SECTION 2.0

PROPOSED ACTION AND ALTERNATIVES

This section describes the existing Project (i.e., No Action Alternative) and SSWD's proposed changes to the existing Project (i.e., SSWD's Proposed Project). Section 2.1 describes the No Action Alternative, the baseline from which to compare all action alternatives. Section 2.2 describes SSWD's Proposed Project. Section 2.3 describes alternatives considered but not analyzed in detail in this document.

2.1 No Action Alternative

Under the No Action Alternative, the Project would continue to operate into the future as it has historically operated (i.e., for the past 5 years) but with planned modification to the Camp Far West Dam Spillway as described below, and no new environmental PM&E measures would be implemented. Provided below is a description of: 1) existing Project facilities (Section 2.1.1); 2) existing Project Boundary (Section 2.1.2); 3) Project safety (Section 2.1.3); 4) current Project operations (Section 2.1.4); 5) conditions in the existing FERC license and other agreements and contracts that affect existing Project operations (Section 2.1.5), and facility maintenance (Section 2.1.6).

2.1.1 Existing Project Facilities and Features

The existing Project includes one development – Camp Far West. Figure 1.1-2 shows the Project in relation to the Bear and Feather River watersheds, and Figure 1.1-2 shows existing Project facilities and features.

The Project does not include any open water conveyance facilities, transmission lines, active borrow or spoil areas, the diversion dam located downstream from Camp Far West Dam, SSWD's Conveyance Canal, CFWID's Camp Far West Canal, or the intake structures to these water delivery canals.

Table 2.1-1 and Table 2.1-2 summarize key information for the Project's powerhouse and reservoir, respectively.

Table 2.1-1. Key information regarding the Camp Far West Hydroelectric Project's powerhouse.

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]	
Camp Far West	1	Francis	143	200	725	6,800	3,750	26,900

[1] Manufacturer's stated turbine and/or generator capacity, as shown on equipment nameplate.

[2] Defined as the average available capacity during the period of highest demand within the driest recent historical period, which for this purpose is July and August 1977.

[3] Megawatt hours: 1,000 kilowatt hours.

Table 2.1-2. Key morphological information regarding the Camp Far West Hydroelectric Project's reservoir.

Project Reservoir	NMWSE (ft)	Gross Storage[1] (ac-ft)	Usable Storage[2] (ac-ft)	Surface Area[3] (ac)	Maximum Depth[3] (ft)	Shoreline Length[3] (mi)	Drainage Area At Dam (sq mi)
Camp Far West	300	93,737	91,327	1,886	155	29	284

Key: NMWSE = normal maximum water surface elevation; ft =feet; ac-ft = acre-feet; ac = acres; mi = miles; and sq mi = square miles

[1] Defined as the reservoir storage between the NMWSE and the bottom of the reservoir.

[2] Defined as the reservoir storage between the NMWSE and the invert of the 72-inch hollow jet valve level outlet (i.e., 175 ft), below which there is 2,500 ac-ft of reservoir storage that is not available for release (i.e., dead storage).

[3] At NMWSE.

Existing Project facilities and features are described below.

2.1.1.1 Main Dam and Auxiliary Dams

2.1.1.1.1 Main Dam

The first Camp Far West Dam was a 50-ft high concrete gravity structure built by the CFWID in 1927. Construction on the current dam was completed in January1964 by SSWD as part of the California State Water Plan to enhance water supply in California's Central Valley. Camp Far West Dam and Reservoir are not part of California's State Water Project.

The main embankment of the existing dam is a zoned earthfill structure, which is 185 ft high, 40 ft wide at the crest and 2,070 ft long. The dam has variable 2 to 1, 2.5 to 1, and 3 to 1 upstream slopes, with a 60-ft wide beam at an elevation of 200 ft, and a 2 to 1 downstream slope. The certified crest of the dam is at an elevation of 320 ft and has an additional 2.2 to 3.1 ft of camber resulting from roadway construction along the dam crest.

The central impervious core of the main embankment is comprised of compacted silts, clays, and gravels. Upstream from the core is a compacted shell of sand, gravel, and cobbles. Downstream and separated from the core by an inclined chimney drain is a shell of compacted clays and silts, which is further overlain by a shell of compacted rock with soil fines. Underlying the center portion of the embankment over the original river channel and extending from the 12-ft thick inclined chimney drain to the downstream toe is a 6-ft-thick, 100-ft-wide horizontal drain blanket. Both upstream and downstream slopes of the embankment are covered with a layer of riprap having a maximum diameter of 3 ft.

Figure 2.1-1 shows the Camp Far West Dam.

Figure 2.1-1. Photograph of some Camp Far West Hydroelectric Project facilities and features.

2.1.1.1.2 North and South Wing Dams

Adjacent to the left abutment of the main embankment is the south wing dam constructed of earthfill with a maximum height of 45 ft, a crest width of 20 ft, and length of 1,060 ft. Constructed to the north of the main embankment opposite the spillway is the north earthfill wing dam that is 25 ft in height, 20 ft in width at the crest, and 1,460 ft in length. The upstream slopes of the south and north wing dams are 2.5 to 1 and 3 to 1, respectively. The downstream slopes of both wing dams are 2.5 to 1. The north and south wing dams are constructed of compacted clays and silts. The upstream outside slope of the two wing dams is covered with 3 ft of riprap underlain by an 18-in. layer of gravel bedding. The downstream slope of the south wing dam is protected by a layer of riprap with a minimum thickness of 3 ft.

2.1.1.1.3 North Dike

The Project includes an earthfill dike constructed to the north of the north wing dam, and referred to as the north dike. The north dike is 15-ft-high, has a crest length of 1,450 ft, and a crest width of 20 ft. The nominal elevation at the top of the dike is 320 ft.

2.1.1.2 Camp Far West Reservoir

When the main dam was built, the reservoir had a surface area of 2,020 ac and storage volume of 104,000 acre-feet (ac-ft) at the Normal Maximum Water Surface Elevation (NMWSE) of 300 ft. Based on recent SSWD topographic and bathymetric surveys, the current reservoir surface area is 1,886 ac with a gross storage capacity of approximately 93,737 ac-ft at the NMWSE of 300 ft. The reservoir contains 1,307 ac-ft and has a surface area of about 74 ac at its minimum operating elevation of 175 ft, below which the reservoir storage is not available for release (i.e., dead storage). Maximum reservoir depth is approximately 155 ft, relative to the NMWSE. Figure 2.1-2 shows Camp Far West Reservoir.

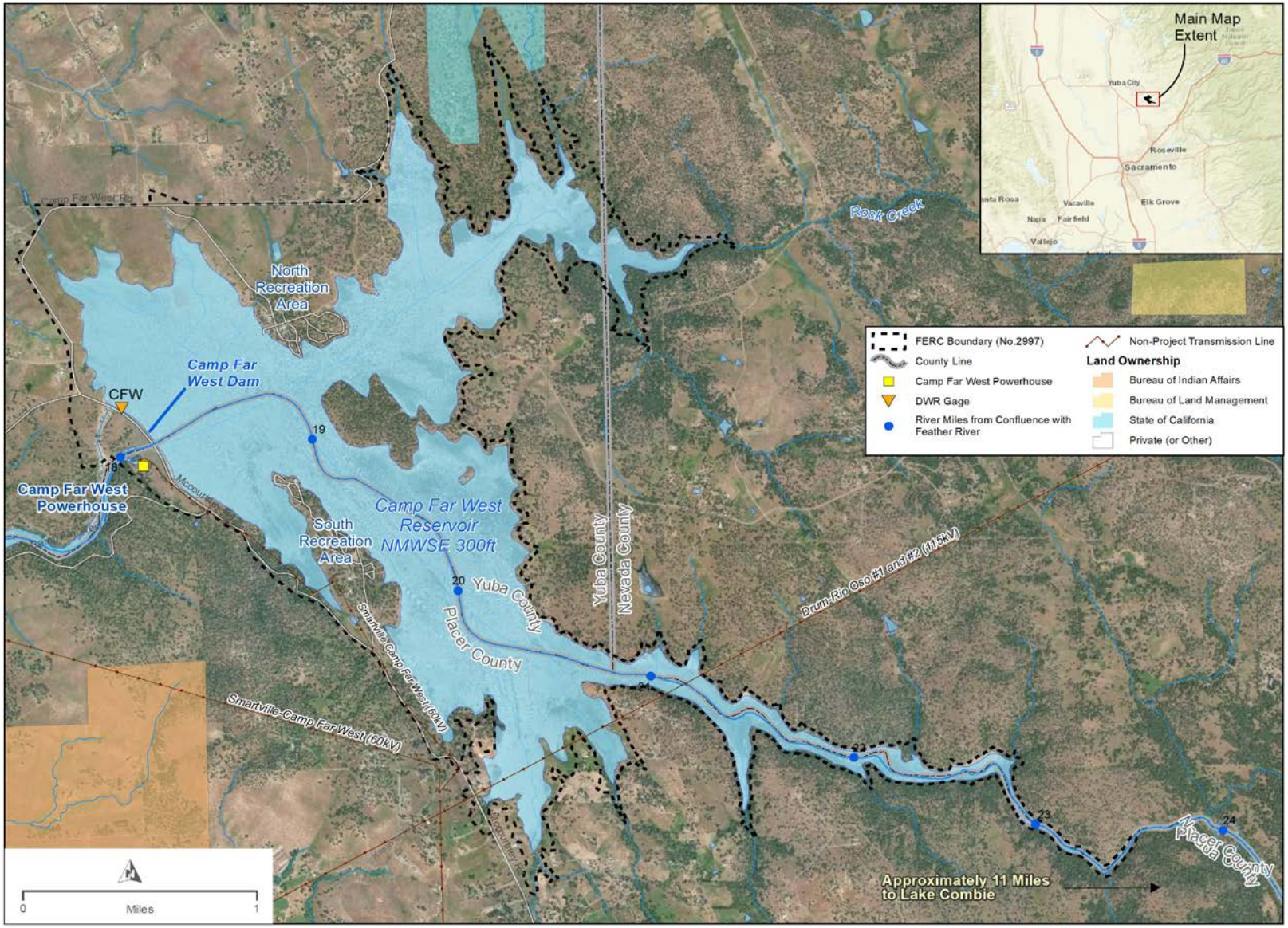

Figure 2.1-2. Camp Far West Reservoir and associated facilities and features.

2.1.1.3 Camp Far West Spillway

2.1.1.3.1 Existing Spillway

An overflow spillway is located adjacent to the right abutment of the Camp Far West main dam. The spillway structure consists of a 15-ft-wide reinforced concrete approach apron with the invert at 290 ft, an ungated, ogee-type reinforced concrete structure with a crest length of 300 ft, and a 77-ft long downstream reinforced concrete chute with vertical reinforced concrete counterforted sidewalls. The spillway crest elevation is 300 ft. The channel downstream of the spillway terminates in a chute excavated in solid rock. This unlined channel then joins the Bear River approximately 1,200 ft below the main dam. A 302.5-ft single-span, steel-truss bridge across the spillway crest provides access across the dam. The spillway has a maximum design capacity of 106,500 cubic feet per second (cfs) at a reservoir elevation of 320 ft. Figure 2.1-1 shows the existing Camp Far West Dam Spillway.

2.1.1.3.2 Ongoing Spillway Modification to Meet Probable Maximum Flood

In 2005, the probable maximum flood (PMF) was recalculated for the Camp Far West Hydroelectric Project resulting in a Camp Far West Dam spillway capacity of less than the PMF and consequently inadequate spillway capacity. Since the existing spillway capacity at NMWSE (i.e., 106,500 cfs) is less than the recalculated peak outflow during the PMF (i.e., approximately 126,600 cfs [NHC 2006]), FERC directed SSWD to increase the spillway capacity to accommodate passage of the revised PMF and avoid overtopping the dam at a reservoir elevation of 320 ft. Similarly, the California Division of Safety of Dams (DSOD) directed SSWD to increase the spillway capacity to ensure passage of the revised PMF with 1.0 ft of freeboard at the dam. The modification is needed to assure that the Camp Far West Dam spillway could accommodate the PMF wherein water would flow over the spillway rather than overtop the dam embankment thereby avoiding the risk of dam failure along with sudden and significant downstream flooding. SSWD is coordinating with FERC and DSOD to modify the spillway, as directed.

At the time this Application for New License is filed, the spillway modification, which has been agreed to by FERC,[1] includes the following:

- New Auxiliary Spillway Structure. The proposed new auxiliary spillway structure would be an ogee-type weir, horizontally concaved, with a crest length of 300 ft. The spillway would be constructed of reinforced concrete and be of similar design to the existing, adjacent spillway structure. Although the auxiliary spillway is being constructed to elevation 305 ft, it will not affect the existing Camp Far West Reservoir NMWSE because the reservoir will still spill over the existing elevation 300 ft spillway: the auxiliary spillway would only be activated at higher inflows.

[1] FERC approved the spillway modification in a memo filed on July 3, 2007 (Accession No. 200170709-0225).

- New Inlet Channel. A new unlined spillway inlet channel would be excavated upstream of the auxiliary spillway structure, within the Camp Far West Reservoir area, to divert water to the new auxiliary spillway. The width of the new auxiliary inlet channel would be a minimum of 300 ft at its narrowest, and the bottom elevation of the channel would be a constant 290 ft elevation. The side slopes of the channel would be constructed at 1:1 slopes where moderately weathered or un-weathered rock is encountered and 2:1 slopes for all other material types.
- New Outlet Channel. A new unlined auxiliary spillway outlet channel would be constructed downstream of the new auxiliary spillway structure to convey water back to the existing spillway channel. The channel would be approximately 805 ft long with a slope varying from -3 percent to -5.6 percent. The side slopes of the channel would be constructed at 1:1 slopes where moderately weathered or un-weathered rock is encountered and 2:1 slopes for all other material types.
- New Bridge. A new approximately 300-ft-long bridge would be constructed for the new auxiliary spillway to provide continuity and allow vehicular traffic to pass over the dam and along Blackford Road. The bridge would be constructed of precast concrete girders, and consist of side concrete barriers and a paved road surface. Guardrails would be placed at the ends of the bridge for transition from the road to the bridge. The bridge would be supported by concrete abutments at each end and two additional piers, evenly spaced.
- Grading and Raising Existing Blackford Road. Construction of the new bridge to a top-of-paved-surface-elevation of 325 ft would require the existing Blackford Road to be raised approximately 15 ft at the west end of the proposed new bridge to accommodate the approach to the bridge over the new auxiliary spillway. The new bridge would ramp back down to the existing road grade on the east end. Fill would be required on the west end of the bridge in order to accommodate the approach to the new spillway bridge. Maximum grade would be approximately 6 percent, similar to existing maximum grade. The road width would be 24 ft along Blackford Road and 20 ft along Camp Far West Road. Fill side slopes would be constructed at 2:1.
- Relocation of Existing Powerline. A segment of an existing distribution powerline, which is located just south of the proposed new auxiliary spillway and owned and operated by Pacific Gas and Electric (PG&E), would be relocated. The line serves only as a distribution line from the Camp Far West Powerhouse switchyard to the main grid and would not disrupt power distribution to other users.

SSWD anticipates that the auxiliary spillway would be constructed in the course of 3 months in fall 2020 and 5 months in spring-summer 2021.

When the spillway modification is complete, the auxiliary spillway in combination with the existing spillway will have a combined capacity of 134,600 cfs at a water surface elevation of 318.5 ft.

For the purposes of this Application for New License, SSWD assumes the spillway modification is fully implemented under the existing license and is in place when FERC issues a new license for the Project.

2.1.1.4 Water Intakes and Water Conveyance Systems

2.1.1.4.1 Intakes

There are two intake structures associated with the Camp Far West Dam; the power intake that was constructed when hydropower was added to the dam, and the intake structure for the outlet works. Both structures are submerged for most of the year and are located at the upstream toe of the main dam.

The power intake structure consists of a reinforced concrete ungated vertical intake tower 22-ft-high, with openings on three sides; two 10-ft-wide by 14-ft-high and one 10-ft-wide by 10-ft-high. The openings are protected by steel trashracks on 6-in. centers. A concrete bulkhead enables positive closure and the sill elevation measures 197.0 ft.

The intake for the outlet works consists of a reinforced concrete ungated vertical intake tower 25-ft-4 in. high, with openings on three sides – each 7-ft-wide by 8-ft-high. The openings are protected by steel trashracks on 6-in. centers and the sill elevation measures 175.0 ft.

2.2.2.4.2 Water Conveyance Systems

There are three main conveyance systems associated with the Camp Far West Dam. The overflow spillway discussed above flows into an unlined rock conveyance channel that carries the spill back into the Bear River downstream of the dam.

The power intake structure described above connects to a 760-ft-long, 8-ft diameter concrete tunnel through the left abutment of Camp Far West Dam that conveys water directly to the Camp Far West Powerhouse, which discharges to the Bear River at the base of Camp Far West Dam.

A 350-ft-long 48-in. diameter steel pipe connects the intake structure for the outlet works described above to a valve chamber, and a 400 ft long, 7.5-ft diameter concrete-lined horseshoe tunnel connects the valve chamber to a 48-in. diameter Howell Bunger outlet valve on the downstream face of Camp Far West Dam. The valve has a release capacity of 500 cfs at NMWSE and discharges directly into the Bear River.

Each facility is shown on Figure 2.1-1.

2.1.1.5 Camp Far West Powerhouse

The powerhouse was constructed in conjunction with the addition of hydropower licensed in 1981 after Camp Far West Dam was built and in operation. The powerhouse is an above-ground, steel reinforced concrete structure that houses a single vertical-shaft Francis-type turbine. The turbine-generator unit is rated at 6,800 kilowatts (kW) under a rated head of 143 ft and a rated

flow of 725 cfs. The unit includes a synchronous three-phase, 13.6 kilovolt (kV) generator with a capability of 6,800 kW. The intake is submerged in the reservoir. Figure 2.1-1 shows the Camp Far West Powerhouse.

2.1.1.6 Camp Far West Switchyard

The Camp Far West Switchyard is a fenced switchyard adjacent to the Camp Far West Powerhouse containing a 6/8 NVA, OH/FA, three phase, 13.8 kV – 60 kV, delta-ground wye power step-up transformer; a 60 KV, 31, 60 Marts, 600 ampere, 1,000 MVA short circuit bulk oil circuit breaker; and appropriate disconnect switches. The switchyard also contains PG&E electrical equipment facilities that are not part of the Project. Figures 3.1-1 shows the Camp Far West Switchyard.

2.1.1.7 Camp Far West Reservoir Recreation Facilities

There are two developed recreational areas on the Camp Far West Reservoir, both of which are owned by SSWD and leased to a private concessionaire to operate. The North Shore Recreation Area (NSRA) is located off of Camp Far West Road in Wheatland, CA. This campground is currently open year-round. The South Shore Recreation Area (SSRA) is located off of McCourtney Road (Placer Co. C6037) in unincorporated Lincoln, CA, and is only open from mid-May until September. The boat launching facility at the NSRA was reconstructed in 2003-2004. Table 2.1-3 provides details of the recreation facilities at the NSRA and the SSRA. Figure 2.1-2 shows the locations of the NSRA and SSRA.

Table 2.1-3. Camp Far West Hydroelectric Project recreation facilities.

Facility	Amenity	North Shore Recreation Area	South Shore Recreation Area
Family Campgrounds	No. Sites (standard)	70	67
	Sites (RV with hookups)	10	none
	Parking Spurs	1 spur per site	1 spur per site
	Overflow Parking Spaces	None	18 single
	Restrooms	2 flush	1 flush, 2 vault
Group Campgrounds	Sites	2, 25-person group sites, 1, 50-person horse camp site	1, 50-person group site
	Parking Spaces	None[1]	10
	Restrooms	4 portable chemical toilets	None[2]
Day Use Areas	Picnic Sites	20	33
	Swim Beaches	1	1
	Parking Spaces	None[3]	44
	Restrooms	1 flush	None[4]
Boat Ramps	Number	1, 4-lane concrete ramp	1, 2-lane concrete ramp
	Parking Spaces	82 single, 73 vehicle with trailer	52 vehicle with trailer
	Restrooms	1 flush	1 flush
Dispersed Use Areas[5]	Sites	2	2
	Restrooms	6 portable chemical toilets	6 portable chemical toilets

Table 2.1-3. (continued)

Facility	Amenity	North Shore Recreation Area	South Shore Recreation Area
Other Facilities	Entrance Station	1	1
	Store	1	1
	RV Dump Station & Holding Pond	1	1
	Concessionaire Trailers	2	1
	Water Treatment Plant	1	None[6]
	Water Storage Tank	1, 60,000-gallon tank	None[6]

[1] The group campsites use the adjoining family campground restroom building.
[2] Parking is available in open areas adjacent to the group sites, but is not designated or defined.
[3] The day use area (picnic area and swim beach) uses the adjoining boat ramp parking area for parking.
[4] The picnic area uses the adjoining boat ramp restroom building.
[5] The dispersed use areas provide day use and overnight opportunities with minimal facilities (roads, portable chemical toilets and trash cans).
[6] Water is piped under the reservoir to South Shore Recreation Area from the North Shore Recreation Area treatment plant and storage tank.

A recreational water system source is Camp Far West Reservoir, where two pumps in the reservoir deliver water at 70 gallons/minute (5,000,000 gallons or 15.3 ac-ft per year) uphill via underground piping to the water treatment facility in the NSRA. After being treated, the water is piped nearby to a 60,000-gallon storage tank constructed of belted steel and recently installed in 2011. From the storage tank, underground distribution piping sends the water throughout the NSRA and SSRA. The SSRA facilities are connected via two pipes under the reservoir that sends the water from the NSRA to the SSRA.

Both NSRA and SSRA have a sewage holding pond with an aerator to handle the sanitary needs of the flush restroom buildings and the RV dump stations at each recreation area. The NSRA and SSRA ponds have surface areas of approximately 1.5 and 0.5 ac, respectively. The NSRA sewage system uses a gravity-feed operation and is supplemented by a pump to get the sewage up to the holding pond. The SSRA sewage system is a gravity-fed system. SSWD maintains the sewage ponds in conformance with a permit issued by the Central Valley Regional Water Quality Control Board.

2.1.1.8 Gages

Flow data for the Project comes from four gages, data for two of which are published by the USGS (Table 2.1-4). SSWD also measures spill through the Camp Far West Dam spillway by indirect stage method.

Table 2.1-4. Streamflow and other gages in the Camp Far West Hydroelectric Project Vicinity.

United States Geological Survey (USGS) Identifier	California Data Exchange Center (CDEC) Identifier[1]	Gage Name	Measures
--	--	Camp Far West Dam Low-Level Outlet Flowmeter[2]	Low-level outlet discharge
--	--	Camp Far West Powerhouse Flowmeter[2]	Powerhouse discharge
11423700[3]	CFW[4]	Bear River at Camp Far West Dam (Camp Far West Reservoir)	Reservoir Stage and Storage

Table 2.1-4. (continued)

United States Geological Survey (USGS) Identifier	California Data Exchange Center (CDEC) Identifier[1]	Gage Name	Measures
11423800[5]	CFW[6]	Bear River Fish Release below Camp Far West Reservoir	Compliance with flow requirements in Existing FERC License

[1] Unlike USGS data which are reviewed for quality by USGS prior to publishing the data, CDEC data are not reviewed by CDEC before being made available.
[2] Flowmeters below Camp Far West Dam at low-level outlet and powerhouse are currently maintained by the Sacramento Municipal Utility District (SMUD) and data are not reported publicly.
[3] USGS gage 11423700 measured Camp Far West Reservoir storage, but has not been reported by USGS since September 30, 1983.
[4] CDEC gage CFW, maintained by DWR Flood Management, reports real-time Camp Far West Reservoir stage and end-of-month Camp Far West Reservoir storage-.
[5] USGS Gage 11423800, maintained by USGS, reports river flow below the non-Project diversion dam for compliance with the FERC license. It is not a full flow gage.
[6] CDEC gage CFW reported computed flow downstream from Camp Far West Dam, but is inactive as of June 1, 2018.

Figure 2.1-3 shows the fish release valve in the non-Project diversion dam. Water is released through a slide gate into a concrete structure on the south-side of the non-Project diversion dam. The structure includes a rectangular notch and weir plate. The water level is measured to determine the depth of flow over the weir and calculate flow.

Figure 2.1-3. Camp Far West Hydroelectric Project minimum flow compliance gage (USGS Gage 11423800, Bear River Fish Release below Camp Far West Reservoir.

Seven gages exist downstream of the Project. One gage is a stage gage that measures the stage of the pool formed by the non-Project diversion dam, and the other six are flow gages. One flow gage is located on CFWID's North Canal to measure diversions into the canal from the Bear River. Two flow gages are located on SSWD's Main Canal: one gage measures diversions from SSWD's Main Canal into CFWID's South Canal, and the second gage is located further along the Main Canal and measures flow in the Main Canal past the CFWID's South Canal withdrawal.[2] The fourth flow gage is USGS Gage 11424000, *Bear River near Wheatland*, reported by California Data Exchange Center (CDEC) as BRW, *Bear River near Wheatland*, located 6.5 mi downstream from Camp Far West Dam, 200 ft downstream of the State Highway 65 bridge crossing, which is a full-flow gage and is maintained by USGS and DWR. The last flow gage is CDEC Gage BPG, *Bear River at Pleasant Grove Road*, a full-flow gage maintained by DWR and located 10.5 mi downstream from Camp Far West Dam. Figure 2.1-4 shows the location of the gages.

[2] SSWD Main and Canal and CFWID South Canal and North Canal diversions are measured and reported in compliance with CA SWRCB Surface Water Measurement and Reporting Regulations (California Code of Regulations, Title 23, Chapters 2.7 and 2.8). Beginning January 1, 2020, hourly diversion data will be reported weekly, and will be publicly available.

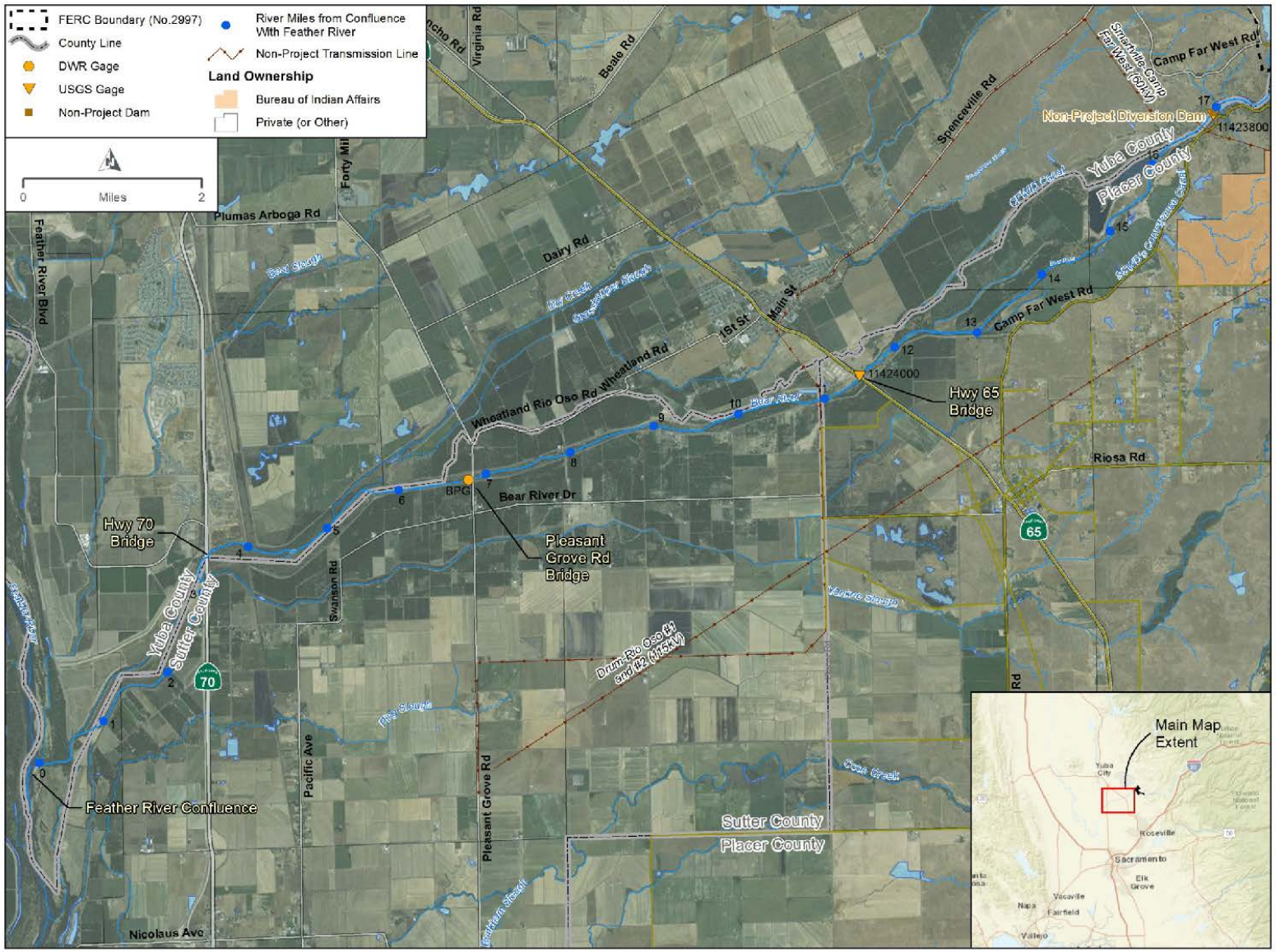

Figure 2.1-4. Location of downstream flow streamflow gages.

2.1.1.9 Primary Project Roads and Trails

There are no Primary Project Roads or Trails included explicitly in the existing FERC-licensed Project facilities.

2.1.2 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 Camp Far West Hydroelectric Project, the existing FERC Project Boundary encompasses 2,863.7 ac of land. SSWD owns over 95 percent (2,710.5 ac) of the land within the boundary, and the remaining 5 percent (153.2 ac) of the land is owned by private parties – no federal or state land occurs within or adjacent to the FERC Project Boundary or along the Bear River downstream of the Project. The boundary generally follows the 320 ft elevation contour around Camp Far West Reservoir with the exception of the additional lands included at the northwest end of the reservoir that include the NSRA and additional lands included at the southwest end of the reservoir that include the SSRA.

2.1.3 Existing Project Safety

The Project has been operating for more than 35 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. SSWD has a strong commitment to employee and public safety, which is reflected in its safety procedures and training program, and its safety record.

2.1.4 Operations

2.1.4.1 Use of SSWD's Water Balance/Operations Model

SSWD has operated the Project since 1984. However, Project operations have changed through time. Therefore, historical operations information (e.g., flows, storage and generation) may not provide the best picture of current existing conditions. To describe better existing operations of Camp Far West Reservoir and associated hydropower and irrigation facilities over a range of hydrologic conditions, SSWD developed the Camp Far West Hydroelectric Project Water Balance/Operations Model (Ops Model).

The Ops Model is a tool to examine water supply and hydropower generation under a variety of hydrologic and operational conditions, and addresses operational decisions including: stream flow requirements, water supply, recreation, and hydropower generation. The Ops Model simulates operations subject to the physical constraints of the Project, including maximum and minimum reservoir elevations, reservoir outlet and powerhouse capacities, and the existing

configuration of the Camp Far West Dam Spillway. Ops Model logic focuses on operations of Camp Far West Reservoir and the downstream non-Project diversion dam, which includes simulated diversions into SSWD's Main Canal and CFWID's North Canal and South Canal. Irrigation diversions are based on estimated agricultural demands, Camp Far West Reservoir storage and anticipated releases and diversions from upstream water storage projects. The Ops Model contains data for historical water transfers but does not include water transfers in its simulation of operations. The Ops Model also includes a representation of the Bear River downstream of the diversion dam to the confluence of the Bear River with the Feather River, including tributary inflow from Dry Creek at river mile (R.M.)[3] 5.1. Three additional stream nodes are located downstream of the diversion dam: Bear River at Wheatland; Bear River at Pleasant Grove Road; and the Bear River at the confluence with the Feather River. Table 2.1-5 provides a summary of output available from the Ops Model and Figure 2.1-5 is an overview of the Project, SSWD and CFWID service territories, and Ops Model nodes.

Table 2.1-5. Summary of Ops Model nodes and outputs.

Model Node	Model Output
NODES WITHIN PROJECT	
Camp Far West Reservoir	Storage and elevation
Camp Far West Powerhouse	Generation and release through turbine
Camp Far West Dam	Release from low-level outlet and spillway
NODES DOWNSTREAM OF PROJECT	
CFWID North Canal	Diversion into canal
CFWID South Canal	Diversion into canal
SSWD Main Canal	Diversion into canal
Non-Project Diversion Dam	Estimated flow below diversion dam
Bear River at Wheatland	Estimated flow in river
Bear River at Pleasant Grove Road	Estimated flow in river
Bear River at Feather River	Estimated flow in river

[3] In this exhibit, river miles are estimated using SSWD's relicensing Geographic Information System (GIS) of the Bear River basin moving from downstream to upstream in the Bear River with R.M. 0.0 designating the confluence of the Bear River with the Feather River.

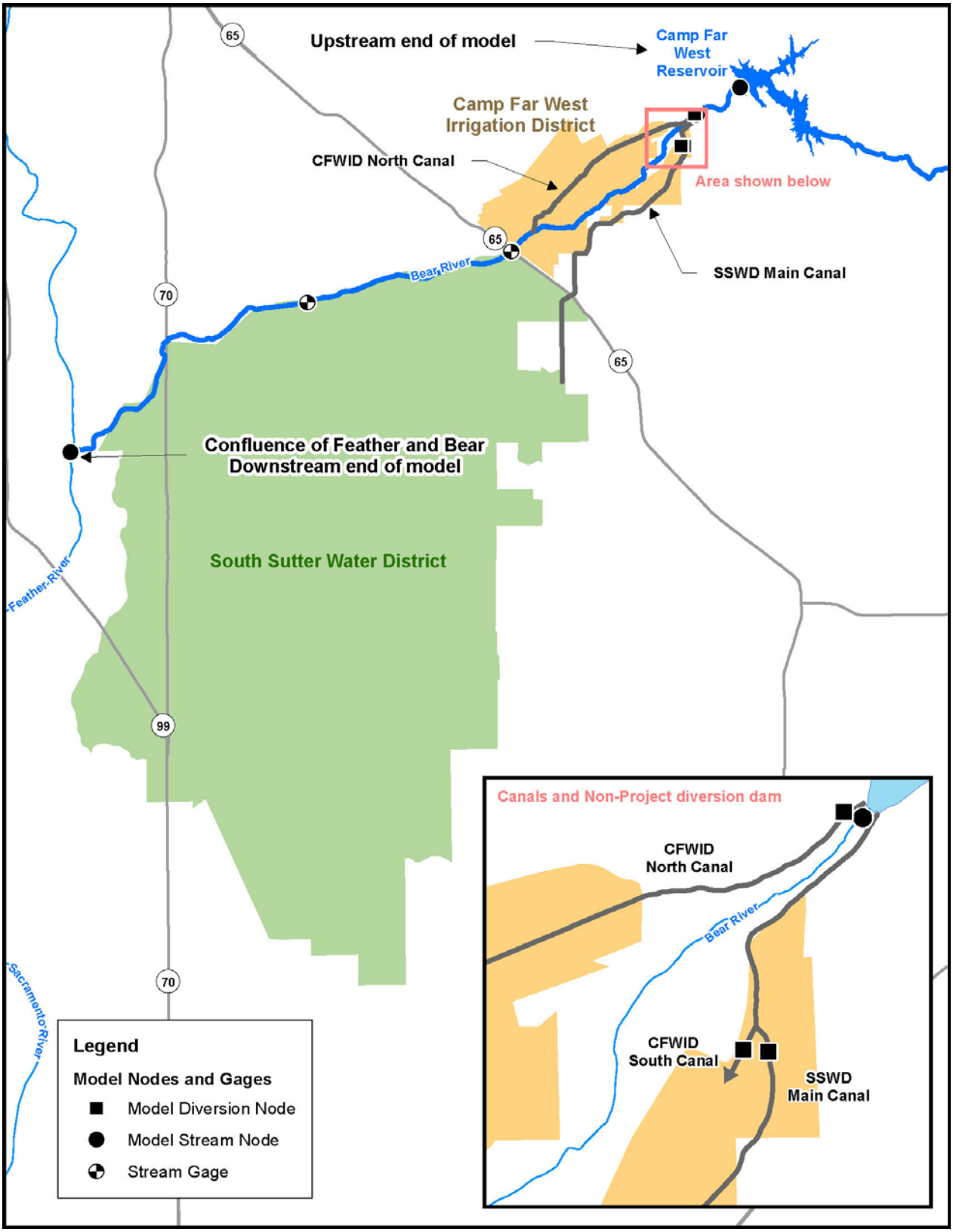

Figure 2.1-5. Camp Far West Hydroelectric Project, SSWD and CFWID service territories, and Ops Model nodes.

The Ops Model simulates operations on a daily time-step for 39 years of historical hydrology from Water Year (WY) 1976 through WY 2014. This period covers a range of hydrologic conditions and includes both the driest (1977) and wettest (1983) years on record, based on total annual inflow to Camp Far West Reservoir. The period also includes three multi-year periods of below average inflow: WYs 1976 through 1977; WYs 1987 through 1992; and WYs 2012 through 2014.

The Ops Model is a Microsoft Excel spreadsheet. SSWD selected Microsoft Excel as the Ops Model platform for several reasons including: availability to Relicensing Participants;[4] transparency of Ops Model logic and operations; flexibility in developing operational rules; and existing familiarity with spreadsheets for most Relicensing Participants. The Ops Model allows user-defined variables to be changed and different operations to be evaluated. Ops Model operational logic is transparent and editable.

The Ops Model includes preliminary WY types based on five WY types proposed for the upstream Nevada Irrigation District's (NID) Yuba-Bear Project (FERC Project No. 2266) and Pacific Gas and Electric's (PG&E) Drum-Spaulding Project (FERC Project No. 2310), collectively, the Yuba-Bear Drum Spaulding (YB/DS) Projects. The YB/DS Projects' WY types are used in the Ops Model for reporting model results and to evaluate potential operational decisions. The existing Project license includes only two WY types.

The Ops Model was developed and validated with inputs designed to represent historical operations and historical inflow.

Then, the Ops Model was used to develop a Baseline scenario, assuming YB/DS Projects near-term operations with assumed new YB/DS FERC license requirements based on the FERC-issued Final Environmental Impact Statement (FEIS) for both projects and the current level of development upstream. The YB/DS Projects are currently in the process of relicensing. Therefore, upstream operations are expected to change in the near future and those changes will affect inflow into Camp Far West Reservoir and SSWD's operations. Inflow into Camp Far West was provided by HDR Inc., a consultant to NID and PG&E for the YB/DS relicensing, based on a model of the YB/DS Projects. The Baseline scenario includes Camp Far West operations representative of how SSWD currently operates the Project, and includes all current physical, regulatory, and contractual constraints.

The Ops Model was then used to develop two separate Proposed Project simulations. The first scenario, Proposed Project (Near-Term Condition), assumes YB/DS Projects operations with assumed new YB/DS FERC license requirements based on the FERC-FEIS for both projects, the current level of development upstream, and SSWD's Proposed Project. The second scenario, (Future Condition), assumes YB/DS Projects operations with assumed new FERC license requirements, a future level of development upstream, and SSWD's Proposed Project.

[4] In this exhibit, "Relicensing Participants" includes SSWD, federal and State agencies, local agencies, non-governmental organizations (NGO), businesses and members of the public that routinely and actively take part (i.e., attend meetings/workshops and make filings) in the Camp Far West Project relicensing.

Inflow hydrology for Dry Creek was developed as part of SSWD's relicensing Study 2.2 *Water Temperature Modeling*, by gage reconstruction. Dry Creek was gaged from WY 1947 to 1962, capturing 87 percent (99.9 square miles, or sq mi) of the total Dry Creek drainage basin. The analysis was a flow gage reconstruction for the desired WYs (1976 through 2014), and not an estimate of the total Dry Creek flow at the Bear River. Statistical regression relationships were developed to relate the Dry Creek gage to other flow gages in Northern California as summarized in Table 2.1-6. Due to the lack of overlapping periods of record, regressions of Laguna Creek near Elk Grove and Dry Creek near Roseville to South Honcut Creek were developed to first synthesize South Honcut Creek, which is then used to synthesize Dry Creek near Wheatland. The resulting time series was used for both the Near-Term and Future Conditions scenarios.

Table 2.1-6. Flow gages used in analysis.

Flow Gage	Gage Identification	WYs Available	Mean Elevation (ft)	Watershed Area (mi^2)	Dry Creek Synthesis Periods
Dry Creek near Wheatland	11424500	1947-1962	920	99.9	--
South Honcut Creek near Bangor	11407500, *A05775*	1951-1986, *2006-2014*	1640	30.6	1975-1986
Dry Creek near Roseville	11447293	2000-2012	450	80.1	2000-2005
Laguna Creek near Elk Grove	11336585	1996-2014	120	31.9	1996-1999
Napa River near St. Helena	11456000	1947-1995, 2000-2014	1020	78.8	1987-1995

Note: Italicized data from DWR Water Data Library, all other data from USGS.

The Ops Model was validated by comparison with observed data from WY 1995 through WY 2014. Recent years are used for validation because SSWD operations have changed during the 39-year simulation period, most notably in 2000. For this reason, a separate simulation was used for model validation. The validation model also includes limited water transfers that occurred during the validation period.

The Ops Model Validation Report and the Ops Model itself is included in Appendix E1 of Exhibit E.

2.1.4.2 Relicensing Hydrology Datasets

SSWD developed six hydrology datasets (mean daily values for flows and daily values for reservoir elevation and storage) to support the Camp Far West Project relicensing. These datasets are:

1. Historical Hydrology. This dataset is composed of publicly available, empirical, gaged reservoir and flow data in the Project Area, and covers the period from WY 1928 through WY 2014. The WY 1928 through 1964 period covers the period prior to the development of Camp Far West Dam;[5] the WY 1967 through 1984 covers the period

[5] This period starts after the first Camp Far West Dam, which was a 50-ft high concrete gravity structure was built by the CFWID in 1927. The dam was enlarged in 1964 by SSWD as part of the California State Water Plan to enhance water supply in California's Central Valley. Camp Far West Dam and Reservoir are not part of California's State Water Project.

from when the dam was in place but prior to the development of Camp Far West Powerhouse; and the WY 1985 through 2014 period covers the period from when both the dam and powerhouse were in place. The Ops Model includes calculated, historical inflow to Camp Far Water Reservoir based on historical gage records for the modeling period of record, which is from WY 1976 through WY 2014.

2. Unimpaired Hydrology. This dataset is an estimation of flows that would have occurred in the basin during the modeling period of record if no Project or non-Project facilities were present.[6]

3. Environmental Baseline. This dataset is the No Action Alternative, and is an estimation of inflow to Camp Far West Reservoir, operations, and flows that would have occurred in the basin during the modeling period of record if the Project and all non-Project facilities were present and operating under expected, near-term conditions. This dataset is used throughout SSWD's Application for New License to represent environmental baseline reservoir and flow conditions. SSWD uses this dataset instead of the Historical Hydrology dataset to represent near-term environmental baseline conditions because using historical data would be misleading given changes in Project and non-Project operations over time. This hydrology dataset is a product of the Ops Model, and is sometimes referred to in this Application for New License as the No Action Alternative. Near-Term Conditions assume YB/DS Project operations with assumed new FERC license requirements based on the FERC-issued FEIS for both YB-DS Projects and the current level of development upstream.

4. Proposed Project (Near-Term Condition). This dataset is SSWD's Proposed Project under near-term conditions. Near-Term conditions assume YB/DS Project YB/DS Projects operations with assumed new FERC license requirements based on the FERC-issued FEIS for both YB-DS Projects and the current level of development upstream.

5. Proposed Project (Future Condition). This dataset is SSWD's Proposed Project under future conditions. Future conditions assume YB/DS Project operations with assumed new FERC license requirements based on the FERC-issued FEIS for both YB-DS Projects and the future (WY 2062) level of development upstream.

Each hydrology dataset as well as SSWD's methods used to estimate each flow condition are provided in Appendix E1 of Exhibit E of SSWD's Application for New License. Specifically, for the modeling period of record the attachment includes: 1) mean daily releases from the Project powerhouse; 2) total mean daily flow below Camp Far West Dam (i.e., the sum of the powerhouse discharge, dam spill and low-level outlet release); 3) mean daily fish release flow immediately downstream of the non-Project diversion dam, the flow compliance location in the existing Project license; 4) daily Camp Far West Reservoir water surface elevation (WSE) and storage; and 5) other hydrologic information. Data are provided in the United States Army Corps of Engineers' (USACE) Hydrologic Engineering Center's (HEC) Data Storage System

[6] Unlike other tributaries to the Feather River, the California Department of Water Resources (DWR) does not forecast or estimate unimpaired flow in the Bear River.

(DSS) format and in Microsoft™ Excel format, and monthly duration curves are provided for flow.

2.1.4.3 Typical Operations

The Project is operated primarily to provide irrigation water to growers in SSWD's and CFWID's service districts. However, SSWD also operates the Project to meet Bear River flow requirements and to generate power. SSWD leases the power generating facilities to SMUD, which operates the Camp Far West Powerhouse and switchyard.

Although the specific water availability can vary widely, normal Project operation is to fill the reservoir as early in the season as sufficient water becomes available and to then spill the excess flows over the ungated spillway. Because the reservoir is primarily fed by rainfall-produced runoff, it is difficult to predict the amount of inflow anticipated before the end of the season; therefore, SSWD retains within the reservoir all of the inflow except releases for requirements for fisheries until the beginning of the irrigation season. Since the reservoir is operated as a fill-and-spill system, its effect on downstream flood flows is erratic, as it may range from complete control to only minor surcharge regulation.

Camp Far West Reservoir does not have any dedicated flood control space or associated flood control rules.

In most years, the reservoir reaches NMWSE in January when the basin produces its heaviest runoff, and then starts to decline in April or May as releases for irrigation increase. The reservoir reaches its lowest point in the mid-October period when irrigation deliveries are no longer made.

Power is produced at Camp Far West Powerhouse during the winter/early spring months when the reservoir is spilling and during the spring and summer months when releases are being made for irrigation and to meet instream flow requirements. Because of the generating unit's operating characteristics, power can only be generated when the elevation of the reservoir water surface is at or above 236 ft and when reservoir outflow is greater than 130 cfs. If these two criteria cannot be met, water is released through the low-level outlet. This condition normally occurs each year starting in September and continuing into the fall until such time that surplus inflows are available to be passed through the powerhouse.

During the irrigation season, up to a maximum of 530 cfs passes through the powerhouse in conformance with downstream irrigation and instream requirements. However, during the heavy runoff period when spilling from the reservoir occurs, a greater quantity of water is routed through the powerhouse up to its maximum limit of 725 cfs.

When the reservoir water surface is high enough to send flows over the spillway, all flows up to approximately the physical capacity of the turbine are diverted through the power tunnel. The balance of any flows greater than turbine capacity are passed over the uncontrolled spillway.

During normal reservoir releases for furnishing irrigation water, all releases are utilized for power production except under those conditions as described above when the combination of head and flow are outside the operating characteristics of the turbine. During dry periods outside of the irrigation season, reservoir releases can be limited to minimum instream flow requirements, which are at times controlled by inflow per the existing license (see Article 29). Inflow from the Bear River is measured during the low-flow season by SSWD in the Bear River immediately upstream of Camp Far West Reservoir.

Operation of the powerhouse is automatic except for start-up, which is done manually. A powerhouse shutdown activates an alarm at SMUD's dispatch center, which requires sending trained personnel to the site to determine the problem and re-start the powerhouse.

SMUD receives Renewable Energy Credits (REC) for power generated at Camp Far West Powerhouse through the CEC. The powerhouse is registered under CEC Plant ID H0083.

To demonstrate normal operations, SSWD selected 1995, 2003, and 2001 as representative Wet, Normal, and Dry WYs, respectively, because these years approximate the 10, 50, and 90 percent exceedance intervals, respectively, for annual flow volume as measured at USGS Gage 11424000 (*Bear River near Wheatland*). This gage was selected because it is the nearest full-flow gage to Camp Far West Dam. Figures 2.1-6 through 2.1-8 show for each representative WY: 1) daily water storage in Camp Far West Reservoir based on exiting reservoir storage curves; 2) mean daily water releases from Camp Far West Dam and Powerhouse (i.e., releases through the powerhouse, low-level outlet and over the spillway); and 3) mean daily flows at USGS Gage 11424000 located about 6.5 mi downstream from Camp Far West Dam near Wheatland.

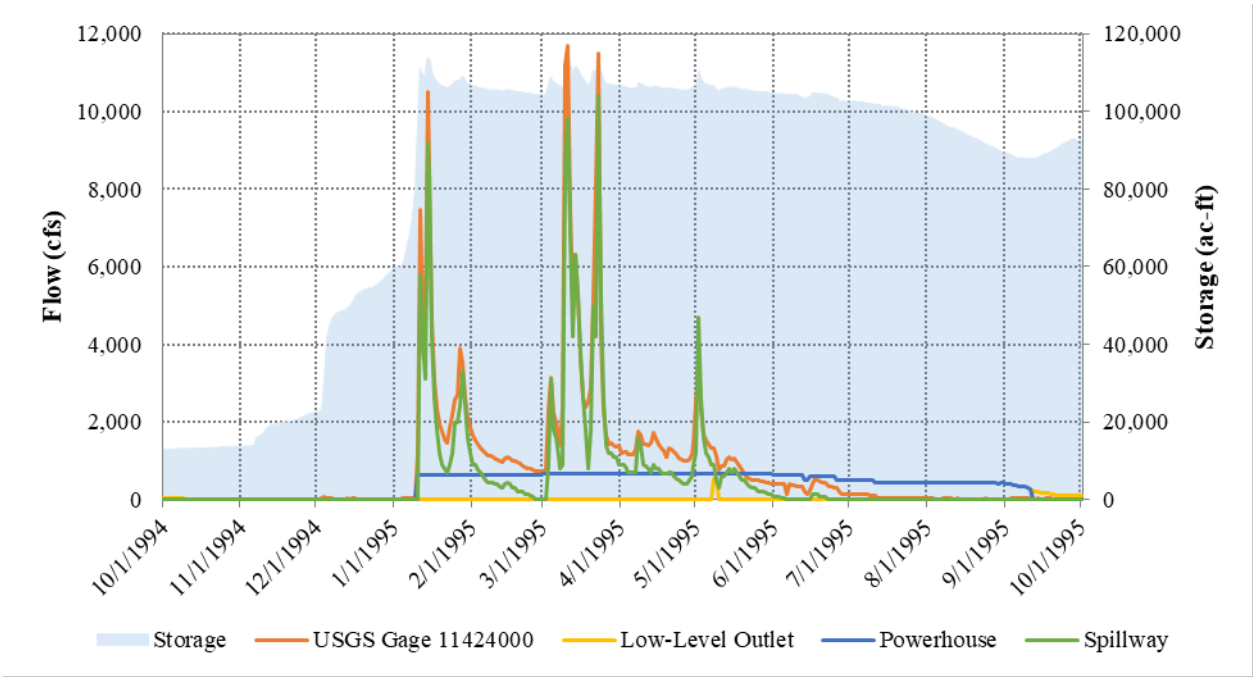

Figure 2.1-6. Camp Far West Hydroelectric Project releases and storage in a representative Wet Water Year – 1995 (Historical Hydrology).

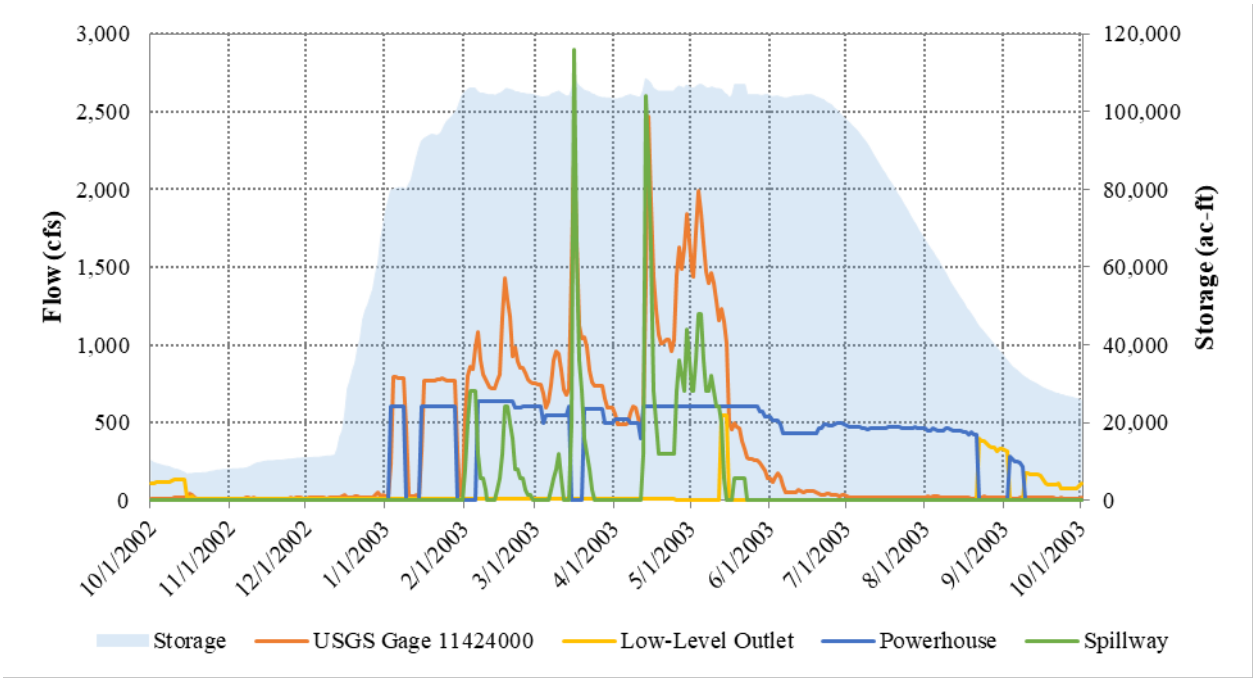

Figure 2.1-7. Camp Far West Hydroelectric Project releases and storage in a representative Normal Water Year – 2003 (Historical Hydrology).

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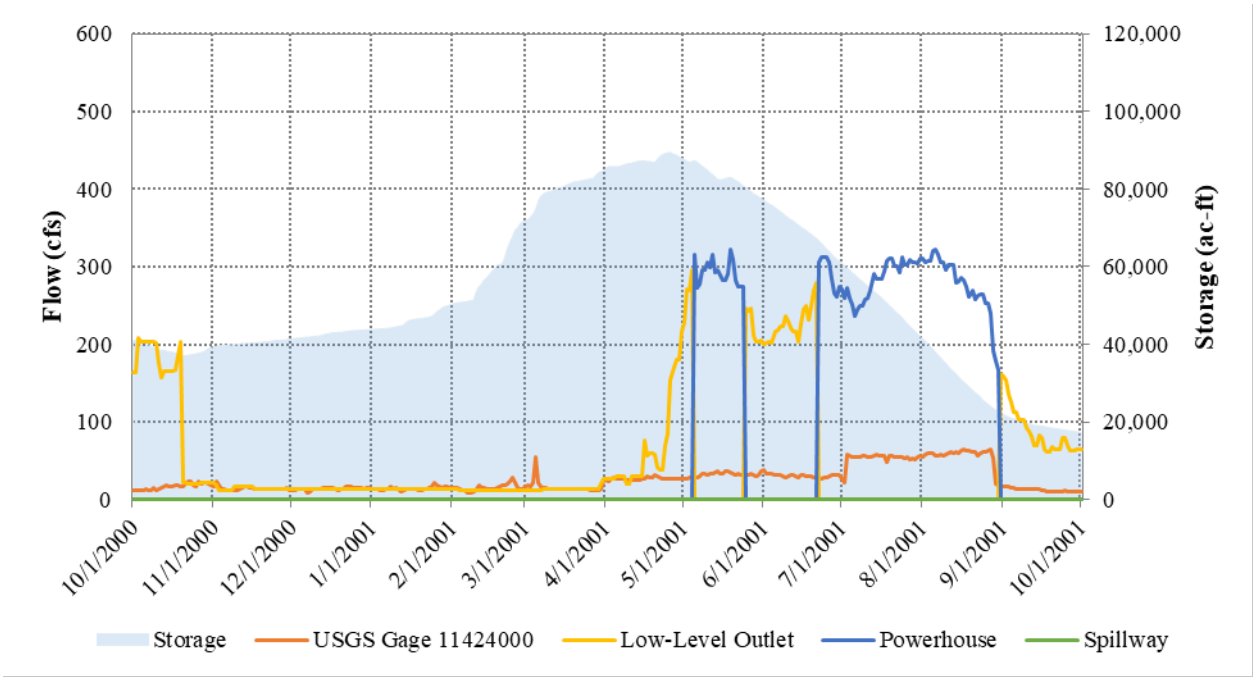


Figure 2.1-8. Camp Far West Hydroelectric Project releases and storage in a representative Dry Water Year – 2001 (Historical Hydrology).

2.1.5 Existing Environmental Measures

This section discusses operating constraints, including conditions in the existing FERC license, measures in other existing licenses, agreements and contracts that affect Project operations.

2.1.5.1 Conditions in Current FERC License

The initial license included 33 articles numbered 1 through 33, which have not changed since the license was issued. Of these, SSWD considers six articles (i.e., articles 24, 25, 26, 27, 28 and 32) "expired" or "out of date," because each pertains to a construction activity that has been completed, a filing related to a construction activity that has been completed, or another activity that has been completed. As a result, the existing license contains 27 "active" articles. The general topic that each of the 27 active articles is provided in Table 2.1-7.

Table 2.1-7. List of active requirements in the existing FERC license for the Camp Far West Hydroelectric Project.

Article(s)	Description	Article(s)	Description
1	General - Compliance	15	Construction of fish and wildlife protective devices and structures by Licensee
2 & 3	FERC approval of changes	16	Construction of fish handling facilities by U.S.
4	FERC inspection and supervision	17	Recreation facilities
5	Obtain any needed land rights	18	Allow public access to Project lands and waters
6	Federal takeover	19	Soil erosion and sedimentation control
7	Project costs and depreciation	20	Clearing

Table 2.1-7. (continued)

Article(s)	Description	Article(s)	Description
8	Gaging and stream gaging	21	Implied surrender provisions
9	Install additional capacity if order by FERC	22	Termination of license
10	Coordinate with others if ordered by FERC	23	Terms and conditions of FPA
11	Headwater benefits	29	Minimum flows
12	Operation as ordered by FERC to protect life, health property or for other benefits	30	Consult with resource agencies on impacts to fish and wildlife during construction and operation of project.
13	Non-project use of project lands	31	Annual Charges
14	Public safety related to safety of transmission lines, telephone lines, etc.	33	Standard Land Use Article

Of these, Article 29 is more germane to Project operations than the other 27 articles. Provided below as Article 29 as it appears in the existing FERC License.

> **Article 29.** The licensee shall maintain a continuous minimum flow of 25 cfs from April 1 through June 30 and 10 cfs from July 1 through March 31 or inflow to the project reservoir, whichever is less, as measured immediately below the Camp Far West diversion dam to protect and enhance the fishery resources in Bear Creek. The flows may be temporarily modified if required by operating emergencies beyond the control of the licensee, or for short periods for fishery management purposes, upon mutual agreement between the licensee and the California Department of Fish and Game. Gaging facilities shall be constructed according to the recommendations of the Geological Survey and shall be operational by April 15, 1989.[7]

2.1.5.2 Measures in Other Existing Licenses, Agreements and Contracts that Affect Project Operations

2.1.5.2.1 SSWD's Water Rights for Power (No Expiration Date)

SSWD holds a post-1914 appropriative water right for the purposes of operating the Project for hydroelectric power generation. Table 2.1-8 provides SWRCB designations and the key terms of the post-1914 appropriative water-right permit held by SSWD for power use.

[7] Article 29 in the initial license was amended in 46 FERC ¶62,088, Order Amending License, issued by FERC on January 26, 1989 to read as shown above.

Table 2.1-8. Water right permit held by SSWD for operation of the Camp Far West Hydroelectric Project for power generation.[1]

Priority (date)	SWRCB Designation (application)	SWRCB Designation (permit)	SWRCB Designation (license)	Source (Waterbody)	Rate, Amount & Season	Point of Diversion (powerhouse)
1/4/80	26162	18360	Not Issued Yet	Bear River	725 cfs Direct Diversion from 1/1 – 12/31 103,100 ac-ft Storage from 10/1 – 6/30	Camp Far West Dam Powerhouse

[1] SSWD's water rights include a Bay-Delta flow component as described in Section 5.2.3.

For the protection of fish and wildlife, SSWD's Permit 18360 identifies a minimum required release of 25 cfs during April 1 through June 30 and 10 cfs from July 1 through March 31. If the total inflow to Camp Far West Reservoir is less than the designated amount for a given period, SSWD shall bypass that quantity.

The time to complete beneficial use for Permit 18360 expired on December 1, 1995. SSWD submitted a request for licensing of Permit 18360 to the SWRCB Division of Water Rights on September 9, 1997, which is still pending.

SSWD operates the Project consistent with the terms and conditions of the above water right.

2.1.5.2.2 Water Supply Deliveries from the Bear River to SSWD's Service Area (No Expiration Date)

SSWD makes water deliveries from the Bear River and several small tributaries to its members within its service area consistent with SSWD's consumptive use water rights. Table 2.1-9 lists SSWD's post-1914 appropriative water-right licenses and permit for irrigation and domestic uses.

Table 2.1-9. Water rights held by SSWD for delivery to SSWD's members within its service area for irrigation and domestic uses.

Priority (date)	SWRCB Designation (application)	SWRCB Designation (license)	Source (Waterbody)	Purpose of Use	Rate & Amount	Season (period)	Place of Beneficial Use
6/13/41	10221	11120	Bear River	Irrigation, Domestic and Incidental Power [2]	250 cfs Direct Diversion	from 3/1 – 6/30 and from 9/1 – 10/31	59,000 ac within SSWD and 4,180 ac within CFWID
					40,000 ac-ft Storage	from 10/1 – 6/30	
5/12/52[1]	14804	11118	Bear River	Irrigation, Domestic and Incidental Power	330 cfs Direct Diversion	from 5/1 – 9/1	59,000 ac within SSWD and 4,180 ac within CFWID
					58,370 ac-ft Storage	from 10/1 – 6/30	
8/16/51	14430	4653	Coon Creek	Irrigation	2 cfs Direct Diversion	from about 4/1 – about 11/1	80 ac
4/12/65	22102	11121	East Side Canal, Coon Creek, Markham Ravine, and Auburn Ravine	Irrigation	40.3 cfs Direct Diversion 4,769 ac-ft per annum	from 4/1 – 6/15 and 9/1 – 10/31	4,000 ac

Table 2.1-9. (continued)

Priority (date)	SWRCB Designation (application)	SWRCB Designation (license)	Source (Waterbody)	Purpose of Use	Rate & Amount	Season (period)	Place of Beneficial Use
8/11/71	23838	12587	Yankee Slough	Irrigation	1.35 cfs Direct Diversion 143 ac-ft per annum	from 4/1 – 6/30 and 9/1 – 9/30	235 ac

[1] SSWD received a release from priority from Applications 5633 and 5634 for Application 14804.
[2] Incidental Power is identified as a purpose of use for Applications 10221 and 14804. The powerhouse listed in the place of use for these applications is a hydroelectric facility located along SSWD's main canal.

SSWD delivers this water from the Bear River via its Main Canal, which is located on the Bear River about 1.2 mi downstream of Camp Far West Dam (Figure 2.1-5).

Identical to the required fish release for SSWD's power permit, Applications 10221 and 14804 identify minimum required releases of 25 cfs during April 1 through June 30 and 10 cfs from July 1 through March 31. If the total inflow to Camp Far West Reservoir is less than the designated amount for a given period, SSWD shall bypass that quantity. These required fish releases are not additive.

2.1.5.2.3 Bay-Delta Bear River Voluntary Agreement (Expires December 31, 2035)

In February 2000, after prolonged negotiations, SSWD, DWR and the CFWID entered into the Bear River Settlement Agreement (DWR, SSWD and CFWID 2000) with the objective of settling the responsibilities of SSWD, CFWID, and all other Bear River water rights, to implement the standards in the SWRCB's May 22, 1995 *Water Quality Control Plan for the San Francisco Bay/ Sacramento-San Joaquin Delta Estuary*.

To incorporate this settlement agreement into SSWD's water rights, in July 2000, the SWRCB issued Order 2000-10 that amended SSWD's Water Right Licenses 11120 and 11118 to provide that:

> During releases of water in connection with the change of purpose of use and place of use of up to 4,400 acre-feet transferred to DWR during dry and critical years,[8] Licensee shall increase flows in the lower Bear River by no more than 37 cfs from July through September. To avoid stranding impacts to anadromous fish in the Bear River below Camp Far West Reservoir, Licensee shall, by the end of a release period from the reservoir in connection with said change, ramp down flows from the reservoir at a rate not to exceed 25 cfs over a 24-hour period.

[8] The Bear River Settlement Agreement and SWRCB Order 2000-10 state: *"Dry and critical years are defined, for purposes of this order, as set forth on page 23 of the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Adopted by the SWRCB in May, 1995), except that such years do not include a year in which water storage in Camp Far West Reservoir on April 1 is at or below 33,255 acre-feet ("extreme critical year")."*

The required flow volume is in addition to the minimum flow requirement in the Project license, and is measured immediately downstream of the diversion dam as spill over the diversion dam (i.e., SSWD installs notched boards on the diversion dam and controls the elevation of the diversion dam impoundment to provide the required flow).

As shown in Table 2.1-10, SSWD has met the requirements in the Bear River Settlement Agreement and in its amended water rights in each "Dry" and "Critically Dry Year", as defined in the agreement. Transfers are not required in non-"Dry" and "Critically Dry" years. In each transfer year, DWR compensated SSWD for the amount of water transferred.

Table 2.1-10. Years in which SSWD has met the requirements in the Bear River Settlement Agreement and in its amended water rights.

Year	Was Year "Dry" or "Critically Dry" Based on the Bear River Settlement Agreement[1]	Amount of Water Transferred to DWR in "Dry" and Critically Dry" Years in Accordance with the Bear River Settlement Agreement[2]
2000	No	Transfer Not Required
2001	Yes	4,137
2002	Yes	3,882
2003	No	Transfer Not Required
2004	No	Transfer Not Required
2005	No	Transfer Not Required
2006	No	Transfer Not Required
2007	Yes	4,644
2008	Yes	4,425
2009	Yes	4,423
2010	No	Transfer Not Required
2011	No	Transfer Not Required
2012	No	Transfer Not Required
2013	Yes	4,402
2014	Yes	4,400
2015	Yes	4,471
2016	No	Transfer Not Required
2017	No	Transfer Not Required
2018	No	Transfer Not Required

[1] The SSWD/SWRCB/DWR Bear River Settlement Agreement and SSWD's amended water rights define "Dry" and "Critically Dry" years as determined by the Sacramento Valley 40-30-30 Index.

[2] The SSWD/SWRCB/DWR Bear River Settlement Agreement and SSWD's amended water rights stipulate that SSWD will transfer up to 4,400 ac-ft of water to DWR in "Dry" and "Critically Dry" years, and DWR will compensate SSWD for the volume of the transfer at an agreed upon cost per ac-ft.

SWRCB's Order 2000-10 states that this arrangement would terminate upon the termination of the Bear River Settlement Agreement on December 31, 2035, or sooner if the agreement is terminated sooner.

2.1.5.2.4 Water Supply Contracts (No Expiration Date)

SSWD and CFWID entered into an Agreement in 1957 and a Supplemental Agreement in 1973, relative to the construction and subsequent enlargement of Camp Far West Reservoir. Under the Agreement, SSWD provides CFWID the first 13,000 ac-ft of water from the Reservoir each year to satisfy CFWID's senior water rights along the Bear River. A summary of CFWID's water

rights are provided in Table 2.1-11. No other active water rights[9] are identified downstream of Camp Far West Dam along the Bear River.

Table 2.1-11. Water rights held by CFWID, downstream of Camp Far West Dam.

Priority (date)	SWRCB Designation (application)	SWRCB Designation (license)	Source (Waterbody)	Purpose of Use	Amount & Place of Diversion or Storage (amount & place)	Season (period)	Place of Beneficial Use
4/1/1918	959	385	Bear River	Agricultural Use	13.24 cfs Direct Diversion	from 4/1 to 10/1	A net irrigable area of 4,445 acres within a gross area of 5,045 acres consisting of 4,732 acres within the boundaries of CFWID and 313 acres outside of CFWID
6/13/1922	2881	2266	Bear River	Irrigation	5,000 ac-ft Storage per annum[1]	from 3/1 to 5/1	
2/11/1924	3843	2267	Bear River	Irrigation	11.76 cfs Direct Diversion	from 5/1 to 10/1	
4/28/1941	10190	2740	Bear River	Irrigation	5,000 ac-ft Storage per annum[1]	from 5/1 to 6/1	

[1] The maximum annual quantity diverted under Licenses 2740 and 2266 shall not exceed 5,000 ac-ft per annum.

2.1.5.2.5 Water Transfers

In recent years, SSWD has participated in water transfers of water held in storage in Camp Far West Reservoir. Transfers have occurred in 2008, 2009, 2010, 2014, 2015, and 2018. Table 2.1-12 summarizes the approximate volumes of water released for transfer in each of these years. In each year, transfer water was released from Camp Far West Dam in the months of July, August, and September. Transfer water flowed over the non-Project diversion dam and down the Bear River, was conveyed across the Sacramento-San Joaquin River Delta, and was subsequently pumped out of the southern Delta at facilities owned and operated by the State Water Project (SWP) or the Central Valley Project (CVP). The decision on whether to participate in voluntary water transfers is made each year, when there are potential buyers, by the SSWD Board of Directors. It is unknown whether SSWD will participate in future water transfers.

Table 2.1-12. Annual SSWD water transfers in recent years.

Water Year	Total Volume Released for Transfer (ac-ft)
2008	7,100
2009	10,000
2010	10,000
2014	10,000
2015	6,000
2018	10,590

[9] An Initial Statement of Water Diversion and Use was filed in 1978 in support of a riparian and pre-1914 water right claim; however, the SWRCB currently lists Statement S009549 as inactive.

2.1.5.2.6 SMUD Power Purchase Contract (Expires July 1, 2031)

In August 1991, SSWD and SMUD entered into a Contract for the Sale and Purchase of Electricity of the power generated at the Camp Far West Powerhouse. Under the contract, SMUD reimburses SSWD for the construction of the Camp Far West Powerhouse and associated power facilities, SMUD operates the powerhouse under a lease, and SMUD receives all the power from the powerhouse by paying for the power at a fixed rate. The contract expires on July 1, 2031.

SMUD receives Renewable Energy Credits for power generated at Camp Far West Powerhouse through the California Energy Commission. The powerhouse is registered under California Energy Commission Plant ID H0083.

2.1.6 Facility Maintenance

2.1.6.1 Camp Far West Powerhouse Maintenance

SMUD conducts annual mechanical and electrical inspections and maintenance at the Camp Far West Powerhouse to verify the structural and/or functional integrity of the facilities and to identify conditions that might disrupt operations. The Camp Far West Powerhouse unit is offline to support planned outages for approximately 2-3 weeks in the September/October period. During an unplanned outage, such as when the unit trips offline, water flows to the low-level outlet. Depending on maintenance work needed on the tunnel and penstock, it can be dewatered by closing the intake gates.

2.1.6.2 Other Facility Maintenance

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

2.1.6.2.1 Vegetation Maintenance

Vegetation management, manually using hand tools and chemically by the use of herbicides, is implemented by SSWD at Project Facilities. Vegetation management is completed throughout the Project Area as necessary to reduce fire hazard, to provide for adequate Project Facility access and inspection, to protect Project Facilities, and to provide for worker and public health and safety. In general, vegetation management is implemented within about 75 ft of the powerhouse and switchyard; within about 15 ft on either side of roads and trails to Project Facilities; and within recreation areas.

Vegetation management occurs both by hand trimming and herbicides. Hand trimming includes trimming grasses and forbs using string trimmers, and removal or trimming of overhanging shrubs and tree limbs using a chain saw or other handheld saw or clippers. These management activities are conducted as needed in conjunction with facility inspections.

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

2.1.6.2.2 Hazard Trees

Hazard trees, generally defined as dead or dying trees or trees with defects that may result in failure and have the potential to cause property damage, personal injury, or death, are removed as needed. Removal is conducted with a chainsaw, handheld saw, or other equipment. Smaller diameter debris from felled hazard trees is either chipped or lopped and scattered. Downed logs are typically left onsite and only moved if needed for safety. If moving logs is necessary, it may be completed by hand or machine depending on the situation.

2.1.6.2.3 Vertebrate Pest Management

SSWD implements rodent control as needed in facility interiors using an integrated pest management approach that includes sanitation and exclusion. General use of rodenticides, applied in accordance with the label instruction, may be used when necessary.

2.1.6.2.4 Road Maintenance

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

2.1.6.2.5 Facility Painting

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

2.1.6.2.6 Recreation Facilities Maintenance

SSWD, through a concessionaire, routinely maintains the Project recreation facilities at the North and South Shore recreation areas. Typical routine maintenance activities include litter and trash collection, lowering/raising the boat launch docks as the water level changes, fire pit cleaning and ash removal, cleaning and maintaining restroom buildings, gate and traffic control maintenance, keeping roadways and parking areas clear of debris, and public signage maintenance. In addition, SSWD routinely maintains and tests the water supply system and sewage treatment ponds with aerators that serve the flush restroom buildings and RV sanitary dump stations at both recreation areas.

2.2 Proposed Changes to the Existing Project

2.2.1 Changes to Existing Project Facilities and Features

SSWD proposes three general changes to existing Project facilities: 1) raising the NMWSE of Camp Far West Reservoir by 5 ft from an elevation of 300 ft to an elevation of 305 ft;[10] 2) modifications to Project recreation facilities at Camp Far West Reservoir; and, 3) addition of a single Primary Project Road. In addition, SSWD proposes a slight modification to the existing FERC Project Boundary. Each of these is discussed below.

2.2.1.1 Camp Far West Reservoir Pool Raise

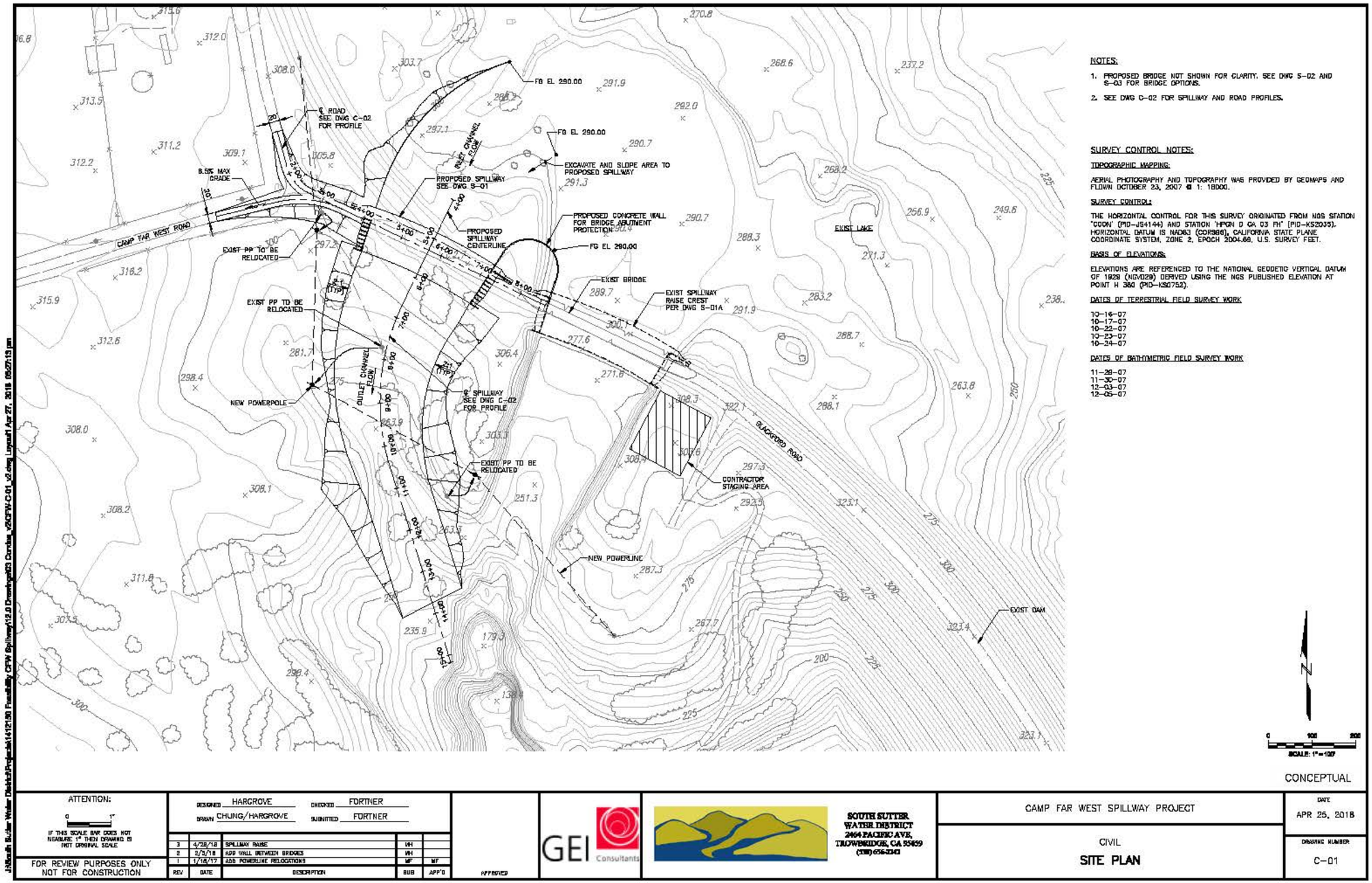
Recent aerial surveying and topographic mapping shows that Camp Far West Reservoir stores 93,737 ac-ft of water at its existing Camp Far West Reservoir NMWSE of 300 ft. This is roughly 10 percent less than anticipated when the dam was enlarged in 1964, and the amount authorized in SSWD's water rights. Therefore, SSWD proposes to raise the NMWSE of Camp Far West Reservoir by 5 ft to an elevation of 305 ft. The Pool Raise would increase Camp Far West Reservoir storage by 9,836 ac-ft to a capacity of 103,573 ac-ft at Camp Far West Reservoir's new NMWSE of 305 ft. When the Pool Raise is complete, the auxiliary spillway in combination with the modified existing spillway will have a combined capacity of 126,600 cfs at a water surface elevation of 318.5 ft.

2.2.1.1.1 Anticipated Facilities

The Pool Raise would involve demolition of the concrete cap on the existing Camp Far West Dam spillway, the addition of approximately 1,730 cy of concrete to raise the existing spillway crest from an elevation of 300 ft to an elevation 305 ft, and anchoring of the new concrete with steel dowels. The spillway design would not change from its existing reinforced concrete, ungated, ogee-type weir and the existing 300-ft crest length will not change. In addition, no changes would be required to the ongoing spillway modification. Figure 2.2.-1 is a general conceptual-level plan showing the details of the Pool Raise. Figures 2.2-2 and 2.2-3 show

[10] For the purpose of this exhibit, this is referred to as the "Pool Raise."

profiles of the existing spillway and Blackford Road profiles. Figure 2.2-4 shows additional typical sections of the existing spillway. When the Pool Raise is complete, the auxiliary spillway in combination with the modified existing spillway will have a combined capacity of 126,600 cfs at a water surface elevation of 318.5 ft.



NOTES:

1. PROPOSED BRIDGE NOT SHOWN FOR CLARITY. SEE DWG S-02 AND S-03 FOR BRIDGE OPTIONS.
2. SEE DWG C-02 FOR SPILLWAY AND ROAD PROFILES.

SURVEY CONTROL NOTES:

TOPOGRAPHIC MAPPING:

AERIAL PHOTOGRAPHY AND TOPOGRAPHY WAS PROVIDED BY GEOMAPS AND FLOWN OCTOBER 23, 2007 @ 1: 18000.

SURVEY CONTROL:

THE HORIZONTAL CONTROL FOR THIS SURVEY ORIGINATED FROM NGS STATION "COON" (PID-JS4144) AND STATION "HPGN D CA 03 FH" (PID-KS2035). HORIZONTAL DATUM IS NAD83 (CORS96), CALIFORNIA STATE PLANE COORDINATE SYSTEM, ZONE 2, EPOCH 2004.00, U.S. SURVEY FEET.

BASIS OF ELEVATIONS:

ELEVATIONS ARE REFERENCED TO THE NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD29) DERIVED USING THE NGS PUBLISHED ELEVATION AT POINT H 380 (PID-KS0752).

DATES OF TERRESTRIAL FIELD SURVEY WORK

10-16-07
10-17-07
10-22-07
10-23-07
10-24-07

DATES OF BATHYMETRIC FIELD SURVEY WORK

11-28-07
11-30-07
12-03-07
12-05-07

ATTENTION:
0 1"
IF THIS SCALE BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT ORIGINAL SCALE

FOR REVIEW PURPOSES ONLY
NOT FOR CONSTRUCTION

DESIGNED HARGROVE CHECKED FORTNER
DRAWN CHUNG/HARGROVE SUBMITTED FORTNER

REV	DATE	DESCRIPTION	BUB	APP'D
3	4/28/18	SPILLWAY RAISE	VH	
2	2/5/18	ADD WALL BETWEEN BRIDGES	VH	
1	1/18/17	ADD POWERLINE RELOCATIONS	MF	MF

APPROVED

GEI Consultants

SOUTH SUTTER WATER DISTRICT
2464 PACIFIC AVE.
TROWBRIDGE, CA 95659
(530) 656-2343

CAMP FAR WEST SPILLWAY PROJECT

CIVIL
SITE PLAN

DATE
APR 25, 2018

DRAWING NUMBER
C-01

Figure 2.2-1. Conceptual level plan for Camp Far West Reservoir Pool Raise – general plan.

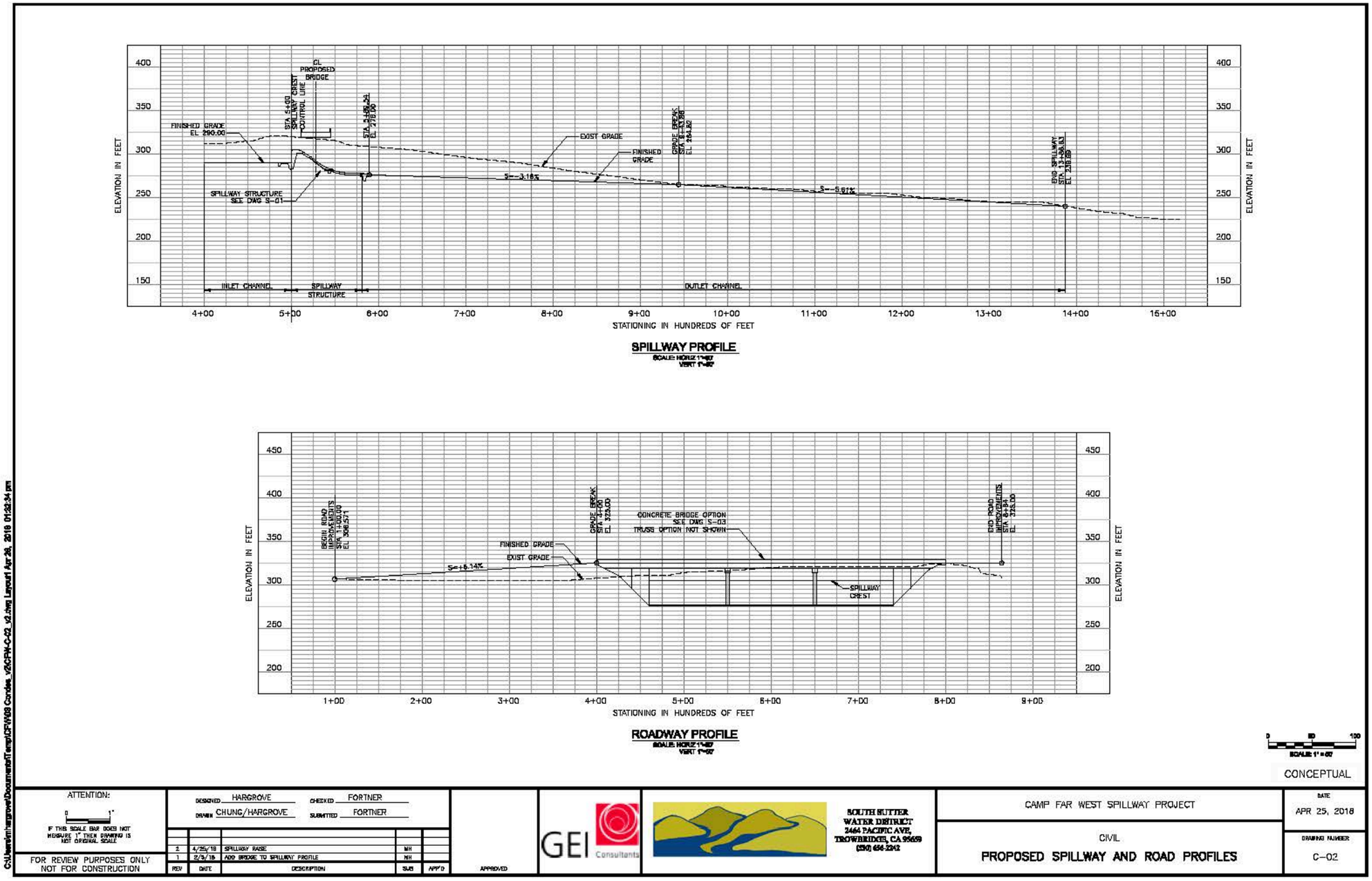


Figure 2.2-2. Conceptual level plan for Camp Far West Reservoir Pool Raise – spillway and road profiles.

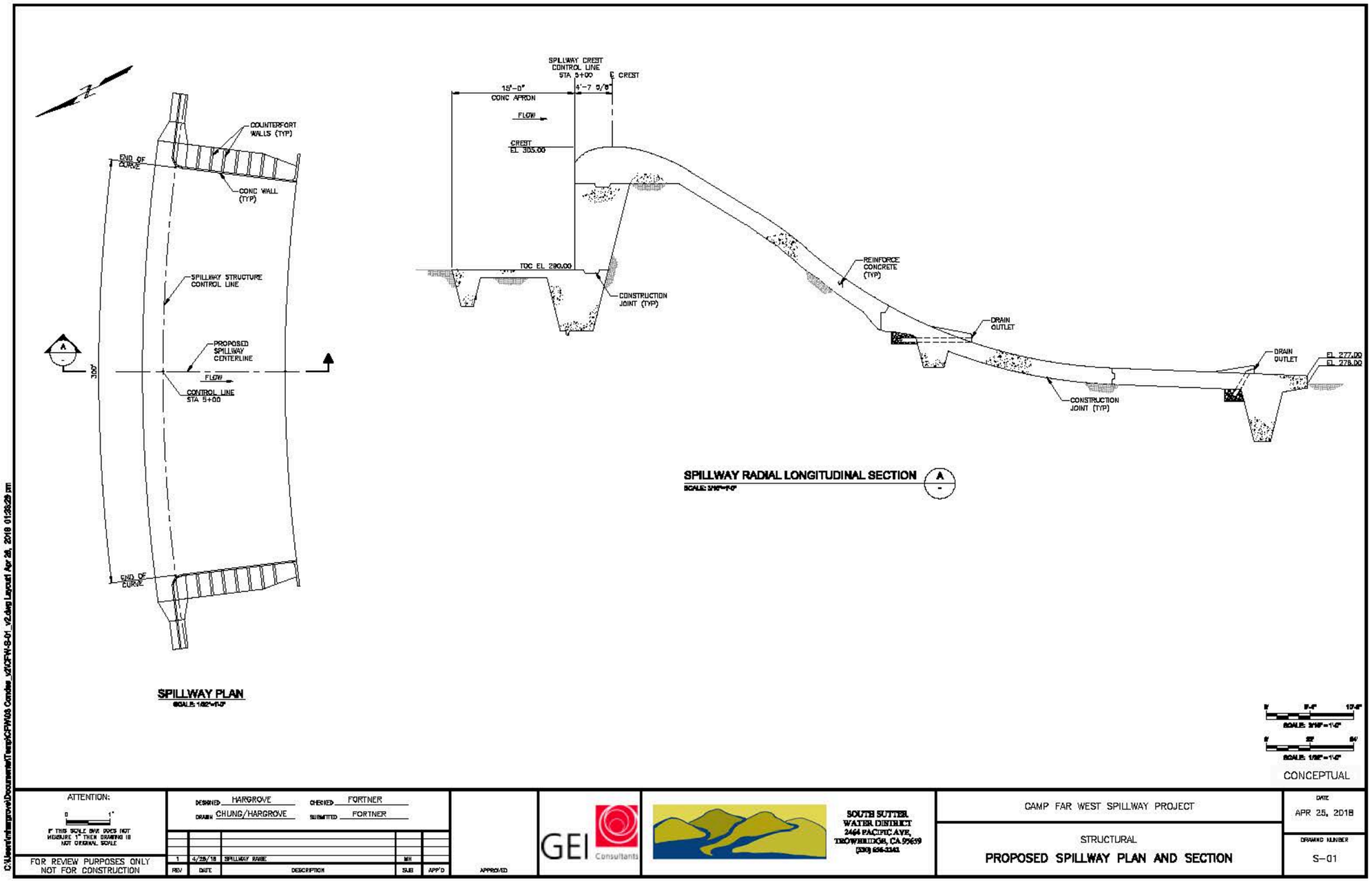


Figure 2.2-3. Conceptual level plan for Camp Far West Reservoir Pool Raise – spillway and road typical sections.

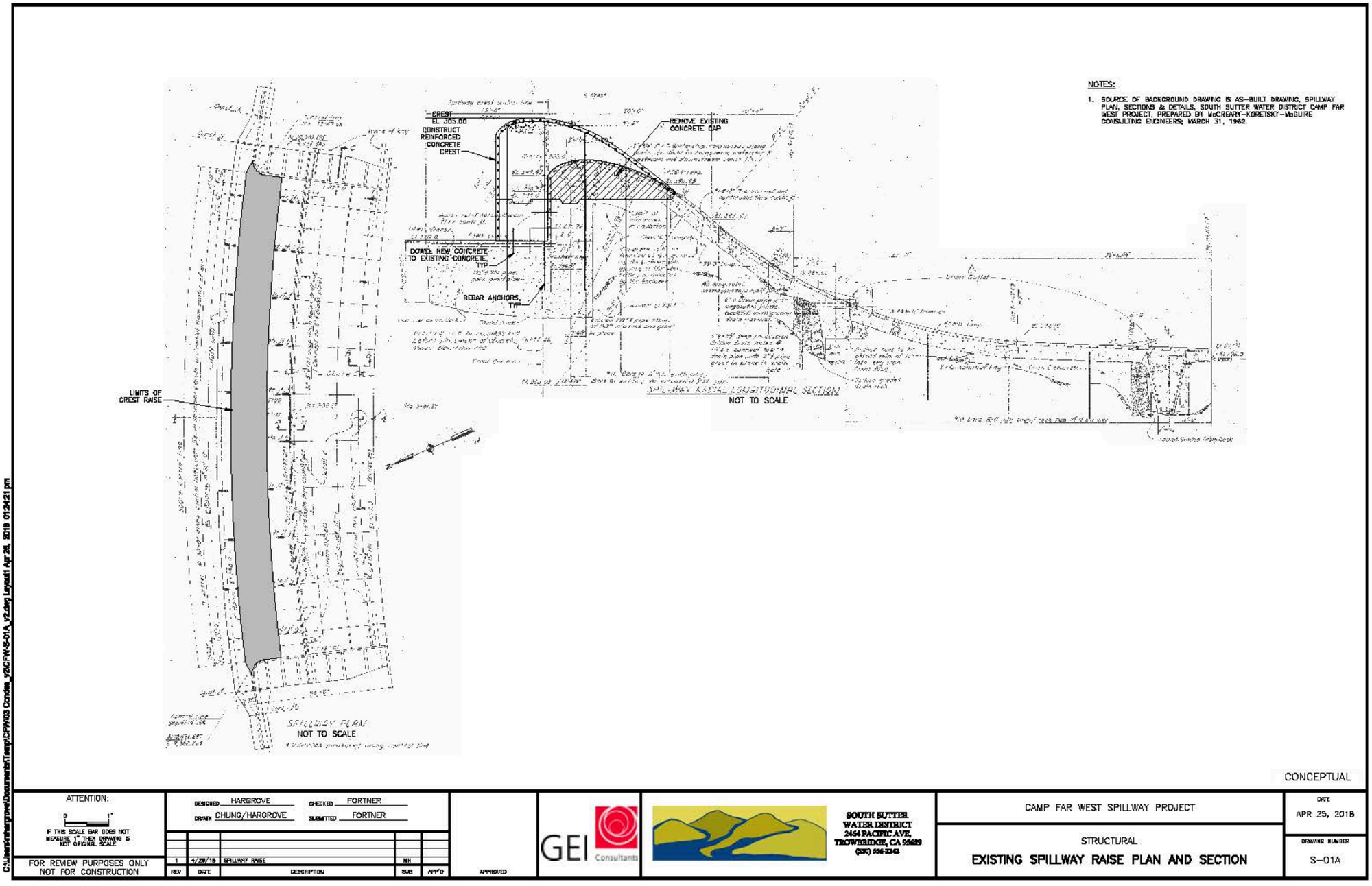


Figure 2.2-4. Conceptual level plan for Camp Far West Reservoir Pool Raise - spillway typical section.

2.2.1.1.2 Anticipated Construction

The existing spillway crest modifications to facilitate the pool raise would involve demolition of the existing concrete cap, the addition of 1,730 cu yd of concrete to raise the spillway crest from an elevation of 300 ft to an elevation 305 ft, and anchoring of the new concrete with steel dowels. The spillway design would not change from its existing reinforced concrete, ungated, ogee-type weir and the existing 300-ft crest length will not change.

Construction Laydown and Staging Areas

A contractor staging area would be located south of Blackford Road, immediately adjacent to the auxiliary spillway. Activities at the staging area would include parking for concrete trucks and other construction vehicles, temporary storing of material (e.g., rebar for new concrete crest and demolished concrete), and meetings. At this time, SSWD anticipates the staging area will encompass 3.71 ac (Figure 2.2-5).

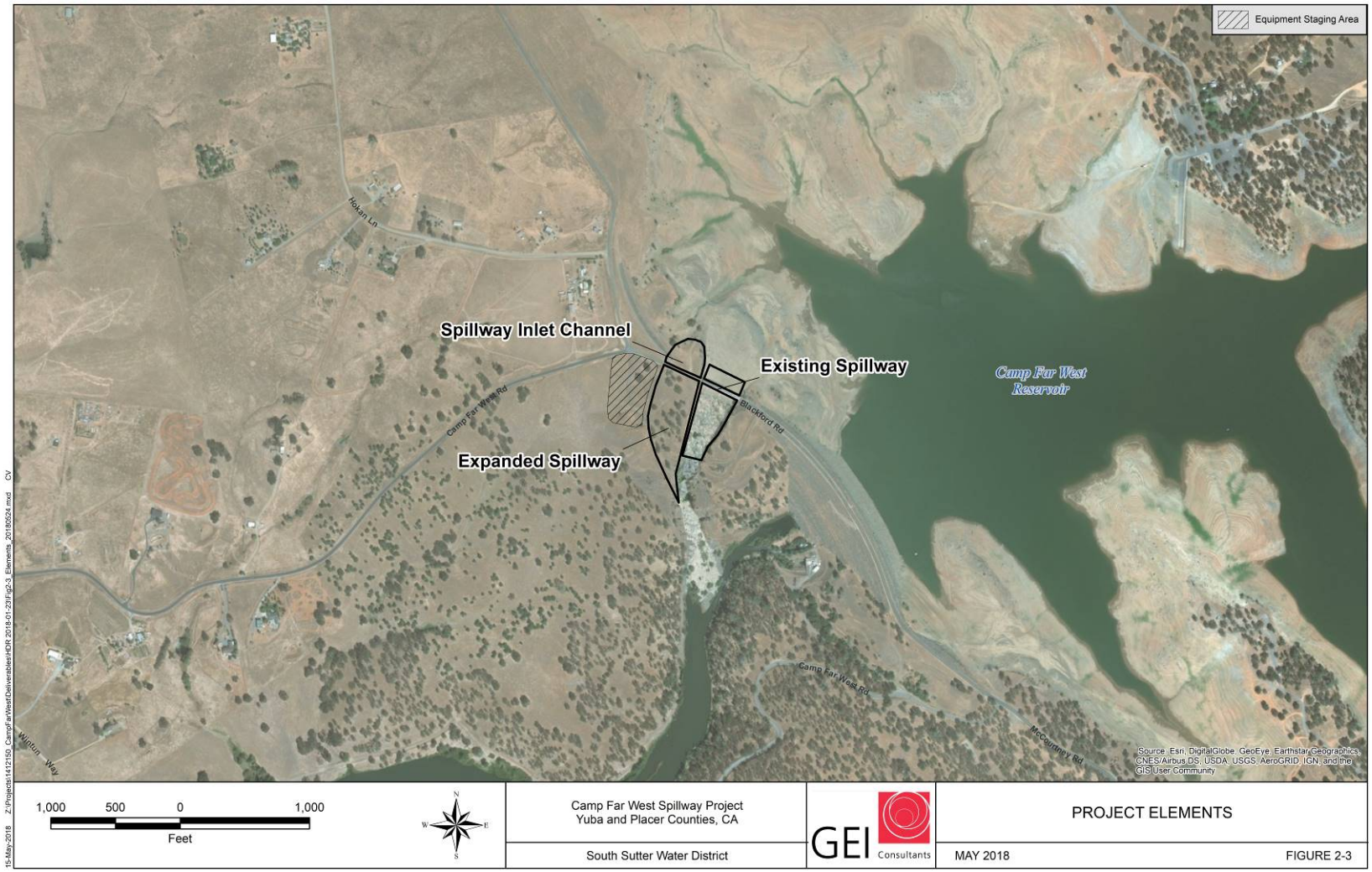


Figure 2.2-5. Anticipated construction laydown area and staging area for the Pool Raise.

Construction Borrow and Disposal Areas

Concrete would be brought from offsite (within 100 miles) thus there will be no on-site borrow areas associated with the Pool Raise. Steel needed for pool raise would be transported from Sacramento, CA. The approximately 550 cy of demolished concrete, rebar, and any other material from the spillway cap removal would be disposed of at an approved off-site facility that accepts construction waste, such as at the Western Regional Sanitary Landfill in Placer County, CA, which is permitted to receive construction waste in the quantities anticipated and is located within 50 miles of the Project (WPWMA 2018). Location and disposal of hazardous waste materials is not expected to occur for the Pool Raise.

Construction Roads and Traffic Considerations

Construction-related traffic would be spread over the duration of the Pool Raise work. During this period, the existing bridge over the spillway would likely be closed to through-traffic and detours around the dam may be required. During construction and the bridge closure, local residents would use McCourtney Road and then Riosa Road to access Highway 65 for north-south travel to Wheatland and the Sacramento areas (Figure 2.2-6). Closures and detours would be coordinated with Yuba County. The bridge would be permanently reopened following completion of the Pool Raise. There would be no work within the reservoir or the construction of any additional haul routes for the existing spillway modifications for the Pool Raise.

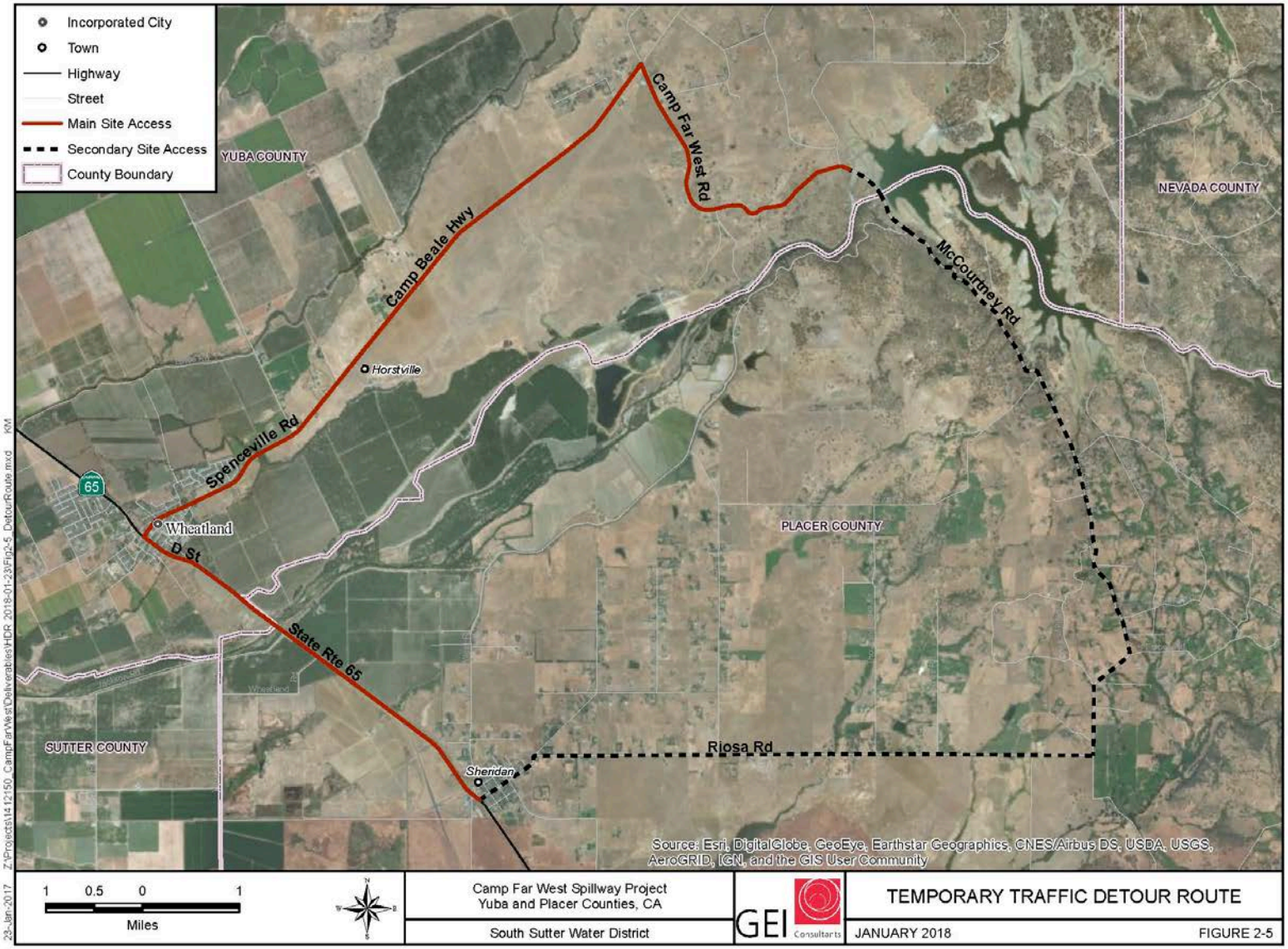


Figure 2.2-6. Anticipated traffic detour route during construction of the Pool Raise.

Construction Sequences and Schedule

At this time, SSWD anticipates that planning, design, and construction would take approximately 2 years to complete. The typical construction sequence and duration for this type of work is shown in Table 2.2-1. The major activities are discussed below.

Table 2.2-1. Draft preliminary schedule for construction of the Pool Raise.

Task #	Task Name	Duration
1	**Complete Pool Raise Design**	**585 days**
1.1	Seismological Investigation	45 days
1.2	Geotechnical Investigation	90 days
1.3	Geotechnical Data Evaluation	45 days
1.4	Agency Consultation on Engineering Evaluation	60 days
1.5	Preliminary (30%) Design & Specifications	120 days
1.6	Draft 60% Design & Specifications	90 days
1.7	Draft 90% Design & Specifications	90 days
1.8	Final (100%) Design & Specifications	45 days
2	**Complete Environmental Permitting and Obtain Regulatory Approvals**	**150 days**
2.1	Notify adjacent landowners of upcoming pool raise	1 day
3	**Onsite Kickoff Meeting**	**1 day**
4	**Site Preparation**	**126 days**
4.1	Pre-Construction Meeting	2 days
4.2	Prepare Site for Demolition and Set Traffic Control	3 days
4.3	Demolishing and Removal of Waste	7 days
4.4	Prepare Foundation for New Concrete	5 days
4.5	Construct Forms for New Concrete	7 days
4.6	Install Rebar and Pour New Concrete	97 days
4.7	Relocate Inundated Recreation Facilities	90 days
5	**Site Cleanup and Restoration**	**1 day**
5.1	Site Cleanup and Restoration	1 day
	Total	**863 days**

[1] All work related to the recreation facilities relocation and described below in Section 3.1.5.9 will take 90 days overall. However, the work will occur in phases throughout 1 full calendar year to minimize any impacts to the recreation area visitors and experiences -- mostly outside the peak recreation season (i.e., Memorial Day through Labor Day holiday weekends). Refer to Section 3.3.6.2.1 in Exhibit E of this Application for New License for additional details.

Seismological Investigation

Seismological data would be to provide estimates on strong ground motion and seismic design parameters for the existing spillway. A review of surface-fault rupture hazard would be performed using existing California Geological Survey and USGS reports on active faults in the vicinity of the planned structure. SSWD would develop a database of historical and recent seismicity in the region to assess the controlling seismic source(s) for deterministic ground motion assessment. The evaluation of site seismicity would include the following critical parameters:

- The distance to the closest seismic source
- The specific geometry of the seismic source in the Project area
- The maximum expected earthquake magnitude
- Deterministic and probabilistic response spectra

SSWD would prepare a detailed Subsurface Exploration Work Plan for geotechnical investigations. The investigations would focus on exploring the thickness of overburden, depth

to competent bedrock, and engineering characteristics of the soil and rock beneath the existing spillway and bridge abutments. The work plan would describe locations of geotechnical explorations, samplings details, and other field exploration activities. A laboratory testing plan would be included in the work plan detailing the types and numbers of laboratory tests to be performed during subsurface investigations. The work plan would include any permits or access approvals needed to conduct the investigations, and methods for restoration of all areas disturbed by the field investigation.

The investigation program would consist of borings and test pits. Exploration locations and depths may be adjusted based on conditions encountered during the subsurface investigations. Access constraints and logistics would be further evaluated during preparation of the work plan. Site terrain may require track-mounted drilling equipment. The work plan would include the use of drilling and sampling equipment suitable for the site constraints, thus minimizing the need for access improvements.

All soil and rock samples collected from the borings and test pits would be carefully logged, labeled, and photographed. Exploratory borings would be continuously logged, describing the types and characteristics of the material encountered. Soils would be described in accordance with American Society for Testing and Materials (ASTM) D2487 Classification of Soils for Engineering Purposes and ASTM D2488 Description and Identification of Soils. Rock core samples would be identified and described based on standards developed by the International Society of Rock Mechanics (ISRM 1981) and Bureau of Reclamation (2001). The borehole logs would include complete descriptions of materials encountered, including the frequency and orientation of fractures and joints, as well as additional relevant field information, such as fluid loss or penetration rates. Additionally, Core Recovery (REC) Rock Quality Designation (RQD) would be recorded and presented on boring logs based on procedures described in Deere and Deere (1989). The remaining samples and cores would be stored until completion of construction. Field logs would be prepared by the field logger, which would be reviewed by a senior geologist and input into a gINT log format for finalization.

Drill cuttings and fluid from the borings would be collected in 55-gallon drums or roll-away bins for testing and disposal. The cuttings would be hauled off-site for disposal after completion of laboratory testing. It is assumed that the cuttings would not contain hazardous or toxic material. All drilling and sampling activities would be performed at the direction of a qualified geologist licensed in the State of California. A field engineer or geologist would supervise all drilling and sampling, and will log the soil and rock in accordance with ASTM standards.

The laboratory testing program would be finalized during implementation of the subsurface exploration program. It is assumed that index testing would include sieve analysis, Atterberg Limits, specific gravity, and bulk density to be performed on samples collected from the site. Additionally, unconfined compression tests would be performed on bedrock samples collected from within the preliminary footprint of the concrete spillway and bridge abutments.

Geotechnical Investigation

A geotechnical evaluation would be prepared to support the Pool Raise design. The evaluation would cover the methods and results of the necessary work needed to perform for the

investigation, provide key graphics, and summarize the findings, conclusions, and recommendations. The evaluation would include the following:

- Detailed site map showing all investigations
- Boring logs, test pit logs, and laboratory results
- Updated site geologic map and two preliminary geologic cross sections oriented normal and parallel to the spillway alignment.
- Evaluation of design parameters

Design

SSWD would coordinate with FERC and DSOD at the 30 percent, 60 percent, 90 percent and final design milestones. SSWD would prepare a Final Design Report that would include detailed hydraulic, geotechnical and design evaluation. The final design documents would be submitted to FERC and DSOD for final approval/acceptance. A 60 percent design (draft of the final design) would be provided to FERC and the California Division of Safety of Dams (DSOD) for review and approval. Following approval of the 60 percent design, SSWD would advertise the work for bid and contractor selection.

Obtain Permits and Approvals

SSWD would consult with FERC, federal, state and local agencies to discuss the Pool Raise's permitting/approval needs, including any necessary ground-disturbing investigations. Table 2.2-2 list permits and approvals that may be required.

Table 2.2-2. Anticipated permits and approvals that may be needed for the Pool Raise.

Permit/Approval	Issuing Body
Approval for inclusion in the License	FERC, including SWRCB's issuance of Clean Water Act Section 401 Water Quality Certification for FERC's issuance of the new license. Compliance with both NEPA and CEQA would be required. It is assume d SSWD would be the lead agency for CEQA compliance.
Clean Water Act Section 404 Permit	U.S. Army Corps of Engineers – Nationwide Permit (NWP) #3 [Maintenance] and #7 [Outfall Structures & Associated Intake Structures]
Clean Water Act Section 401 Water Quality Certification for Construction	Central Valley Regional Water Quality Control Board or State Water Quality Control Board
Section 1600 Streambed Alteration Agreement	California Department of Fish and Wildlife
Endangered Species Act – Section 7 Consultation	U.S. Fish and Wildlife Service. FERC or the USACE would be the lead agency for consultation. A biological opinion may be needed.
Endangered Species Act Incidental Take Permit	California Department of Fish and Wildlife
National Historic Preservation Act, Section 106	State Historic Preservation Office and Native Americans. FERC or the USACE would be the lead agency for consultation.
Endangered Species Act Incidental Take Permit	California Department of Fish and Wildlife
Grading permits	Counties of Sutter, Yuba and Nevada
Clean Water Act Section 402 (National Pollution Discharge Elimination System)	Central Valley Regional Water Quality Control Board
Stormwater Pollution Prevention Plan	Central Valley Regional Water Quality Control Board
Other Approvals	California Division of Safety of Dams, FERC

On-Site Kick Off Meeting to Discuss Logistics, Work Sequence and Safety

A pre-construction meeting will be held with the construction contractor to discuss construction related activities including schedule, work sequencing, environmental requirements, temporary facilities, staging areas, parking, site access, traffic control, and various other items.

Prepare Site for Demolition, including Traffic Control

The following activities are expected to be performed to prepare for demolition work required for the existing weir:

- Set-up project notification and warning signs in accordance with Caltrans Unified Traffic Control Devices Manual Devices (MUTCD) and Yuba County standards at locations along the east and west approaches of Blackford Road to notify on-coming traffic of construction being conducted at the site.
- Provide traffic control as needed for deliveries and hauling of materials to and from the site.
- Set-up staging areas, including staging area near southeast side of existing bridge on Blackford Road.
- Set-up all environmental and safety controls.
- Construct access ramps to existing spillway.
- Move demolition tools and equipment to the existing weir area and set-up.

Demolition of Existing Weir, and Removal of Waste

The following activities are expected to be performed for the removal of the existing weir:

- Sawcut a minimum of 12" existing weir at elevation 295 on the vertical upstream face of the weir at elevation 295.71 on sloped downstream face of the weir. Sawcuts shall be perpendicular to the face of the weir.
- Stop sawcuts a minimum of 6-inches from longitudinal joints. Chip out concrete around waterstop and protect and preserve a minimum of 6-inches of the waterstop in the joints.
- The remaining concrete on the weir may be removed by hydroblasting or hydrodemolition. Removing concrete by hammering or percussion means shall not be allowed.
- All concrete removal by hydrodemolition and water used shall be contained and disposed of off-site.

Prepare Foundation for New Concrete

The following activities are expected to be performed for the preparation of the foundation for the new concrete:

- Surfaces of all existing concrete against which new concrete will be placed shall be roughened to a minimum of 0.25 inch amplitude.
- Within 48 hours prior to placement of new concrete, use low-pressure water jetting to remove all loose materials and rust at existing reinforcement.

- Protect exposed existing waterstops from sun exposure and damage during reinforcement installation procedures.
- Protect reinforcement after removal of existing concrete to preclude rust forming on the ends of exposed reinforcement.

Construct Forms for New Concrete

The following activities are expected to be performed for constructing forms for the concrete:

- Formwork shall be designed by an engineer licensed in the state of California and shall support all concrete placement loads.
- Formwork may consist of wood or steel; aluminum formwork or accessories shall not be allowed.
- Formwork shall be designed for placement of concrete in 2 lifts.

Install Rebar and Pour New Concrete

The following activities are expected to be performed for the installation of the new rebar and concrete:

- All reinforcement shall consist of 60 ksi reinforcement.
- Vertical anchor dowels shall consist of #10 bars and shall be placed in 2-inch diameter grouted holes with a minimum embedment as shown on the drawings and shall be located at 6-feet on-center each way in each section of the crest.
- Edge distance from joint to vertical anchors shall be a minimum of 6-inches and shall not exceed 12-inches.
- Vertical anchor dowels may be mechanically coupled above the surface of the concrete removal and above the existing apron with Engineer approved mechanical couplers.
- Anchor dowels shall have a 135-degree hook that connects with the reinforcement mat to be placed at the surface of the new structure.
- Dowels placed between new and existing concrete shall consist of #5 bars and shall be placed in 1-1/2-inch diameter holes with a minimum embedment of 8-inches and shall be located at 12-inches on center each-way in each structure.
- Place #5 dowels as shown to match existing longitudinal reinforcement.
- Edge distance from joint to dowels shall be a minimum of 6-inches and shall not exceed 12-inches.
- Roughen hole surfaces by means of a wire brush and remove loose materials prior to grouting all dowels.
- Place 9-inch waterstops per manufacturer’s requirements at each contraction joint to match existing waterstops. Weld new waterstops to existing waterstops per manufacturer recommendations.

- Place new #5 vertical longitudinal bars in first concrete lift to elevation 295 and allow for Type A lap with vertical bars from second and final lift in accordance with ACI 318.
- Horizontal #4 bars at 12-inches on-center shall be lapped as needed in crest sections and shall not extend through contraction joints.
- Minimum cover for all reinforcement shall be a minimum of 3-inches.
- Concrete shall be placed in 2 lifts the first lift to elevation 295 and the second lift to complete crest structure.
- Concrete mix design:
  - Minimum 28-day strength of 4,000 psi
  - Shall have a maximum aggregate size of 0.75
  - All aggregate shall be proven to conform to ASTM C1567 for alkali reactivity
  - Type II/V low alkali cement shall be used
  - Class F Fly Ash may be used up to a 20 percent replacement of cementitious materials to reduce heat of hydration in concrete
  - Air entrainment shall be a minimum of 6 percent
  - Maximum water/cement ratio of 0.45
  - All admixtures shall be compatible and shall not contain any chlorides
  - Maximum slump of concrete shall not exceed 3-inches.
- Roughen surface of first lift to be in contact with second lift to a 0.25 inch amplitude and remove all laitance and loose materials prior to placement of final concrete lift.
- All concrete placement work shall conform to ACI 305R and 306R hot and cold weather placements of concrete.
- Both lifts are categorized as mass concrete placements and shall be placed in accordance with ACI 207.1 to prevent thermal cracking.

Recreation Facilities Relocation

As a result of the Pool Raise, 104 recreational facilities or site features would be impacted along the shoreline at the NSRA and SSRA. Most of the impacted features (i.e., 59%) would be directly impacted by the pool raise by either partially or fully inundating the features. In these instances, the inundated features would be relocated, re-routed or re-aligned to avoid inundation. The remaining impacted features (i.e., 41%) would be indirectly impacted, whereby the Pool Raise would not inundate the feature, but would closely abut the feature likely resulting in flooding and/or erosion impacts to the features due to wind, wave or high flow events. In a few instances, a feature would be indirectly impacted and require relocation because an inundated segment of a circulation road would likely be re-aligned through these features. The construction work to relocate, re-route or realign the impacted features would be completed in one calendar year. Overall, the majority of the construction would occur outside the peak recreation season (i.e., Memorial Day through Labor Day holiday weekends). In instances where

construction would be necessary during the peak season, the work would be restricted to select areas and conducted during low-use periods (i.e., weekdays) to minimize any impacts to the recreation facilities and visitor experiences.

At NSRA, 57 site features would be impacted, including 21 campsite living spaces (i.e., table and/or grill area), 19 campsite vehicle spurs, 13 circulation road segments (i.e., 2,410 ft of dirt roads and 480 ft of paved roads), 2 boat ramp and parking area segments, 1 picnic site, and 1 water hydrant. The majority of the impacted recreational site features at NSRA would be at the family campground (i.e., 43 impacted features) followed by the dispersed use areas (i.e., 6 impacted features – all dirt roads), group campground (i.e., 4 impacted features), and the day use area and boat launch facilities (i.e., each with 2 impacted features). At the family campground, most of the impacted features would be campsite living spaces and vehicle spurs (i.e., each with 19 impacted sites) with a five impacted road (dirt surface) segments. At the group campground, one of the two group campsites would be fully inundated. At the dispersed use areas, all of the impacted features would be the dirt roads (i.e., 1,410 ft) that provide shoreline access. Overall, most of the impacted features at NSRA (i.e., 61%) would be directly impacted by the pool raise and the remaining impacted features would be indirectly impacted (i.e., features abutting the 305 ft NMWSE).

At SSRA, 47 site features would be impacted, including 15 circulation road segments (i.e., 3,720 ft of dirt roads and 1,140 ft of paved roads), 11 campsite living spaces (i.e., table and/or grill area), 9 picnic sites, 7 campsite vehicle spurs, 1 boat ramp turnaround area, 1 parking area, 1 swim beach, 1 water hydrant, and 1 stage. The majority of the impacted recreational site features at SSRA would be at the family campground (i.e., 22 impacted features) followed by the day use area (i.e., 14 impacted features), dispersed use areas (i.e., 9 impacted features – all dirt road segments), the swim beach (i.e., 2 impacted features), and the boat launch (i.e., 1 impacted feature). At the family campground, most of the impacted features would be campsite living spaces (i.e., 11 sites), vehicle spurs (i.e., 7 sites) and road segments (i.e., 3 segments). At the dispersed use areas, all of the impacted features would be the dirt roads (i.e., 2,710 ft) that provide shoreline access. The entire swim beach would be inundated. Overall, most of the impacted features at SSRA (i.e., 55%) would be directly impacted by the Pool Raise and the remaining impacted features would be indirectly impacted (i.e., features abutting the 305 ft NMWSE). Notably, at five campsites in the family campground, the campsite living space and vehicle spurs would be indirectly impacted and require relocation because an inundated segment of the campground circulation road would likely be re-aligned through these campsites.

Clean-Up and Site Restoration

During construction daily clean-up activities will take place to keep construction and staging areas clean. After construction is completed the disturbed areas, including areas where temporary access or staging has taken place, will be restored to similar conditions prior to construction. Equipment, material, temporary facilities, temporary controls, etc. will be removed from the site. A final clean-up and walk-thru will be conducted to make sure site clean-up and restoration has been completed.

2.2.1.2 Other Changes to Existing Recreation Facilities

Beyond the replacement of inundated recreation facilities, while the Project RAs are able to meet the current and future recreational demand, some of the recreation facilities are in need of replacement or rehabilitation to maintain the proper functioning condition of the facility. Nearly all of the facilities will require replacement or rehabilitation during the term of the new license to maintain the facilities in proper functioning condition; and, particularly the restrooms, potable water system and the circulation roads, which will need near-term rehabilitation in order to provide facilities in a safe and proper functioning condition. When constructing or rehabilitating Project recreation facilities, SSWD will obtain all necessary permits and approval for survey work, facility design and on-site resource evaluations.

2.2.1.3 Changes to Primary Project Roads and Trails

SSWD proposes to add to the new license as a Primary Project Road an existing road that accesses the Camp Far West Powerhouse. The existing road is within the proposed and existing FERC Project boundaries. The road extends approximately 0.25 miles from an existing SSWD locked gate at Camp Far West Road to the Camp Far West Powerhouse and Switchyard. The existing road is not open to the public for safety reasons, is used and maintained solely by SSWD to access the Camp Far West Powerhouse and Switchyard, and has an asphalt-paved surface approximately 20 ft wide and shoulder width of approximately two feet. While the road was constructed when Camp Far West Powerhouse and Switchyard were constructed and is SSWD's only vehicular access route to Camp Far West Powerhouse and Switchyard, the road is not identified in the existing license as a Project facility. Figure 2.1-1 in this Exhibit as well as Attachment G-1 in Exhibit G of the FLA shows the location of the existing road. Roads associated with recreation facilities are considered in SSWD's proposed Recreation Facilities Plan.

2.2.1.4 Changes to Project Gages

SSWD does not propose any changes to Project gages described in Section 2.1.1.8.

2.2.2 Change to Existing FERC Project Boundary

SSWD proposes several changes to the existing FERC Project Boundary in order to more accurately define lands necessary for the safe operation and maintenance 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 FERC Project Boundary that are currently utilized with a preponderance of use related to the Project operation and maintenance, 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 existing FERC 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 300' elevation NMWSE or to a distance of 200 ft from the 300-ft elevation NMWSE. These changes are proposed as these are the preferred methods of defining project boundaries as outlined in the FERC Drawing Guide (FERC 2012), provide a minimum of 15 ft of dry shore for all locations around the reservoir and are a better representation of lands required for Project O&M around the Project reservoir.

Proposed changes are discussed below. All proposed changes are described in detail in Section 2.0 of Exhibit G.

SSWD proposes the following changes under the category of corrections to the existing FERC Project Boundary:

- The addition of the areas that encompass rights-of-way for road access to the Camp Far West Powerhouse used to access and maintain the dam outlet and powerhouse. Land in this proposed addition is owned by a private land owner (Placer County Assessor's Parcel Number 018-020-015-000).
- The removal of the land owned by SSWD to the west of the dam spillway (Yuba County Assessor's Parcel Number 015-370-016-000). These lands are not used or needed for Project O&M. Note that the area of the new Spillway Modification to the Bear River is retained in the Proposed Project Boundary with a 15 ft buffer.
- The removal of the area in the existing Project Boundary bounded on the north and west by Camp Far West Road, extending to a boundary established at 200' from the NMWSE. This land is not used for Project O&M. Land in this proposed removal is owned by SSWD (Yuba County Assessor's Parcel Numbers 015840021000, 015840020000, 015370016000).
- The removal of the area in the existing Project Boundary bounded on the north by Camp Far West Road, extending to the northern use limit of the North Recreation Area. This land is not used as part of the recreation facility or for Project O&M. Land in this proposed removal is owned by SSWD (Yuba County Assessor's Parcel Number 015840022000).

SSWD proposes the following changes under the category of a contour 20 ft above the 300-ft NMWSE or proximity of 200 horizontal ft from the 300 ft NMWSE:

- The addition and removal of land such that the Project Boundary around Camp Far West Reservoir where the Project Boundary is not encompassing Project facilities is defined by the lesser (closer to reservoir NMWSE) of either the topographic contour of 320 ft, which is 20 ft above the 300-ft NMWSE, or 200 horizontal ft from the 300 ft NMWSE. Lands in this proposed change are a combination of lands owned by private land owners and SSWD. The corrections consist of many small additions and subtractions from the existing FERC boundary based on higher accuracy elevation data made available since

the creation of the original boundary geometry. Areas of significant change are limited to the upland reaches of tributary canyons of unnamed creeks where the existing FERC Boundary extends beyond 200 ft horizontally from the 300 ft NMWSE. All of the upland canyon changes are removal of lands included in the existing FERC boundary.

Table 2.2-3 summaries SSWD's proposed changes to the existing FERC Project Boundary.

Table 2.2-3. Summary of proposed changes to the existing FERC Project Boundary.

Owner and Action	Added to Include Primary Project Roads (ac)	Beyond 200 ft from the 300-ft NMWSE (ac)	Correction to 320 ft contour (ac)	Not Used for Project O&M (ac)	Added to include recreation area (ac)	Total (ac)
EXISTING FERC PROJECT BOUNDARY						
Private Lands	--	--	--	--	--	139.6
SSWD Lands	--	--	--	--	--	2,724.1
Total	--	--	--	--	--	**2,863.7**
PROPOSED CHANGES TO EXISTING FERC PROJECT BOUNDARY						
Changes to Private Lands						
addition	+0.7	--	+7.2	--	--	+7.9
subtraction	--	-0.4	-0.4	--	--	-0.8
Subtotal	*+0.7*	*-0.4*	*+6.8*	*0.0*	--	*+7.1*
addition	0	--	+7.7	--	+6.7	+14.4
subtraction	--	-87.6	-2.0	-121.6	--	-211.2
Subtotal	*0*	*-87.6*	*+5.7*	*-121.6*	*+6.7*	*-196.8*
Total	**+0.7**	**-88.0**	**+12.5**	**-121.6**	**+6.7**	**-189.7**
PROPOSED FERC PROJECT BOUNDARY						
Private Lands	--	--	--	--	--	146.7
SSWD Lands	--	--	--	--	--	2,527.3
Total	--	--	--	--	--	**2,674.0**

Where SSWD proposes to add private lands to the FERC Project Boundary, SSWD has notified the land owner of this proposal.

Neither the existing FERC Project Boundary nor the Proposed FERC Project Boundary includes federal lands or tribal reservation lands.

2.2.3 Changes to Existing Project Operations

The Proposed Project would create additional storage space in Camp Far West Reservoir, which allows for more water to be stored when Camp Far West Reservoir fills and spills. The additional stored water may be delivered for water supply in the year when it is stored, or carried over for water supply and downstream demand in future years. Some of the changes to the No Action Alternative with the Proposed Project include:

- Increase in average annual water supply deliveries to SSWD of 1,600 ac-ft over the period of record modeled, ranging from an increase of 4,800 ac-ft in Below Normal WYs to 400 ac-ft in Wet WYs. A decrease of 300 ac-ft occurs in Critical WYs.
- Increase in average annual carryover storage in Camp Far West Reservoir of 4,700 ac-ft over the period of record modeled, ranging from an increase of 8,300 ac-ft in Wet WYs

to 5,800 in Below Normal WYs. Decreases of 400 and 900 ac occur in Dry and Critical WYs, respectively.

- Increase in average annual energy production at Camp Far West Powerhouse of 443 MWhrs over the period of record modeled, ranging from an increase of 1,174 MWhrs in Wet WYs to 10 MWhrs in Critical WYs. A decrease of 121 MWhs occurs in Dry WYs. About 60 percent of the overall increase occurs in off-peak energy and 40 percent in peak energy.
- Increase of two years (i.e., 1987 and 2001) over the period of record modeled when Bay-Delta Settlement Agreement releases would be made, and decrease in one year (i.e., 1991).
- Decrease in average annual flow below the non-Project diversion dam of 2 cfs over the period of record modeled, ranging from a decrease of 12 cfs in Below Normal WYs to 8 in Above Normal WYs. Increases of 6, 2 and 3 cfs occur in Wet, Dry and Critical WYs. No substantial difference in the Bear River downstream occurs due to accretion.

2.2.4 Changes to Conditions in the FERC License and Other Agreements

2.2.4.1 SSWD's Proposed Conditions in the FERC license

SSWD developed Proposed Conditions, including associated implementation plans, for the new licenses. These conditions are:

- SSWD Proposed Condition WR1, Implement Water Year Types. SSWD shall determine the WY types in this condition, and shall use the determinations to implement articles and conditions of the license that are dependent on WY type.
- SSWD Proposed Conditions AR1, Implement Minimum Streamflows. SSWD shall maintain the minimum streamflows in the Bear River downstream of the Project as described in this condition.
- SSWD Proposed Condition AR2, Implement Fall and Spring Pulse Flows. SSWD shall provide fall and spring pulse flows in the Bear River downstream of the Project described in this condition.
- SSWD Proposed Condition AR3, Implement Ramping Rates. SSWD shall make a good-faith effort to adhere to the target ramping rates in the Bear River downstream of the Project described in this condition.
- SSWD Proposed Condition TR1, Implement a Bald Eagle Management Plan. SSWD shall implement the Bald Eagle Management Plan included in Appendix E2 in Exhibit E of this Application for New License.
- SSWD proposed Condition TR2, Implement Blue Heron Rookery Management. SSWD shall implement a Limited Operating Period within a buffer of any great blue heron (*Ardea herodias*) rookeries located on Camp Far West Reservoir.

- SSWD Proposed Condition RR1, Implement Recreation Facilities Plan. SSWD shall implement the Recreation Facilities Plan included in Appendix E2 in Exhibit E of this Application for New License.
- SSWD Proposed Condition CR1, Implement Historic Properties Management Plan. SSWD shall implement the Historic Properties Management Plan included in Volume 3 of SSWD's Application for New License.

Refer to Appendix E2 in Exhibit E for the full text of each measure.

SSWD does not propose to include the requirements of the Bear River Settlement Agreement in the new license for the following reasons. First, no participant to the relicensing has suggested the requirements be included in the new license. Second, the requirements in the agreement resulted from prolonged negotiations to resolve a water rights issue, which is outside FERC's jurisdiction under Section 27 of the Federal Power Act. The agreement resulted in a paid water transfer and is not appropriately characterized as a PM&E measure, except for the down ramp restriction to avoid fish stranding resulting from the water transfer. The release of the water in "dry" and "critically dry" years as required by the agreement provides little, if any, benefit to aquatic resources in the Bear River because the water is provided in the July through September period when releases are too warm to be of any benefit; and providing benefits to aquatic resources in the Bear River is not the purpose of the Settlement Agreement. Third, the Settlement Agreement terminates on December 31, 2035, or sooner if agreed to by SSWD, SWRCB and DWR. The Settlement Agreement does not contemplate, nor did the parties bargain for, the need to go through a FERC license amendment process to terminate the benefits and obligations of the Settlement Agreement.

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

Section 2.1.5.2 describes other licenses (i.e., not the FERC license), agreements and contracts that affect current Project operations. When FERC issues its new license, SSWD would apply to the SWRCB to modify any water rights, if necessary, to make them consistent with the new license. SSWD does not anticipate any changes will be needed to SSWD's water delivery contracts. Upon termination of the existing SSWD/SMUD Contract, SSWD plans to negotiate a new lease/power purchase contract or multiple contracts with, at this time, an unknown third party, which could be SMUD, or other parties. SSWD may 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. SSWD would continue to make releases to meet its Bear River Settlement Agreement requirements, though as described in Section 2.2.4.1 in this Exhibit E, those requirements may change as the SWRCB updates the Bay-Delta Plan.

2.2.5 Changes to Existing Facility Maintenance

Section 2.1.6 describes SSWD's existing facility maintenance. SSWD does not propose any changes to maintenance, except as regards to implementation of SSWD's Proposed PM&E measures.

2.3 Alternatives Considered But Eliminated From Further Analysis

SSWD considered but eliminated from further analysis the following alternatives:

- Retire the Project
- Issue a Non-Power License
- Federal Agency Takeover of the Project
- Alternatives Proposed by FWN in its DLA Comments

Each of these alternatives and the consideration of factors through which the alternative was eliminated from further analysis are described below.

2.3.1 Retire the Project

Project retirement could be accomplished with or without removal of the Project dam. No Relicensing Participant has proposed that removal of the Project dam would be appropriate in this case and, besides providing for hydroelectric power generation, the dam also provides critical water-supply functions, as well as important environmental and recreational opportunities. For these reasons, there is little practical basis for recommending removal of the Project dam, and dam removal is not a reasonably foreseeable alternative to relicensing the Project with appropriate resource management measures.

The second Project retirement alternative would involve retaining the Project dam and disabling or removing equipment used to generate power. Project works would remain in place and would be used for historical consumptive-use, environmental and recreational water management, or other purposes. No Relicensing Participant has advocated this alternative and there is no basis for recommending it. Because the power supplied by the Project is needed, replacement power from some other source, without adding air pollutants, would have to be provided. For these reasons, removal of the electric generating equipment is not a reasonably foreseeable alternative.

2.3.2 Issue a Non-Power License

A non-power license is a temporary license that FERC would issue when it determines that a governmental agency, other than SSWD in this case, would assume regulatory authority and supervision over the lands and facilities covered by the non-power license. At this point, no agency has suggested a willingness or ability to do this. No party has sought a non-power license and there is no basis for concluding that the Project should no longer be used to produce power. As stated above, if the power facilities were removed, a source of replacement power would have to be identified. Thus, a non-power license is not a realistic alternative to relicensing in this circumstance.

2.3.3 Federal Agency Takeover of the Project

Federal takeover of the Project is not a reasonably foreseeable alternative. Federal takeover and operation of the Project would require Congressional approval. While that fact alone would not preclude further consideration of this alternative, there is no evidence to indicate that federal takeover should be recommended to Congress. No Relicensing Participant or other party has suggested federal takeover would be appropriate, and no federal agency has expressed an interest in operating the Project. So, federal takeover of the Project is not a reasonably foreseeable alternative.

2.4 List of Attachments

None.