of-way.
- The addition and removal of lands such that the Project Boundary around Our House Diversion Dam impoundment where the Project Boundary is not encompassing Project facilities is defined by the topographic contour of 2,060 ft, which is 30 ft above the NMWSE. Lands in this proposed change are a combination of federal lands managed by the NFS as part of the TNF, and land owned by private land owners.

For the Narrows 2 Development, YCWA proposes the following changes under the category of corrections to the existing Project Boundary.

- The addition of the area that encompasses a 20-ft right-of-way (i.e., 10 ft on either side of centerline) around the Primary Project Trail that is used to access USGS gage #11418000 located downstream of the Narrows 2 Powerhouse and the gage building itself. Land in this proposed addition is owned by and managed by the State of California.
- The removal of the area that extends south beyond a 100-ft right-of-way (i.e., 50 ft on either side of centerline) along the Narrows 2 Access Road, which is a Project road. These lands are not used for Project O&M and do not have any Project or non-Project facilities. Land parcels in this proposed removal are federal land managed by the USACE, land owned and managed by the State of California, and land owned by private land owners.
- The removal of the area that is between a 50-ft offset from the centerline of Narrows 2 Access Road, 50-ft offset from the centerline of the Narrows 2 Powerhouse Intake Access Road, and a 10-ft offset from the westernmost extent of either the communication line between the Narrows 2 Powerhouse and Powerhouse Intake Structure or the Narrows 2 Powerhouse Penstock. These land parcels are not used for Project O&M and do not have

any Project or non-Project facilities Land in the proposed removal is federal land managed by the USACE.

A summary of land ownership within the proposed Yuba River Development Project FERC Project Boundary by Project Development and difference as compared to existing FERC Project Boundary is presented in Table 4.2-5.

Table 4.2-5. Summary of land ownership within the proposed Yuba River Development Project FERC Project Boundary by Project Development and difference as compared to existing FERC Project Boundary.

Development	Forest Service (ac)	USACE (ac)	State of California (ac)	YCWA (ac)	Other Private (ac)	Total	
						Acres	Percent
PROPOSED PROJECT BOUNDARY							
New Colgate	3,413.3	0	0	2,578.8	198.7	6,190.2	99.5%
New Bullards Minimum Flow	0	0	0	<0.1	0	<0.1	0%
Narrows 2	0	11.1	19.5	1.2	0.8	32.6	0.5%
Total	**3,413.3**	**11.1**	**19.5**	**2,580.0**	**199.5**	**6,223.4**	**100%**
Percent	**54.8%**	**0.2%**	**0.3%**	**41.5%**	**3.2%**	**--**	**--**
DIFFERENCE BETWEEN EXISTING AND PROPOSED PROJECT BOUNDARY							
Difference	**-1,003.4**	**-5.0**	**-0.6**	**-569.3**	**-13.5**	**-1,591.8**	**-21.7%**

4.2.3 Proposed Project Operations

4.2.3.1 Changes to Conditions in the FERC License

YCWA developed proposed conditions, including associated implementation plans, for the new licenses in collaboration with Relicensing Participants. In particular, 13 of YCWA's Proposed Conditions would modify flow requirements in the existing license and, thereby, affect future Project operations. Each of these 13 proposed conditions is summarized below.

4.2.3.1.1 Water Year Types for Conditions Pertaining to New Bullards Bar Dam, Our House Diversion Dam, and Log Cabin Diversion Dam (YCWA's Proposed Condition WR2)

YCWA's Proposed Condition WR2 includes the definition of a new hydrologic index, the "Smartsville Hydrological Index," and associated WY types that are used to determine minimum required flows on the North Yuba River downstream of New Bullards Bar Dam, the Middle Yuba River downstream of Our House Diversion Dam, and on Oregon Creek downstream of Log Cabin Dam These hydrologic year types are defined by published forecasts of annual unimpaired Yuba River flow near Smartsville and computed unimpaired flows for previous months. DWR publishes forecasts of annual volumes of unimpaired Yuba River flow near Smartsville in its Bulletin 120, Water Conditions in California, every year in early February, March, April and May. After the end of the WY (i.e., beginning of October), YCWA will use the actual annual volume of unimpaired Yuba River flow near Smartsville for the previous WY

to determine the WY type used until the next forecast is released (i.e., in early February). Table 4.2-6 shows the Smartsville Hydrological Index thresholds and associated WY types.

Table 4.2-6. Smartsville hydrological index Water Year Types and associated thresholds.

Water Year Type	Forecast of Total Unimpaired Runoff in the Yuba River at Smartsville in Thousand Acre-Feet or DWR Full Natural Flow Near Smartsville for the Water Year in Thousand Acre-Feet[1]
Wet	Greater than 3,240
Above Normal	2,191 to 3,240
Below Normal	1,461 to 2,190
Dry	901 to 1,460
Critically Dry	616 to 900

[1] DWR rounds the Bulletin 120 forecast to the nearest thousand acre-feet. The Full Natural Flow is provided to the nearest ac-ft, and YCWA will round DWR's Full Natural Flow to the nearest thousand ac-ft.

4.2.3.1.2 Water Year Types for Conditions Pertaining to Narrows 2 Powerhouse and Narrows 2 Full Bypass (YCWA's Proposed Condition WR3)

Proposed Condition WR3 defines the calculation of the North Yuba Index, to be used to identify the required flow schedule at the Smartsville and at Marysville gages. The schedules in this proposed condition are the same as the schedules described in Exhibits 2, 4 and 5 of the Lower Yuba River Fisheries Agreement. Table 4.2-7 shows the North Yuba Index thresholds and associated WY types.

Table 4.2-7. North Yuba Index[1] Schedules and associated thresholds.

Water Year Type	Thousands of Acre-Feet
Schedule 1	Equal to or greater than 1,400
Schedule 2	Equal to or greater than 1,040 and less than 1,400
Schedule 3	Equal to or greater than 920 and less than 1,040
Schedule 4	Equal to or greater than 820 and less than 920
Schedule 5	Equal to or greater than 693 and less than 820
Schedule 6	Equal to or greater than 500 and less than 693
Conference Year	Less than 500

[1] The North Yuba Index is calculated as the active storage in New Bullards Bar Reservoir on September 30 of the previous Water Year plus New Bullards Bar Reservoir inflow to date plus forecasted inflow[22] through September 30 of the current Water Year.

4.2.3.1.3 Minimum Flows in the Middle Yuba River Downstream of Our House Diversion Dam and Log Cabin Diversion Dam (YCWA's Proposed Condition AR1)

Under YCWA's Proposed Condition AR1, there would be new flow requirements for the Middle Yuba River downstream of Our House Diversion Dam. The required flow will be determined based on the applicable Smartsville Hydrological Index water year type. Table 4.2-8 shows the proposed monthly required flows for the Middle Yuba River downstream of Our House Diversion Dam by WY type, as included in Proposed Condition AR1.

[22] Based on DWR-published Bulletin 120 in each of the months of February, March, April and May, and then thereafter whenever DWR issues an update to the Bulletin 120.

Table 4.2-8. Proposed Project flow requirements for the Middle Yuba River downstream of Our House Diversion Dam by Smartsville hydrological index Water Year Type.

Month	Wet Water Year (cfs)[1]	Above Normal Water Year (cfs)[1]	Below Normal Water Year (cfs)[1]	Dry Water Year (cfs)[1]	Critically Dry Water Year (cfs)[1]
October 1 - 30	60	60	55	50	40
November 1-30	60	60	55	50	40
December 1 - 31	70	60	55	50	40
January 1 - 31	90	75	70	50	40
February 1- 29	90	75	70	50	40
March 1 - 31	100	90	80	55	45
April 1 - 30	120	100	90	70	60
May 1- 31	120	100	90	70	60
June 1 - 30	120	100	90	70	60
July 1 - 31	100	80	70	60	45
August 1 - 31	80	70	60	50	45
September 1- 30	70	60	55	50	45

[1] Or natural inflow if natural inflow is less.

In addition, YCWA's Proposed Condition AR1 would establish new flow requirements for Oregon Creek downstream of Log Cabin Diversion Dam. The required flow will be determined based on the applicable Smartsville Hydrological Index WY type. Table 4.2-9 shows the monthly required flows for Oregon Creek downstream of Log Cabin Diversion Dam by WY type, as included in Proposed Condition AR1.

Table 4.2-9. Proposed Project flow requirements for Oregon Creek downstream of Log Cabin Diversion Dam by Smartsville Hydrological Index Water Year Type.

Month	Wet Water Year (cfs)[1]	Above Normal Water Year (cfs)[1]	Below Normal Water Year (cfs)[1]	Dry Water Year (cfs)[1]	Critically Dry Water Year (cfs)[1]
October 1 - 30	8	8	6	6	6
November 1-30	17	15	15	10	6
December 1 - 31	17	15	15	10	6
January 1 - 31	17	15	15	10	6
February 1- 29	24	19	18	12	12
March 1 - 31	30	30	18	12	12
April 1 - 30	43	43	27	18	18
May 1- 31	43	43	27	18	18
June 1 - 30	43	43	27	18	18
July 1 - 31	25	20	15	10	6
August 1 - 31	13	10	8	6	6
September 1- 30	13	10	8	6	6

[1] Or natural inflow if natural inflow is less.

4.2.3.1.4 Minimum Flows in the North Yuba River Flow Downstream of New Bullards Bar Dam (YCWA's Proposed Condition AR10)

Proposed Condition AR10 would require new flow requirements for the North Yuba River downstream of New Bullards Bar Dam. The required flow will be determined based on the applicable Smartsville Hydrological Index WY type. Table 4.2-10 shows the monthly required flows for the North Yuba River downstream of New Bullards Bar Dam by WY type, as included in Condition AR10.

Table 4.2-10. Proposed Project Flow Requirements for the North Yuba River downstream of New Bullards Bar Dam by Smartsville Hydrological Index Water Year Type.

Month	Wet Water Year (cfs)	Above Normal Water Year(cfs)	Below Normal Water Year(cfs)	Dry Water Year(cfs)	Critically Dry Water Year(cfs)
October 1 - 30	13	13	13	13	7
November 1-30	13	13	13	13	7
December 1 - 31	13	13	13	13	7
January 1 - 31	13	13	13	13	7
February 1- 29	13	13	13	13	7
March 1 - 31	11	12	13	13	7
April 1 - 30	5	5	5	5	5
May 1- 31	5	5	5	5	5
June 1 - 30	5	5	5	5	5
July 1 - 31	11	12	13	13	7
August 1 - 31	11	12	13	13	7
September 1- 30	11	12	13	13	7

4.2.3.1.5 Control Project Spills at Our House Diversion Dam (YCWA's Proposed Condition AR2)

Proposed Condition AR2 would require YCWA to control the rate of spill cessation for flows over Our House Diversion Dam in non-tunnel-closure years. Proposed Condition AR2 indicates that the spill cessation measure will affect flows over Our House Diversion Dam of 600 cfs or less between April 1 and July 31 in Below Normal, Dry and Critically Dry WYs, and between May 1 and July 31 in Wet and Above Normal WYs (WR2). Under these conditions, the Our House Diversion Dam low-level outlet will be used to regulate Middle Yuba River flows downstream of Our House Diversion. The low level outlet valve would be used to reduce flows by a maximum of 100 cfs every 2 days for spills between 200 cfs and 600 cfs, and by a maximum of 50 cfs for spills less than 200 cfs.

4.2.3.1.6 Control Project Spills at Log Cabin Diversion Dam (YCWA's Proposed Condition AR12)

The Project includes Proposed Condition AR12 that would control the rate of spill cessation for flows over Log Cabin Diversion Dam. Proposed Condition AR12 indicates that the spill cessation measure will affect flows over Log Cabin Diversion Dam between 100 cfs or less between April 1 and July 31. Under these conditions, the Log Cabin Diversion Dam low-level outlet will be used to regulate Oregon Creek flows downstream of Log Cabin Diversion Dam. The low level outlet valve would be used to reduce flows by a maximum of 20 cfs every 4 days.

4.2.3.1.7 Periodically Close Lohman Ridge Diversion Tunnel (YCWA's Proposed Condition AR11)

Under YCWA's Proposed Condition AR11, if DWR's May Bulletin 120 forecast is a Wet, Above Normal or Below Normal WY, as defined in YCWA's Proposed Condition WR2, and the subsequent end-of-September New Bullards Bar Reservoir storage is 600,000 ac-ft or greater, the Lohman Ridge Diversion Tunnel would close from October 1 through December 31.

In addition the condition requires that the Lohman Diversion Tunnel would be closed within 2 business days of when DWR publishes its April Bulletin 120 through September 30 if the Bulletin 120 April Forecast is for a Wet WY, as defined in YCWA's Proposed Condition WR2, and the end-of-March New Bullards Bar Reservoir storage is 775,000 acre-feet or greater. Concurrent with the Lohman Ridge Diversion Tunnel closure, the low level outlet and fish release valve at Log Cabin Diversion Dam will be fully opened.

4.2.3.1.8 Provide Whitewater Boating Below Our House Diversion Dam (YCWA's Proposed Condition RR3)

Under YCWA's Proposed Condition RR3, YCWA would provide weekend boating days from October 1 and March 31 between 600 cfs and 2,000 cfs, as measured at USGS streamflow gage 11408880, according to the schedule given in Table 4.2-11.

Table 4.2-11. Proposed Project whitewater boating flows below Our House Diversion Dam.

Water Year Type as Defined in Licensee's Proposed Condition WR2			Number of Weekend Whitewater Boating Days from October 1 through March 31
DWR's Full Natural Flow at Smartsville for the Full Water Year that Ended on September 30	DWR's Bulletin 120 February Forecast	DWR's Bulletin 120 March Forecast	
Wet, Above Normal, Below Normal or Dry	Any Water Year Type	Wet	8
Wet, Above Normal, Below Normal or Dry	Any Water Year Type	Above Normal	6
Wet, Above Normal, Below Normal or Dry	Any Water Year Type	Below Normal, Dry, or Critically Dry	4
Critically Dry	Wet or Above Normal	Any Water Year Type	2
Critically Dry	Below Normal, Dry, or Critically Dry	Any Water Year Type	0

4.2.3.1.9 Minimum Flows on the Yuba River Downstream of the Narrows 2 Powerhouse and Narrows 2 Full Bypass (YCWA's Proposed Condition AR3)

Under YCWA's Proposed Condition AR3, the required conference year flows for the Yuba River near Smartsville and near Marysville are slightly modified from the Yuba Accord in Conference Years. Table 4.2-12 shows the proposed required flows for the Yuba River near Smartsville and Marysville, based on the Water Year type schedules defined in YCWA's Proposed Condition WR3.

Table 4.2-12. Proposed Project flow requirements for the Yuba River downstream of Narrows 2 Powerhouse and Narrows 2 Full Flow Bypass by North Yuba Index Flow Schedule.

Month	Schedule 1 (cfs)	Schedule 2 (cfs)	Schedule 3 (cfs)	Schedule 4 (cfs)	Schedule 5 (cfs)	Schedule 6 (cfs)	Conference Year (cfs)
YUBA RIVER - BELOW NARROWS 2 POWERHOUSE/NARROWS 2 FULL BYPASS (Compliance Point: USGS Streamflow Gage 11418000)							
October 1 – 15	700	700	700	700	600	600	500
October 16 - 30	700	700	700	700	600	600	500
November 1 - 30	700	700	700	700	600	600	500
December 1 - 31	700	700	700	700	550	550	500
January 1- 15	700	700	700	700	550	550	500
January 16 – 31	700	700	700	700	550	550	500
February 1 - 29	700	700	700	700	550	550	500

Table 4.2-12. (continued)

Month	Schedule 1 (cfs)	Schedule 2 (cfs)	Schedule 3 (cfs)	Schedule 4 (cfs)	Schedule 5 (cfs)	Schedule 6 (cfs)	Conference Year (cfs)
YUBA RIVER - BELOW NARROWS 2 POWERHOUSE/NARROWS 2 FULL BYPASS (Compliance Point: USGS Streamflow Gage 11418000) (continued)							
March 1- 31	700	700	700	700	550	550	500
April 1 – 15	700	700	700	700	600	600	500
April 16 – 30	--	--	--	--	--	--	--
May 1 – 15	--	--	--	--	--	--	--
May 16 – 31	--	--	--	--	--	--	--
June 1 - 15	--	--	--	--	--	--	--
June 16 – 30	--	--	--	--	--	--	--
July 1 – 31	--	--	--	--	--	--	--
August 1 – 31	--	--	--	--	--	--	--
September 1 – 30	700	700	700	700	500	500	500
YUBA RIVER - BELOW NARROWS 2 POWERHOUSE/NARROWS 2 FULL BYPASS (Compliance Point: USGS Streamflow Gage 11421000)							
October 1 - 15	500	500	500	400	400	350	350
October 16 - 30	500	500	500	400	400	350	350
November 1 - 30	500	500	500	500	500	350	350
December 1 - 31	500	500	500	500	500	350	350
January 1- 15	500	500	500	500	500	350	350
January 16 – 31	500	500	500	500	500	350	350
February 1 - 29	500	500	500	500	500	350	350
March 1- 31	700	700	500	500	500	350	350
April 1 - 15	1,000	700	700	600	500	350	300
April 16 - 30	1,000	800	700	900	600	500	245
May 1 - 15	2,000	1,000	900	900	600	500	245
May 16 - 31	2,000	1,000	900	600	400	400	245
June 1 - 15	1,500	800	500	400	400	300	245
June 16 - 30	1,500	500	500	400	400	150	150
July 1 - 31	700	500	500	400	400	150	150
August 1 - 31	600	500	500	400	400	150	150
September 1 - 30	500	500	500	400	400	350	150

4.2.3.1.10 Control Project Ramping and Flow Fluctuation Downstream of Englebright Dam (YCWA's Proposed Condition AR9)

Under YCWA's Proposed Condition AR9, YCWA would operate New Bullards Bar Reservoir and Project facilities downstream of Englebright Dam and coordinate with PG&E on the operations of the Narrows 1 Powerhouse to avoid fluctuations in flow of the Yuba River downstream of Englebright Dam at the Smartsville gage and daily changes in Project operations affecting releases or bypasses of flow downstream of Englebright Dam at the Smartsville gage. Changes in Yuba River flow downstream of Englebright Dam would not increase at a rate of greater than 500 cfs per hour, nor decrease at a rate in excess of 200 cfs per hour at any point in the year. Also, at no point in the year would flows change, either up or down, by more than 15 percent of the average daily flow once they have been established at a base rate, nor would they be reduced by more than 30 percent of the previous day's flow.

In addition, between September 1 and December 31, and between January 1 and May 31, flow reductions under normal operations (i.e., non-spill management) would be limited according to the flows in Tables 4.2-13 and 4.2-14. In the two tables, "Base Flow" means the flows other

than flows related to emergencies, required by the USACE flood control criteria, required to maintain a flood control buffer or for other flood control purposes, bypasses of uncontrolled flows into Englebright Reservoir, uncontrolled spilling, or uncontrolled flows of tributary streams downstream of Englebright Dam.

Table 4.2-13. Maximum flow reductions corresponding to the maximum 5-day average release (Base Flow) that has occurred during the period extending from September 1 through December 31.

Base Flow Range (cfs)	Maximum Allowable Flow Reduction (cfs)
450 – 549	200
550 - 849	250
850 – 1,049	300
1,050 – 1,349	350
1,350 – 1,599	400
1,600 – 1,849	450
1,850 – 2,199	500
2,200 – 2,549	550
2,550 – 2,899	600
2,900 – 3,199	650
3,200 – 3,549	700
3,550 – 4,130	750

Table 4.2-14. Maximum flow reductions corresponding to the maximum 5-day average release (Base Flow) that has occurred during the period extending from January 1 through May 31.

Base Flow Range (cfs)	Maximum Allowable Flow Reduction (cfs)
450 - 499	200
500 - 549	250
550 - 649	300
650 - 849	350
850 – 1,199	400
1,200 – 1,449	450
1,450 – 1,699	500
1,700 – 1,899	550
1,900 – 2,149	600
2,150 – 2,399	650
2,400 – 2,699	700
2,700 – 2,949	750
2,950 – 3,199	800
3,200 – 3,449	850
3,450 – 3,899	900
3,900 – 4,130	950

In addition, between April 1 through July 15, flow reductions under normal operations (i.e., non-spill management) would be limited according to the flows in Table 4.2-15. The previous day's average flow will be based on USGS streamflow gage 11418000.

Table 4.2-15. Maximum flow reductions corresponding to the preceding day average flow that has occurred during the period extending from April 1 through July 15.

Previous Day Average Flow Range (cfs)	Maximum Flow Reduction (cfs)
400-999	79
1000-1999	150
2000-4200	200

4.2.3.1.11 Control Project Spills at New Bullards Bar Dam (YCWA's Proposed Condition AR4)

Under YCWA's Proposed Condition AR4, YCWA would implement a spill cessation operation, where spills of 2,000 cfs or less from New Bullards Bar Dam from May 1 through July 31 would be reduced at a rate of 250 cfs per day until spill has ceased.

4.2.3.1.12 Implement Log Cabin and Our House Diversion Dams Sediment Management Plan (YCWA's Proposed Condition GS2)

Under YCWA's Proposed Condition GS2, YCWA would operate the low level outlet valves at Our House and Log Cabin diversion dams during high flow events between October 1 and March 21 to move sediment trapped behind the diversion dams to the Middle Yuba River and Oregon Creek, respectively. These actions would be tied to events when inflows exceed 3,000 cfs at Our House Diversion Dam and 1,000 cfs at Log Cabin Diversion Dam. The low level outlet at each diversion dam would be opened fully for 9 days, closed half way on the 10th day, and then fully closed on the 11th day. The low-level outlet can be closed during the 11-day period if flow into the impoundment drops below the capacity of the low-level outlet, which is assumed to be 600 cfs for Our House Diversion Dam and 540 cfs for Log Cabin Diversion Dam.

3.2.3.1.13 Implement Drought Management Plan (YCWA Proposed Condition WR9)

YCWA's Proposed Condition WR9 includes a discussion of measures YCWA might adopt to mitigate the adverse effects of future droughts, and how these measures might affect conditions in the new FERC license. In addition, the condition describes a process under which drought relief could be swiftly implemented if needed and if all agencies agreed with YCWA's proposal. This condition has the potential to affect flow and water temperatures in the lower Yuba River.

4.2.3.2 Changes to Measures in Other Licenses, Agreements and Contracts that Affect Operations

Section 2.1.5.2 in Section 2.0 of the Amended FLA describes other licenses (i.e., not the FERC license), agreements and contracts that affect current Project operations. When FERC issues its new license, YCWA would apply to the SWRCB to modify any water rights, if necessary, to make them consistent with the new license. YCWA does not anticipate any changes to YCWA's water delivery contracts. Further, YCWA will continue to make water transfers, when possible, and will abide by the requirements, which are unknown at this time, in a new power purchase contract.

4.2.4 Proposed Environmental Measures

YCWA's proposed environmental and recreational conditions are included in detail in Appendix E2 of the Amended FLA, which also describes whether a proposed condition is the continuation of an existing condition or a proposed new condition. YCWA developed most of its proposed conditions, including associated implementation plans, in collaboration with Relicensing Participants. Table 4.2-6 presents YCWA's understanding of agreement on each of the 41

conditions proposed by YCWA. The proposed conditions are listed by major resource area, and the conditions are included in their entirety in Attachment A to the Applicant-Prepared Draft BA.

Table 4.2-16. List of YCWA's proposed conditions and the Relicensing Participants that YCWA understands agree with YCWA's proposed conditions, as provided in Appendix E2 of the Amended FLA. A green shaded row indicates a condition that YCWA and the Forest Service have reached tentative agreement on as a FPA § 4(e) potential condition. A yellow shaded row indicates a condition that YCWA and Cal Fish and Wildlife or USFWS have reached tentative agreement on as a FPA § 10(j) potential recommendation. A white shaded row indicates a condition that has not been collaboratively agreed to between YCWA and agencies.

YCWA's Proposed Condition			YCWA's Understanding of Relicensing Participants That Agree With YCWA's Proposed Condition[1]						
Designation in This Amended FLA	Replaces YCWA Proposed Condition with This Designation in YCWA's 2014 FLA[2]	Name	FS	FWS	CDFW	SYRCL	FWN	AW	SC
GENERAL									
GEN1[3]	GEN1 & TE3	*Organize Ecological Group and Host Meetings*	X	X	X		X	X	
GEN2	GEN2	*Annual Review of Special-Status Species Lists and Assessment of New Species on NFS Lands*	X				X		
GEN3[3]	GEN3	*Provide Environmental Training to Employees*	X	X	X		X		
GEN4	GEN4	*Develop and Implement a Coordinated Operations Plan to Assure Licensee's Compliance with the New License for the Yuba River Development Project*	X	X	X		X		
GEN5	--[4]	*Special-Status Species on NFS Lands*	X				X		
GEN6	--	*Review of Improvements on NFS Lands*	X				X		
GEOLOGY AND SOILS									
GS1[3, 5]	GS1	*Implement Erosion and Sediment Control Plan*	X		X		X		
GS2[5]	GS2	*Implement Our House and Log Cabin Diversion Dams Sediment Management Plan*	X	X	X		X		
GS3[5]	GS3 & GS4	*Implement Our House and Log Cabin Diversion Dams and New Bullards Bar Reservoir Woody Material Management Plan*	X	X	X		X		
WATER RESOURCES									
WR1[3, 5]	WR1	*Implement Hazardous Materials Management Plan*	X		X		X		
WR2	WR2	*Determine Water Year Types for Conditions Pertaining to Our House Diversion Dam, Log Cabin Diversion Dam and New Bullards Bar Dam*	X	X	X		X		
WR3	WR3	*Determine Water Year Types for Conditions Pertaining to Narrows 2 Powerhouse and Narrows 2 Full Bypass*							
WR4[5]	WR4	*Implement Streamflow and Reservoir Level Compliance Monitoring Plan*	X	X	X		X		
WR5	WR5	*Maintain New Bullards Bar Reservoir Minimum Pool*							
WR6	WR6	*Operate New Bullards Bar Reservoir for Flood Control*							

Table 4.2-16. (continued)

YCWA's Proposed Condition			YCWA's Understanding of Relicensing Participants That Agree With YCWA's Proposed Condition[1]						
Designation in This Amended FLA	**Replaces YCWA Proposed Condition with This Designation in YCWA's 2014 FLA[2]**	**Name**	**FS**	**FWS**	**CDFW**	**SYRCL**	**FWN**	**AW**	**SC**
WATER RESOURCES (continued)									
WR7[5]	TE1	*Implement Water Temperature Monitoring Plan*	X	X	X		X	X	
WR8[5]	--	*Implement Water Quality Monitoring Plan*	X	X	X		X	X	
WR9[5]	--	*Implement Drought Management Plan*							
AQUATIC RESOURCES									
AR1	AR1, in part	*Maintain Minimum Streamflows Below Our House Diversion Dam and Log Cabin Diversion Dam*	X		X		X		
AR2	AR2	*Control Project Spills at Our House Diversion Dam*	X	X	X	X	X	X	
AR3	AR3	*Maintain Minimum Streamflows at Narrows 2 Powerhouse and Narrows 2 Full Bypass*							
AR4	AR4	*Control Project Spills at New Bullards Bar Dam*	X		X		X		
AR5[5]	AR5	*Implement Aquatic Invasive Species Management Plan*	X	X	X		X		
AR6[5]	AR6	*Implement New Bullards Bar Reservoir Fish Stocking Plan*[1]	X		X		X		
AR7[5]	AR7	*Implement Upper Yuba River Aquatic Monitoring Plan*	X				X		
AR8[5]	TE2	*Implement Lower Yuba River Aquatic Monitoring Plan*	X	X	X		X		
AR9	TE4	*Control Project Ramping and Flow Fluctuations Downstream of Englebright Dam*							
AR10	AR1, in part	*Maintain Minimum Streamflow Below New Bullards Bar Dam*							
AR11	--	*Periodically Close Lohman Ridge Diversion Tunnel*	X				X		
AR12	--	*Control Project Spills at Log Cabin Diversion Dam*	X	X	X	X	X	X	
TERRESTRIAL RESOURCES									
TR1[5]	TR1	*Implement Integrated Vegetation Management Plan*	X		X		X		
TR2[5]	TR2	*Implement Bald Eagle and American Peregrine Falcon Management Plan*	X	X	X		X		
TR3[5]	TR3	*Implement Ringtail Management Plan*	X	X	X		X		
TR4[5]	TR4	*Implement Bat Management Plan*	X	X	X		X		
RECREATIONAL RESOURCES									
RR1[5]	RR1	*Implement Recreation Facilities Plan*	X						
RR2	RR2	*Provide Recreation Flow Information*	X		X		X	X	
RR3	--	*Provide Whitewater Boating Below Our House Diversion Dam*	X	X	X		X		X
LAND USE									
LU1[5]	LU1	*Implement Transportation System Management Plan*	X	X	X		X		
LU2[5]	LU2	*Implement Fire Prevention and Response Plan*	X		X		X		

Table 4.2-16. (continued)

YCWA's Proposed Condition			YCWA's Understanding of Relicensing Participants That Agree With YCWA's Proposed Condition[1]						
Designation in This Amended FLA	**Replaces YCWA Proposed Condition with This Designation in YCWA's 2014 FLA[2]**	**Name**	**FS**	**FWS**	**CDFW**	**SYRCL**	**FWN**	**AW**	**SC**
CULTURAL RESOURCES									
CR1[5]	CR1	*Implement Historic Properties Management Plan*	X				X		
AESTHETIC RESOURCES									
VR1[3, 5]	VR1	*Implement Visual Resource Management Plan*	X	X	X		X		
		Subtotal by Relicensing Participant	*34*	*19*	*27*	*2*	*33*	*6*	*1*
		Subtotal of Tentatively Agreed to FPA § 4(e) Potential Conditions	*29 (17 with an implementation plan)*						
		Subtotal of Tentatively Agreed to FPA § 10(j) Potential Recommendations	*5 (3 with an implementation plan)*						
		Other YCWA Proposed Conditions	*7 (1 with an implementation plan)*						
		Total	**41 (21 with an implementation plan)**						

[1] An "X" indicates those parties that YCWA understands agree with YCWA's proposed conditions in this Amended FLA. One should not infer that if an "X" is not in the cell, the Relicensing Participant disagrees with the condition.

[2] The designation corresponds to the designation of a similar condition proposed by YCWA in its April 2014 FLA, which is replaced by the YCWA proposed condition in this Amended FLA.

[3] YCWA understands the Forest Service will use this FPA § 4(e) potential condition instead of the Forest Service's corresponding FPA § 4(e) "standard" administrative condition.

[4] A double dash indicates a YCWA proposed condition in this Amended FLA that does not have a corresponding YCWA proposed condition in YCWA's April 2014 FLA.

[5] This proposed condition includes a detailed implementation plan.

Attachment A of the Applicant-Prepared Draft BA includes the full text of each condition included in YCWA's proposed Project, as well as supporting rationale for each condition. Appendix E3 to Exhibit E of the Amended FLA includes implementation plans identified in the conditions. Appendix E4 to Exhibit E of the Amended FLA includes: 1) for each facility necessary for implementation of an environmental condition, a functional design drawing; 2) a description of the operation and maintenance procedures for any proposed conditions; 3) an implementation or construction schedule for any proposed conditions or facilities, showing the interval after issuance of a new license when implementation of the measure or construction would be commenced and completed; and 4) maps showing the location of the facility or condition.

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SECTION 5.0

DESCRIPTION OF THE EFH ACTION AREA

5.1 NMFS Designation of EFH

The geographic extent of a Chinook salmon EFH Action Area includes the portion of a watershed within specific hydrologic units (HU) that are currently, or were historically, accessible to the anadromous fish species.

Designated EFH for Chinook salmon is identified in Amendment 14 of the Pacific Coast Salmon FMP and codified in 50 C.F.R. § 660.412(a) and part 660, subpart H, table 1. This designation does not identify any specific Chinook salmon races (e.g., spring-run or fall-run). Central Valley spring-run and fall-/late fall-run Chinook salmon are the only runs of Chinook salmon that occur in the Yuba River. To identify watersheds that contain EFH, NMFS uses 4th field hydrologic unit codes (HUCs) developed by the USGS (defined in the Department of the Interior, USGS publication; Hydrologic Unit Maps, Water Supply Paper 2294, 1987).

NMFS' *2008 Final Rule to Implement EFH for Pacific Salmon Included in Amendment 14 to the Pacific Salmon FMP* (73 FR 60987) included two 4th field hydrologic units that were identified (Table 5.1-1) (see 50 C.F.R., pt. 660., subpt. H, table 1).

Table 5.1-1. Pacific Salmon EFH Identified by USGS Hydrologic Unit Code (HUC) for the Yuba River (73 FR 60987).

USGS HUC	Hydrologic Unit Name	Salmon Species	Impassible Man–made Barrier (if present)
18020107	Lower Yuba River	Chinook salmon	not identified
18020125	Upper Yuba	Chinook salmon	not identified

Neither the 2008 Final Rule nor the more recent 2011 5-Year Review of EFH identified Englebright Dam or any upstream dams as impassible man-made barriers limiting the geographical extent of Chinook salmon EFH in the Yuba River watershed.

As discussed in NMFS and PFMC (2011), numerous dams block access to historical salmon habitat or alter the hydrography of downstream river reaches. In identifying EFH in Amendment 14, the PFMC considered dams that completely blocked fish passage, and used four criteria to determine whether a particular dam should represent the upstream extent of EFH:

- *Is the dam federally owned or operated, licensed by the Federal Energy Regulatory Commission (FERC), state licensed, or subject to state dam safety supervision?* This criterion assures the dam is of sufficient size, permanence, impassibility, and legal identity to warrant consideration for inclusion in this list.
- *Is the dam upstream of any other impassible dam?* This criterion provides for a continuous boundary of designated habitat.

- *Is fish passage to upstream areas under consideration, or are fish passage facilities in the design or construction phase?* The discussion about this criterion states that there is no currently, or soon to be, accessible freshwater salmon habitat that is expendable. All such habitat is key to the conservation of these species and needs the special considerations for protection and restoration incumbent with designation.
- *Has NMFS determined that the dam does not block access to habitat that is key for the conservation of the species?* This criterion provides for designation of habitat upstream of, and exclusion of, otherwise listed dams when NMFS is able to determine restoration of passage and conservation of such habitat is necessary for long-term survival of the species and sustainability of the fishery.

As a result, EFH was designated above a number of impassible dams that met one or more of these criteria, including Englebright Dam in the Yuba River Basin. Justification for designating EFH above impassable barriers has been provided in both the EFH regulations and Amendment 14 to the FMP. 50 C.F.R. § 600.815(a)(1)(iv)(F) states:

> If degraded or inaccessible aquatic habitat has contributed to reduced yields of a species or assemblage and if, in the judgment of the Secretary and the appropriate Council(s), the degraded conditions can be reversed through such actions as improved fish passage techniques (for stream or river blockages), improved water quality measures (removal of contaminants or increasing flows), and similar measures that are technologically and economically feasible, EFH should include those habitats that would be necessary to the species to obtain increased yields.

Amendment 14 included the following language regarding habitat needed to support a sustainable fishery and the identification of such habitat through other processes and analyses:

> While available information is not sufficient to conclude that currently accessible habitat is sufficient for supporting sustainable salmon fisheries and a healthy ecosystem, subsequent analyses (e.g., in recovery planning, ESA consultations, or hydropower proceedings) may conclude that inaccessible habitat should be made available to the species.

NMFS and PFMC (2011) also stated that the EFH provisions of the MSA are intended to ensure conservation and protection of EFH to promote a sustainable fishery, which requires a more robust population than necessary to ensure persistence of the population or ESU. Therefore, the PFMC determined that if the habitat may be necessary for the persistence of the population or ESU, it is clearly necessary to promote a sustainable fishery. As demonstrated in both the EFH regulations and Amendment 14 to the FMP, designating EFH above impassable dams is appropriate under certain conditions and has been done in the past (NMFS and PFMC 2011).

In response to comments by PFMC members, Advisory Committees, Management Bodies, and the public, several revisions were made to the March 23, 2011 Final Report on the 5-year review

of EFH for Pacific Coast salmon. According to the revised May 25, 2011 report (NMFS and PFMC 2011), updated GIS data became available that more accurately defined the spatial extent, names, and codes of the HU sub-basin boundaries, particularly in the California Central Valley. Consequently, some of the 4th field HUs listed in Amendment 14 should be removed from EFH for Chinook salmon because they no longer exist. The Lower Yuba River HU No. 18020107 is one of the 4th field HUs in California that were designated as EFH for Chinook salmon in Amendment 14, but due to revisions in the HU codes and names, no longer exists. The revised HU delineation (HUC No. 18020125, as shown on page 203 in PFMC 2014) for EFH in the Yuba River watershed is presented in Figure 5.1-1.

Although not identified in the NMFS' EFH regulations as an impassible man-made barrier, Englebright Dam blocks access by anadromous salmonids to the historically utilized habitat located upstream above the dam. The construction and the continued existence of Englebright Dam have resulted in effects that have contributed to the current status of the managed species within the EFH Action Area, and these effects are considered to be part of the Environmental Baseline (see Section 6.0 of the Applicant-Prepared Draft BA). Consequently, Chinook salmon in the lower Yuba River are restricted to the approximate 24 mi extending from Englebright Dam to the mouth of the lower Yuba River. NMFS has not established EFH for steelhead in the Yuba River because EFH only applies to commercial fisheries, which do not include steelhead.

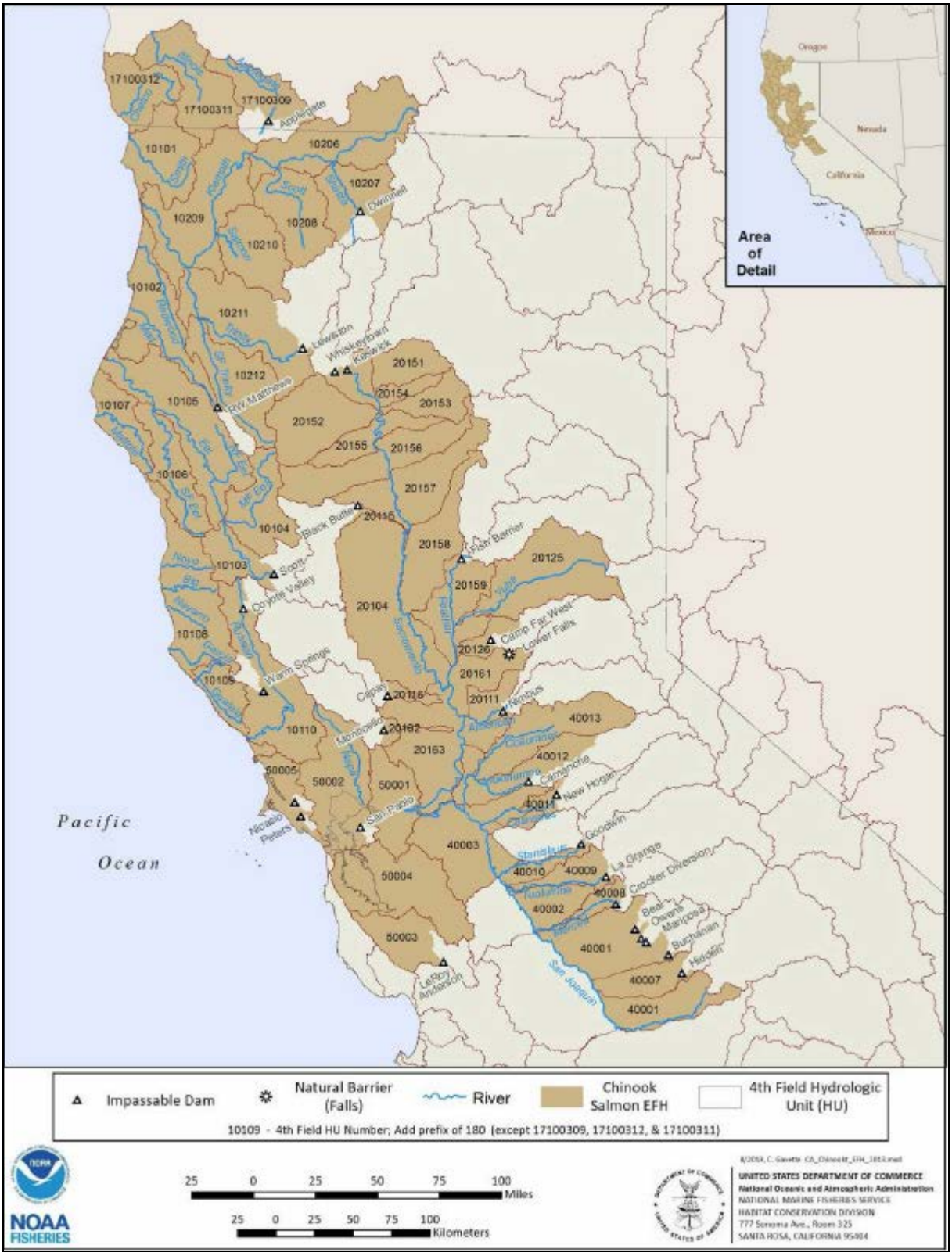

Figure 5.1-1. Chinook salmon EFH in California (PFMC 2014).

5.2 FERC's Defined Action Area

The Action Area for this Applicant-Prepared Draft EFH Assessment is determined considering the extent of the direct and indirect effects of the Proposed Action on designated EFH, including consideration of YCWA's proposed FERC Project Boundary. This section also describes upstream adjacent areas in the upper Yuba River watershed, including the North, Middle, and South Yuba watersheds, which were suggested during the FERC relicensing scoping process (see Section 1.0) but are either not affected by the Proposed Action or do not include designated EFH.

5.2.1 Yuba River Watershed Upstream of Englebright Dam and Reservoir

5.2.1.1 North Yuba River

For the North Yuba River, NMFS (2011a) has designated Chinook salmon EFH "*To Salmon Creek, near Sierra City*." There are no known natural obstructions from Downieville upstream to Sierra City, where Salmon Creek enters the North Yuba River (Yoshiyama et al. 2001). Relatively deep pools are present throughout the North Yuba River from its mouth up to Sierra City (E.R. Gerstung, personal observation in Yoshiyama et al. 2001), and could have provided holding habitat for spring-run Chinook salmon (Yoshiyama et al. 2001).

For this Applicant-Prepared Draft EFH Assessment, potential Project-related effects having the potential to affect EFH in the North Yuba River are limited to the following geographic areas.

5.2.1.1.1 New Bullards Bar Reservoir

Approximately 15.4 mi of the North Yuba River canyon from the NMWSE of the reservoir at RM 17.8 to New Bullards Bar Dam at RM 2.4.

5.2.1.1.2 New Bullards Bar Dam Reach

Approximately 2.4 mi of the North Yuba River from the New Bullards Bar Minimum Flow Release Powerhouse at RM 2.4 to the confluence of the North Yuba River with the Middle Yuba River at RM 0.0.

5.2.1.2 Middle Yuba River

In the Middle Yuba River, NMFS EFH includes; "*The lower river, near where the North Fork joins*". This assessment is presumably based on Yoshiyama et al. (2001) who considered a 10-ft-high falls on the lower Middle Yuba River located about 1.5 mi above the mouth as the effective upstream limit of salmon movement, and who cited 1938 unpublished Cal Fish and Wildlife data supposedly documenting both salmon and steelhead in this lower part of the Middle Yuba River. Because the North Yuba River joins the Middle Yuba River at the Middle Yuba River's most downstream end, there is little designated EFH in the Middle Yuba River.

For this Applicant-Prepared Draft EFH Assessment, potential Project-related effects having the potential to affect EFH focus on the 1.5 mi extending upstream of the confluence of the North and Middle Yuba rivers. Adjacent areas include the following.

5.2.1.2.1 Our House Diversion Dam Impoundment

Approximately 0.1-mi of the Middle Yuba River canyon from the NMWSE of the impoundment at RM 13.0 to the dam at RM 12.6.

5.2.1.2.2 Our House Diversion Dam Reach

Approximately 7.9 mi of the Middle Yuba River from Our House Diversion Dam at RM 12.6 to the confluence of the Middle Yuba River and Oregon Creek at RM 4.7.

5.2.1.2.3 Oregon Creek Reach

Approximately 4.7 mi of the Middle Yuba River from the confluence of the Middle Yuba River and Oregon Creek at RM 4.7 to the confluence of the Middle Yuba River with the North Yuba River at RM 0.0.

5.2.1.2.4 Log Cabin Diversion Dam Impoundment

Approximately 0.2 mi of Oregon Creek canyon from the NMWSE of the impoundment at RM 4.5 to the dam at RM 4.3.

5.2.1.2.5 Log Cabin Diversion Dam Reach

Approximately 4.3 mi of Oregon Creek from Log Cabin Diversion Dam at RM 4.3 to the confluence of Oregon Creek with the Middle Yuba River at RM 0.0.

5.2.1.3 South Yuba River

In the South Yuba River, NMFS' EFH includes "*1-2 miles upstream, perhaps spring run accessed to the present town of Washington.*" The South Yuba River extends approximately 29 mi from the upper end of Englebright Reservoir to the Town of Washington (PG&E and NID 2010). There are records of salmon occurring within 1 to 2 mi upstream of the mouth of the South Yuba River (CDFG unpublished data as cited in Yoshiyama et al. 2001). Yoshiyama et al. (2001) consider the cascade, with at least a 12-ft drop, located 0.5 mi below the juncture of Humbug Creek as essentially the historical upstream limit of salmon during most years of natural streamflows.

Because the Project would not involve any activities in the South Yuba River, it does not have the potential to affect EFH in the South Yuba River. Therefore, the South Yuba River is not considered further in this Applicant-Prepared Draft EFH Assessment.

5.2.1.4 Yuba River Upstream of Englebright Reservoir

Although no Chinook salmon are present in the Yuba River Basin upstream of Englebright Dam, nor have they been present upstream of Englebright Dam since its construction in 1941, the following reaches are contained within designated EFH.

5.2.1.4.1 Middle/North Yuba River Reach

Approximately 5.8 mi of the Yuba River from the confluence of the North Yuba River and the Middle Yuba River at RM 40.0 to the New Colgate Powerhouse at RM 34.2.

5.2.1.4.2 New Colgate Powerhouse Reach

Approximately 2.0 mi of the Yuba River from New Colgate Powerhouse at RM 34.2 to the NMWSE of the USACE's Englebright Reservoir at RM 32.2.

5.2.1.4.3 USACE's Englebright Reservoir

Approximately 7.9 mi of the Yuba River from the NMWSE of the USACE's Englebright Reservoir at RM 32.2 to the USACE's Englebright Dam at RM 24.3.

5.2.2 Yuba River Downstream of Englebright Dam and Reservoir

Presently, Chinook salmon in the Yuba River watershed are restricted to the lower approximate 24.3 mi of the Yuba River. The EFH Action Area includes the lower Yuba River starting at Englebright Dam, downstream to the confluence with the Feather River.

5.2.2.1 Reaches

Various reach delineations of the Yuba River have been used for specific studies and purposes in the lower Yuba River. For the purposes of evaluation of the potential effects to listed species addressed in this Applicant-Prepared Draft EFH Assessment, two sets of reach delineations are primarily referred to: (1) geomorphic reaches; and (2) hydrologic reaches/zones.

The geomorphic reaches were delineated by Wyrick and Pasternack (2012) into eight segments based on the longitudinal profile and associated geomorphic variables. Tributary junctions form the upstream boundary of two reaches and dams form the boundary for two more reaches. The other reach boundaries are formed by hydro-geomorphic variables such as the onset of emergent floodplain gravel, transition from confined bedrock valley to wider, meandering system, and decreases in bed channel slope. Table 5.2-1 provides length and gradient of each of the reaches. Figure 5.2-2 provides a map of the geomorphic reaches in relation to local landmarks.

These geomorphic reaches were utilized by the RMT (2013a) in describing geomorphological characteristics of the lower Yuba River, and also were included in YCWA's (2013) Technical Memorandum 7-10, *Instream Flow Downstream of Englebright Dam*, which can be found in Appendix E6, of YCWA's Amended FLA.

Table 5.2-1. Geomorphic reaches in the Yuba River downstream from Englebright Dam.

Reach Name	Description	Gradient (%)[1]	Start (RM)[1]	End (RM)[1]	Length (mi)
Englebright Dam	Confluence with Deer Creek to Englebright Dam	0.31	23.4	24.3	0.8
Narrows	Deer Creek to emergent gravel at canyon mouth	Not Measurable[2]	22.3	23.4	1.1
Timbuctoo Bend	Upstream of Hwy 20 Bridge to end of emergent gravel bar by Blue Point Mine	0.20	18.6	22.3	3.8
Parks Bar	Dry Creek to 0.35 mi upstream of Hwy 20 Bridge	0.19	13.9	18.6	4.7
Dry Creek	Daguerre Point Dam to Dry Creek	0.14	11.6	13.9	2.3
Daguerre Point Dam	RM 8.3 to Daguerre Point Dam	0.18	8.3	11.6	3.3
Hallwood	RM 3.3 to slope break near Eddie Drive at RM 8.3	0.13	3.3	8.3	5.0
Marysville	Junction with Feather River to RM 3.3	0.05	0.0	3.3	3.3
	Total	**0.16**	**0.0**	**24.3**	**24.3**

[1] Closest RM from base map drafted by YCWA in 2012. RMs were digitized at a large scale over high-resolution aerial imagery along the active river alignment.

[2] The Narrows Reach is very confined with Class III-V rapids that prevent topographic and bathymetric surveys due to safety and accessibility issues. Slope and thalweg location cannot be accurately determined (Wyrick and Pasternack 2012).

The four hydrologic reaches/zones were delineated for the purposes of modeling flow-dependent habitat availability and habitat duration analyses, which rely on homogeneous hydrology within a modeled river section (YCWA 2013). Hydrologic zone (HZ) boundaries were based on points of primary inflows (accretion) and outflows (diversions) in the study area. Table 5.2-2 describes the boundaries and length of each HZ. Figure 5.2-3 provides a map of the hydraulic modeling reaches in relation to local landmarks.

Table 5.2-2. Hydrologic zone boundaries established for habitat modeling in the Yuba River downstream from Englebright Dam.

Hydrologic Zone Name	Zone Abbreviation	Zone Description	Lower Boundary (RM)	Upper Boundary (RM)	Length (mi)
Daguerre Point Hydrologic Zone	DPHZ	Zone extends from the Feather River Confluence upstream to Daguerre Point Dam.	0.00	11.6	11.6
Dry Creek Hydrologic Zone	DryHZ	Zone extends from Daguerre Point Dam upstream to the confluence of Dry Creek.	11.6	13.9	2.3
Deer Creek Hydrologic Zone [1]	DeerHZ	Zone extends from the confluence of Dry Creek upstream to the confluence of Deer Creek.	13.9	23.4	9.5
Englebright Dam Hydrologic Zone	EDHZ	Zone extends upstream from the confluence with Deer Creek to approximately 500 ft below Englebright Dam.	23.4	24.3	0.9

[1] The Narrows Reach, which is within the Deer Creek reach, is very confined, with Class III-V rapids that prevent topographic and bathymetric surveys due to safety and accessibility issues. Slope and thalweg location cannot be accurately determined. Therefore, habitat was not modeled in this 1.1 mi section of the Deer Creek reach.

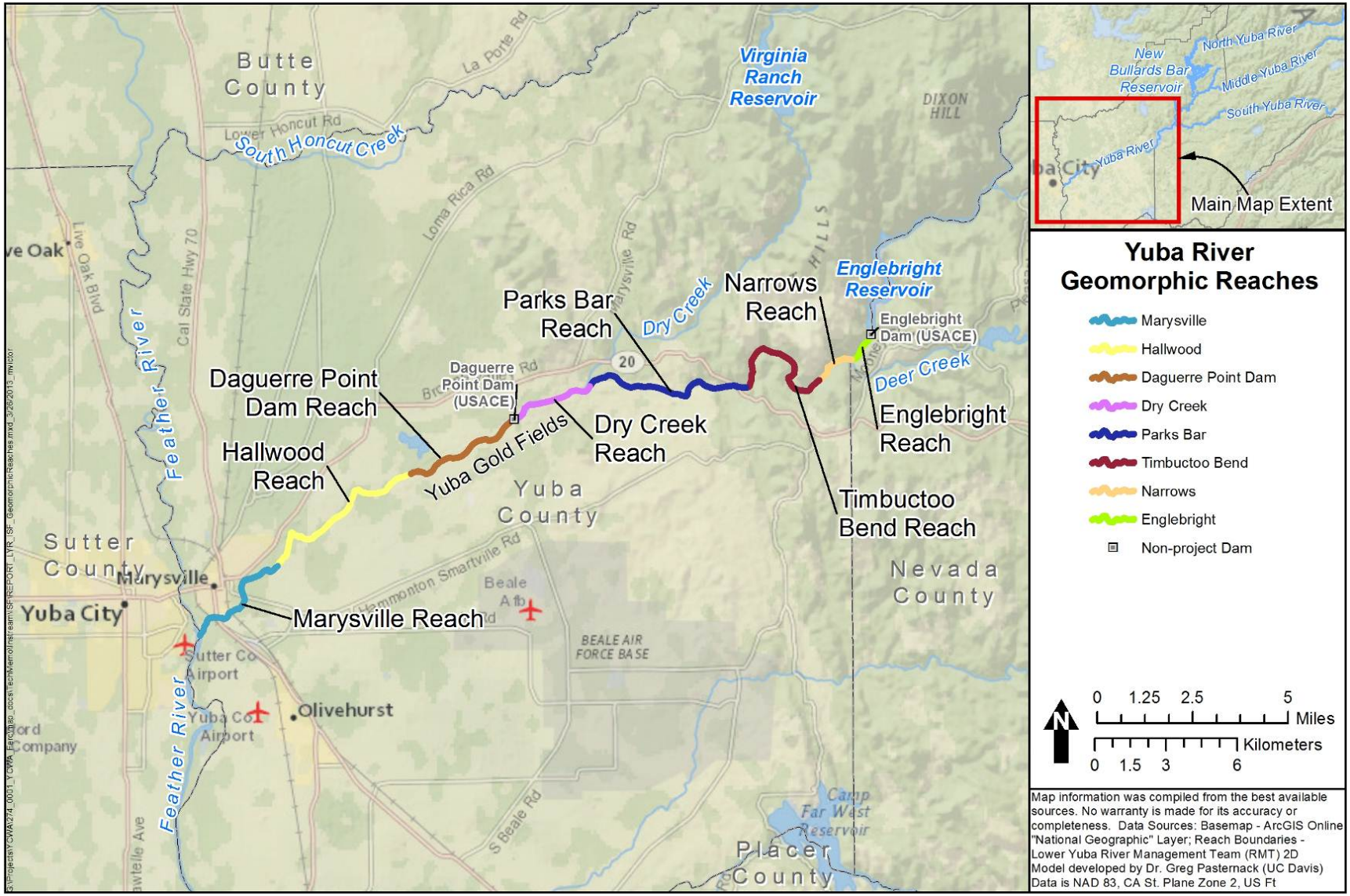

Figure 5.2-2. Map of study area showing geomorphic reach boundaries.

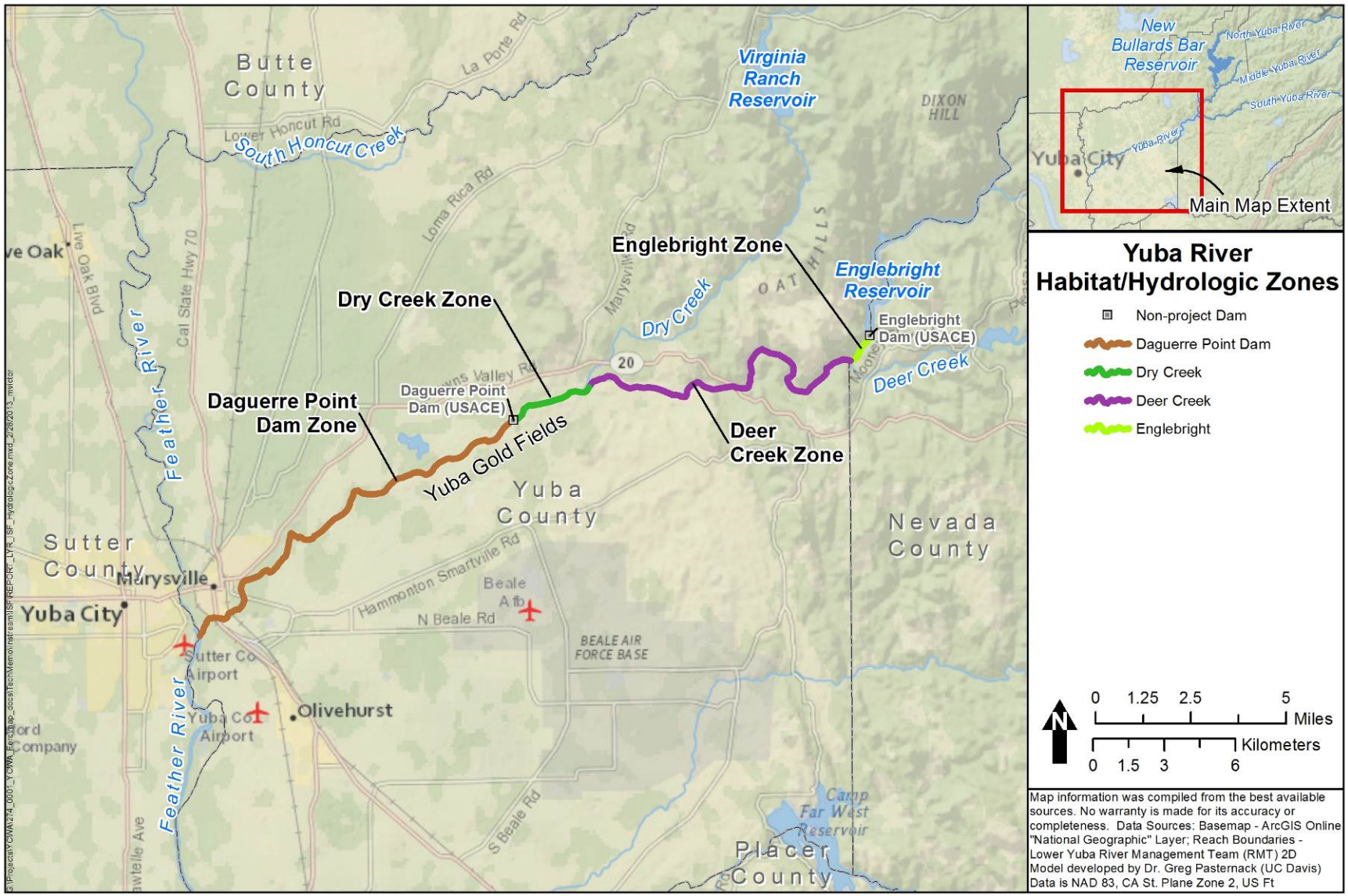

Figure 5.2-3. Map of habitat/hydrologic zone boundaries.

5.3 Downstream Extent of the Action Area

FERC's April 2011 Scoping Document 2 includes anadromous fish and EFH as potentially cumulatively affected resources. As described in the April 2011 Scoping Document 2 for the Yuba River Hydroelectric Project, California, Project No. 2246-058, NMFS suggested that the downstream extent of the potential action area for EFH include the lower Yuba River watershed to the confluence of the Feather River, the lower Feather River, the lower Sacramento River, and through the Sacramento-San Joaquin Delta to San Francisco Bay. In consideration of NMFS's suggestion, FERC's Scoping Document 2 further states "*At this time, we have tentatively determined a cumulative geographic scope for anadromous fish and EFH that includes the Yuba River Basin downstream to the confluence with the Feather River, the lower Feather River, to the lower Sacramento River, and through the Sacramento-San Joaquin Delta to the San Francisco Bay*." Actions throughout the Yuba River Basin and downstream to San Francisco Bay, including proposed Project actions, have the potential to affect the numbers of juveniles and smolts that are produced and survive outward emigration and returning adults to the Yuba River, and the conditions of those individuals. As previously described in Section 1.0 of this Applicant-Prepared Draft EFH Assessment, the recommended geographic scope in the April 2011 scoping document was included in this Applicant-Prepared Draft EFH Assessment to the extent necessary to understand potential effects on Chinook salmon and designated EFH, and how the Project would contribute to those effects.

For the reasons discussed in the following sections, it is not anticipated that direct or indirect effects to EFH would occur to listed species downstream of the mouth of the Yuba River (i.e., in the lower Feather River or Sacramento River).

Flow Considerations

To investigate whether Yuba River flows under the Proposed Action could result in measurable changes in lower Feather River aquatic habitat conditions, the following analysis was conducted.

- Step 1. Modeled daily flows in the lower Yuba River at Marysville were averaged to obtain monthly average flows under the Proposed Action scenario and the Base Case (Environmental Baseline) scenario.
- Step 2. Monthly average flows in the lower Feather River immediately downstream of the Yuba River were obtained from DWR's 2013 Delivery Reliability Report (DRR) Existing Conditions CalSim II scenario.
- Step 3. For the portion of the modeled period of record that is common between the two modeling platforms[23], which extends from October 1969 through September 2003, the differences between monthly average flows in the lower Yuba River at Marysville under the Proposed Action and the Environmental Baseline were calculated, and then added to the monthly average flows in the Feather River.

[23] Calsim II was used to derive modeled monthly average flows in the lower Feather River. Daily flow modeling was not available for the lower Feather River. YCWA's Water Balance and Daily Operations Model was used to derive modeled monthly flows in the lower Yuba River to provide an equitable basis of comparison.

- Step 4. The percent changes in monthy average flows in the Feather River immediately downstream of the Yuba River were evaluated to investigate whether changes in lower Yuba River flows at Marysville resulting from the Proposed Action have the potential to result in detectible changes in lower Feather River flows downstream of the confluence with the lower Yuba River.

Over the 407 months of the period evaluated (Oct 1969-Sep 2003), the average difference in monthly average flow is -0.03 percent (3 one-hundredths of 1 percent). Consequently, the Proposed Action, relative to the Environmental Baseline, would not result in detectable changes in Feather River flows immediately downstream of the Yuba River, and changes in aquatic habitat conditions downstream of the mouth of the Yuba River would not be measurable.

Moreover, operations of the SWP control relatively large flows in the lower Feather River. Thus, even if measurable changes to flows in the Yuba River were to occur, it would not be practicable to attempt to segregate potential changes in lower Feather River flow downstream of the Yuba River associated with potential changes in Yuba River outflow. This conclusion is consistent with previous analyses, as when NMFS (2016b) excluded the Sacramento River downstream from the Feather River from the action area for the BO on DWR and FERC's activities at the Oroville Facilities Hydroelectric Project (FERC Project No. 2100-134), stating "*While operations of Oroville Facilities do influence flows downstream of the confluence of the Feather River and the Sacramento River, through the Delta, San Pablo and San Francisco Bays to the ocean, these flows are mixed with natural flows and those related to the operation of the CVP, so that the effects are not easily segregated. The broader effects of the Oroville Facilities as part of the coordinated operations of the CVP and SWP are analyzed in the CVP/SWP BO. These include the effects of the co-mingled flows of the CVP and SWP in the lower Sacramento River, downstream from the confluence of the Feather River with the Sacramento River, through the Sacramento-San Joaquin River Delta, Suisun Bay, San Pablo Bay, San Francisco Bay, and westward to the Pacific Ocean. Therefore, in section 2.4 Effects of the Action of this Opinion, we do not consider the downstream effects of the proposed action in terms of how the Feather River flows influence the Sacramento River and fish downstream of the Feather River. The effects analyzed in the CVP/SWP BO, however, are considered in sections 2.2 Rangewide Status of Species and Critical Habitat in the Action Area and 2.6 Integration and Synthesis of this Opinion."* Therefore, considerations regarding system-wide effects of coordinated CVP and SWP operations in the Feather River, the Sacramento River and the Delta are presented in Section 6 (Species Managed Under the Pacific Coast Salmon Fisheries Management Plan) of this Applicant-Prepared Draft EFH Assessment.

Water Temperature Considerations

Because YCWA's Relicensing Water Temperature Model does not simulate changes in lower Feather River water temperatures, it is not possible to make a direct comparison of potential effects associated with daily water temperature changes at Marysville in the lower Yuba River with potential daily water temperature changes downstream in the lower Feather River. Therefore, to investigate whether changes in Yuba River water temperatures under the Proposed Action could result in measurable changes in lower Feather River aquatic habitat conditions, the following analysis was conducted:

- Step 1. Modeled daily water temperatures in the lower Yuba River at Marysville were averaged to obtain monthly average water temperatures[24] under the Proposed Action scenario and the Base Case (Environmental Baseline) scenario.
- Step 2. The weighted monthly average water temperature downstream from the Yuba River was computed by comparing the flow and water temperature at the mouth of the Yuba River with that from the Feather River upstream of the Yuba River. Monthly average flows in the lower Feather River were obtained from DWR's 2015 Delivery Capability Report (DCR) Base Conditions CalSim II scenario. Water temperatures in the Feather River were obtained through application of Reclamation's monthly water temperature model.
- Step 3. For the portion of the modeled period of record that is common between the modeling platforms[25], which extends from October 1969 through September 2003, the flow-weighted average water temperature in the Feather River below its confluence with the Yuba River was computed for each month of the common period of record, using each month's average water temperature and flow for the Yuba River at its confluence with the Feather River, and each month's average flow and water temperature on the Feather River upstream from the Yuba River.
- Step 4. The percent change in flow-weighted monthly average water temperatures in the Feather River near the confluence with the Yuba River was evaluated to investigate whether changes in lower Yuba River water temperatures at Marysville have the potential to result in detectible changes in lower Feather River water temperatures.

The period of interest for this water temperature evaluation extends from May through November. Over the 238 months of the period evaluated (Oct 1969-Sep 2003), the average difference in monthly average water temperature is 0.01 percent (1 one-hundredths of 1 percent). Consequently, the Proposed Action, relative to the Environmental Baseline, would not result in detectable changes in Feather River water temperatures immediately downstream of the Yuba River, and changes in aquatic habitat conditions downstream of the mouth of the Yuba River would not be measurable.

Therefore, based on these flow and water temperature considerations associated with the Proposed Action, this Applicant-Prepared Draft EFH Assessment does not include the lower Feather River as part of the Action Area. The lower Feather River, however, is considered in the context of the Central Valley fall-/late fall-run Chinook salmon ESU and the Central Valley spring-run Chinook salmon ESU, respectively (see Section 6.0 of this Applicant-Prepared Draft EFH Assessment).

The discussion of the status of species managed under the Pacific Coast Salmon Fisheries Management Plan (PFMC 2012) includes information on the species' life history, current known range and habitat use, distribution, and other data regarding factors necessary to the species'

[24] Monthly average water temperatures were calculated for the lower Yuba River in order to provide an equitable basis of comparison with the simulated monthly water temperatures in the lower Feather River.

[25] Calsim II was used to derive modeled monthly average flows and Reclamation's water temperature model was used to derive average monthly water temperatures in the lower Feather River. YCWA's Water Balance and Operations Model and Water Temperature Model was used to derive modeled flows and water temperatures in the lower Yuba River.

survival. Because in recent years managed species (i.e., Chinook salmon) are declining through many areas of their range, the overall population trend of a species has implications for new proposals that could result in additional effects on the species (USFWS and NMFS 1998). The trends of the remaining populations of managed species form the basis for evaluating the effects of a proposed action on that species. USFWS and NMFS (1998) further state that "*Unless a species' range is wholly contained within the action area, this analysis* [describing the status of a species within the action area] *is a subset of the preceding rangewide status discussion*."

Because the managed fish species (i.e., Chinook salmon) that inhabit the lower Yuba River are anadromous, they do not reside in the lower Yuba River during their entire lifecycles. Aquatic habitat conditions at the ESU scale, including the Feather River, the Sacramento River and the Sacramento-San Joaquin Delta (Delta) have the potential to affect Chinook salmon (Figure 5.3-1). Therefore, to characterize the existing habitat conditions associated with EFH for Chinook salmon, additional consideration is given to the aquatic habitat conditions, and potential limiting factors and threats that may influence Chinook salmon from both local and ESU-wide perspectives.

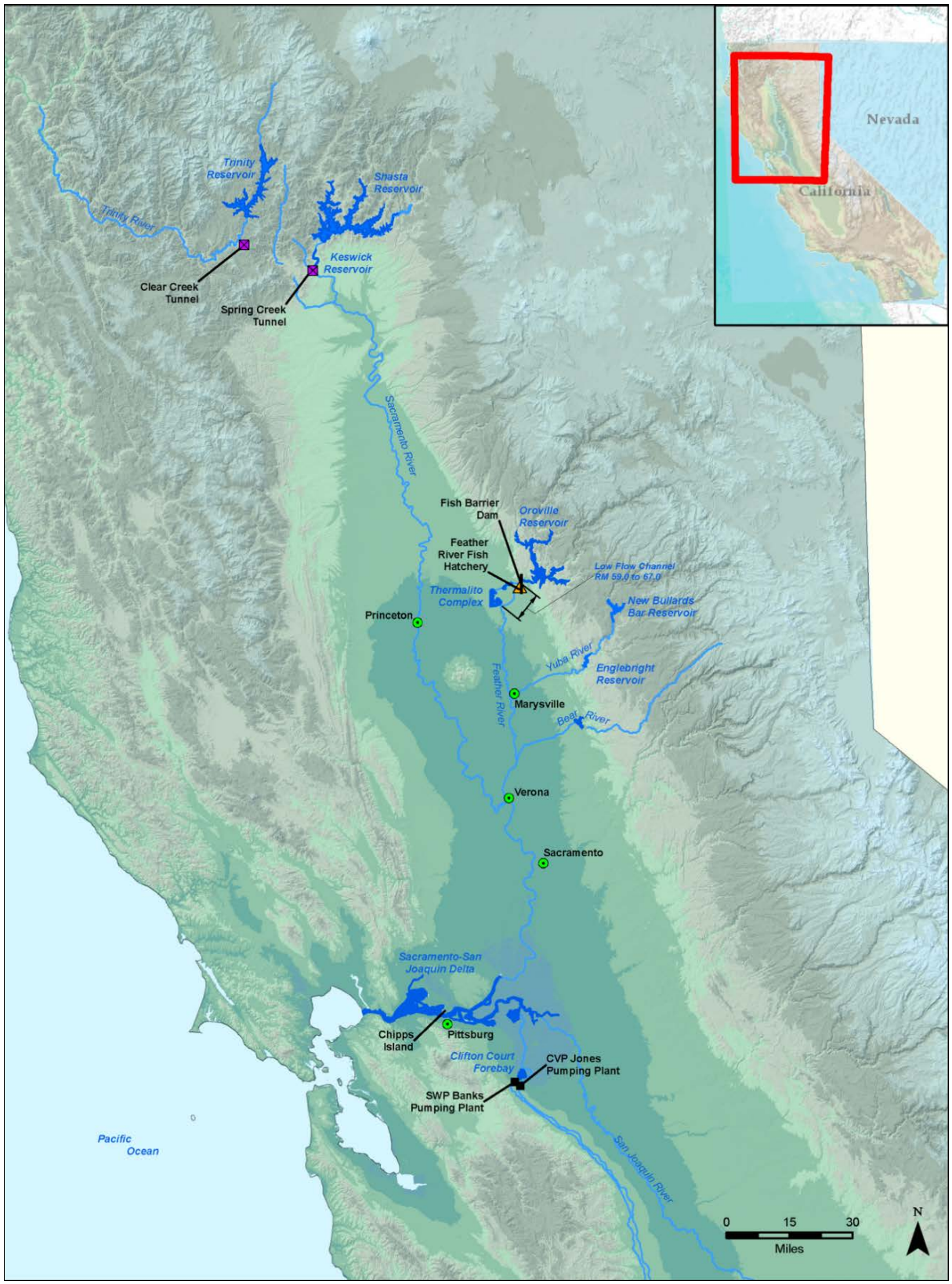

Figure 5.3-1. Other EFH areas affecting Yuba River spring- and fall-run Chinook salmon throughout the ESUs.

5.3.1 Feather River

The Feather River Basin encompasses an area of about 5,900 sq mi (DWR 2007). The Feather River is a major tributary to the Sacramento River and provides about 25 percent of the flow[26] in the Sacramento River (DWR 2007). The lower Feather River extends from the Fish Barrier Dam (RM 67.25) near Oroville Reservoir downstream to the confluence of the Feather and Sacramento rivers (RM 0) (Figure 5.3-1).

Flows in the lower Feather River are influenced by releases from Oroville Dam and Reservoir, which is operated by DWR as part of the SWP. Downstream of Oroville Dam, water is diverted in several directions to: (1) the Thermalito Complex; (2) the Feather River Fish Hatchery (FRFH); and (3) the Low Flow Channel. The sources combine below the Thermalito Afterbay, creating the High Flow Channel. The Low Flow Channel is highly regulated and contains the majority of the anadromous salmonid spawning habitat. The Yuba and Bear rivers are both tributaries to the Feather River. The Yuba River flows into the Feather River near the City of Marysville, 39 RM downstream of the City of Oroville. The Bear River flows into the Feather River about 55 RM downstream of the City of Oroville. Approximately 67 RM downstream of the City of Oroville, the Feather River flows into the Sacramento River near the town of Verona (DWR 2007).

As described in RMT (2010a), monitoring data indicate that water temperatures observed in the lower Feather River at Gridley (located approximately 20 mi upstream of the Feather-Yuba confluence) are warmer than those observed in the lower Yuba River at Marysville by 7°F to 16°F during June, 9°F to 14°F during July, and 11°F to 16°F during August for the 2008 and 2009 monitoring period; it is anticipated that water temperatures in the lower Feather River at the Yuba-Feather confluence would be even warmer.

The lower Feather River below the Yuba-Feather confluence primarily serves as a migration corridor for adult and juvenile anadromous fish. Adult spring-run Chinook salmon may be entering the Feather River as sexually immature fish and must hold in freshwater for up to several months before spawning (Moyle 2002), whereas fall-run Chinook salmon may be entering the Feather River and staging prior to spawning. While maturing, adult spring-run Chinook salmon hold over the summer in deep pools in the low-flow section of the Feather River between Thermalito Diversion Dam (5 miles below Oroville Dam) and the downstream Thermalito Afterbay Outlet (California HSRG 2012). DWR (2009) report that June through mid-October is the primary period during which water temperature could potentially limit Chinook salmon natural production in the Feather River, and that water temperatures above 68°F are likely detrimental to Chinook salmon holding in the Feather River. For the first 7.5 mi below the Fish Barrier Dam, water temperatures in the Feather River can be controlled by releasing water from Oroville Reservoir. Below the Thermalito Outlet, discharges of warmed water from the Thermalito Afterbay can increase ambient river temperatures (DWR 2009).

Downstream of the lower Feather River, flows are mixed with natural flows and those related to the operation of the CVP and the SWP, so that the effects of these co-mingled flows and their

[26] As measured at Oroville Dam.

effects on spring-run Chinook salmon are not easily segregated (NMFS 2016b). The broader effects of the co-mingled flows of the coordinated operations of the CVP and SWP on these species are analyzed in the 2009 NMFS BO (NMFS 2009c) for the coordinated operations of the CVP (Operations Criteria and Plan/OCAP BO). These include the effects of the co-mingled flows of the CVP and SWP in the lower Sacramento River, downstream from the confluence of the lower Feather River with the Sacramento River, through the Sacramento-San Joaquin River Delta, Suisun Bay, San Pablo Bay, and San Francisco Bay, and westward to the Pacific Ocean. Although this Applicant-Prepared Draft EFH Assessment does not include Sacramento River reaches downstream of the Feather River or the Delta as part of the Action Area, these areas are considered in the context of the spring- and fall/late fall-run Chinook salmon ESUs, respectively.

5.3.2 Sacramento River

The Sacramento River is the largest river system in California, yielding 35 percent of the state's water supply. Most of the Sacramento River flow is controlled by Reclamation's Shasta Dam and Reservoir, and river flow is augmented by transfer of Trinity River water through Clear and Spring Creek tunnels to Keswick Reservoir. Immediately below Keswick Dam, the river is deeply incised in bedrock with very limited riparian vegetation.

The upper Sacramento River is often defined as the portion of the river from Princeton (RM 163; downstream extent of salmonid spawning in the Sacramento River) to Keswick Dam (the upstream extent of anadromous fish migration and spawning). The Sacramento River is an important corridor for anadromous fishes moving between the ocean and Delta and upstream river and tributary spawning and rearing habitats. The upper Sacramento River is differentiated from the river's "headwaters" which lie upstream of Shasta Reservoir. The upper Sacramento River provides a diversity of aquatic habitats, including fast-water riffles and shallow glides, slow-water deep glides and pools, and off-channel backwater habitats (Reclamation and SAFCA 2004).

The lower Sacramento River is generally defined as the portion of the river from Princeton to the Delta at approximately Chipps Island (near Pittsburg). The lower Sacramento River is predominantly channelized, leveed and bordered by agricultural lands. Aquatic habitat in the lower Sacramento River is characterized primarily by slow water glides and pools, is depositional in nature, and has lower water clarity and habitat diversity, relative to the upper portion of the river.

5.3.3 Sacramento-San Joaquin Delta

The Delta is a vast, low-lying inland region located east of the San Francisco Bay Area, at the confluence of the Sacramento and San Joaquin rivers. Geographically, this region forms the eastern portion of the San Francisco estuary, which includes San Francisco, San Pablo, and Suisun bays (Figure 5.3-1). An interconnected network of water channels and man-made islands, the Delta stretches nearly 50 mi from Sacramento south to the City of Tracy, and spans almost 25 mi from Antioch east to Stockton (Public Policy Institute of California 2007). The Delta is a complex area for both anadromous fisheries production and distribution of California

water resources for numerous beneficial uses. The Delta also includes the federal CVP Jones Pumping Plant and the SWP Banks Pumping Plant in the south Delta (export pumps). Water withdrawn from the Delta provides for much of California's water needs, including both drinking water and water for agricultural irrigation purposes.

5.3.4 Pacific Ocean

The Pacific Ocean is part of the EFH for Pacific salmon. Important elements of marine EFH include estuarine rearing, ocean rearing, and juvenile and adult migration (PFMC 1999). The spatial distribution of suitable marine habitat conditions is affected by annual and seasonal changes in oceanographic conditions and may affect the tendency for fish to migrate from, or reside in, coastal areas after ocean entry (PFMC 1999). Although potential effects associated with the Project will not affect marine EFH, the Pacific Ocean is identified here for completeness in characterizing Pacific salmon EFH.