

Appendix A

Project Facilities and Maps

Appendix A1

Project Facilities

Table A1-1. Summary of General Information, Project Facilities, and Features

General Information	
Owner and Operator	Pacific Gas and Electric Company
FERC Project Number	96
Current License Term	50 years (through November 30, 2022) ^a
Commenced Commercial Operation	1920
County	Fresno and Madera counties
Hydrologic Drainage Basin	Upper San Joaquin River basin
Watersheds	San Joaquin River watershed
Water Rights	Four individual licensed water rights for a combined total of: • 1,775 cfs diversion and 3,200 acre-feet storage for hydropower generation at K1 and K2 Powerhouses • 4,600 cfs for hydropower generation and incidental domestic uses at K2 Powerhouse
Dams and Reservoirs	
Dams: Kerckhoff Dam	
Reservoirs: Kerckhoff Reservoir	
Intakes and Water Conveyance System	
Intake Structures:	
K1 Intake Structure	
K2 Intake Structure	
Tunnels and Surge Chambers:	
K1 Tunnel	
K1 Surge Chamber ^b	
K2 Tunnel	
K2 Surge Tank/Chamber	
K2 Discharge Tunnel	
Penstocks: ^c	
K1 Penstock No. 1 ^b	
K1 Penstock No. 3 ^b	
K2 Penstock	
Access Tunnels and Adits	
Adit 1 to K1 Tunnel ^b	
Adit 2 to K1 Tunnel ^b	
North Adit to K1 Tunnel (instream flow release)	
Portal door and access tunnel to K2 Powerhouse	
K2 Penstock construction access tunnel (plugged)	
Powerhouses and Switchyards	
K1 Powerhouse (above ground)	
K2 Powerhouse (underground)	
K1 Switchyard	
K2 Switchyard (and Communication Building)	

Project Compliance Gages
J-1 gage – Kerckhoff Reservoir
J-2 gage – San Joaquin River below Kerckhoff Dam
J-7 water temperature gage ^d
Project Communications and Electric Distribution
Fiber optics and 12-kV pole line between the K2 Switchyard and non-Project substation near K1 Headworks
K1 6.6-kV overhead line
Helicopter Landing Zones
HLZ at J-1
HLZ at J-2
HLZ at J-2 low-flow measurement site
HLZ at J-7 ^e
HLZ at Smalley Cove
HLZ near K2 Powerhouse
Ancillary and Support Facilities
Runoff piping above K2 Intake Structure
Boat dock adjacent to A.G. Wishon Powerhouse
Boat dock near tunnel intakes on Kerckhoff Reservoir
Wood storage building on slope above intake structures
Metal storage building between boat dock and K2 Intake Structure
K1 Headworks ^b
Control house near K1 Powerhouse ^b
Communication Building near K1 Powerhouse ^f
Warehouse near K1 Powerhouse
Laydown storage area near K1 Powerhouse
Flood wall at K1 Powerhouse
K2 Tunnel vent
Staging area near K2 Tunnel portal
Public and Worker Safety Features
Log boom on Kerckhoff Reservoir
Boat barrier on Kerckhoff Reservoir
Fencing around the K1 Powerhouse, the K2 Powerhouse, both switchyards, and all headworks; each end of dam crest; and across the path between the boat dock and the trash rake conveyor system at the dam
Boat barrier at K2 Tailrace
Project Roads^g
Access Road 1 (from Access Road 2 to Adit 1)
Access Road 2 (Smalley Road to Adit 2)
Access Road 3 (Access Road 6 – BLM Shared to K1 Powerhouse [Lower])
Access Road 4 (Access Road 3 to K1 Powerhouse [Upper])
Access Road 5 (Access Road 6 – BLM Shared to Laydown Storage Area)
Access Road 5 to 7 Connector (Access Road 5 to Access Road 7)
Access Road 6A (segment from Access Road 6 – BLM Shared to K2 Discharge Tunnel)
Access Road 6B (segment from Access Road 6A to K2 Powerhouse Access Tunnel)
Access Road 6C (segment from Access Road 6 – BLM Shared to K1 Surge Chamber)

Access Road 7 (Access Road 6C to K1 Powerhouse Headworks)
Access Road 8 (Access Road 6 – BLM Shared to K2 Surge Tank/Chamber)
Access Road 9 (Access Road 10 to K2 Penstock Construction Access Tunnel)
Access Road 10 (Access Road 6 to K2 Switchyard)
Smalley Cove Recreation Area Road
Project Trails^g
Trail to J-2 (Kerckhoff Dam to J-2 Gage)
Access path from dock to dam
Access path to North Adit from dam (Kerckhoff Dam to North Adit)
Trail from J-7 HLZ to San Joaquin River (HLZ to J-7 gage) ^e
Project Recreation Facilities
Smalley Cove Recreation Area

Notes: cfs – cubic feet per second
HLZ – helicopter landing zone
K1 – Kerckhoff 1
K2 – Kerckhoff 2

- a The 50-year term for the date of expiration is from expiration of the original license on October 5, 1976.
- b Under the Proposed Action, the facilities would no longer be Project works, but would remain within the FERC Project Boundary as facilities used to maintain the Project, as described in the K1 retirement plan.
- c K1 Penstock No. 2 was abandoned in place and removed from the Project license in 2013.
- d Since 2015, PG&E has been monitoring water temperature at the Gage J-2 location downstream of Kerckhoff Dam, in addition to Gage J-7. In 2020, PG&E relocated the J-7 water temperature gage from its historical location approximately 1/3 mile upstream of the K1 Powerhouse to the K1 Powerhouse (J-7@K1 site) with concurrence from the California Department of Fish and Wildlife.
- e This feature is not included in the Proposed Action.
- f In the Draft License Application, this structure was referred to as the K1 Hoist House.
- g Project roads and trails are shown on Map A2-2a through Map A2-2e. Text in parentheses describes where access roads begin and end as depicted in Maps A2-2a through Map A2-2e.

Table A1-2. Project Facilities and Other Relevant Details

Kerckhoff Dam	
Dam location	San Joaquin River
Constructed	1920
Drainage area	1,481 square miles
Dam type	Concrete arch structure (constant angle arch, variable radius dam)
Elevation datum	North American Datum 1983
Hazard classification	Low
Height of dam height above streambed	• 91 feet from base of dam to spillway crest • 114.5 feet from base of dam to top of dam
Dam crest length	507 feet at elevation of 994.5 feet above msl
Dam thickness	36 feet (maximum)
Elevation of dam crest	994.5 feet above msl
Low-level outlet capacity	3,900 cfs
Low-level outlet pipes	Three 72-inch-diameter pipes
Required minimum flow below Kerckhoff Dam	• 25 cfs (Normal water years) • 15 cfs (Dry water years)
Spillway	
Spillway elevation	Spillway crest at gates at elevation 971.3 feet above msl
Type	14 radial gates: 14.3 feet high by 20 feet long
Spillway length	280 feet
Gate operation	• Radial Gates 1–9: Manually operated (normally operated during storms/high-flow conditions) • Radial Gates 10–14: Automatically operated
Capacity	43,700 cfs
Flood/spill of record	1997
Radial gate control	Automatically controlled gate hoist
Kerckhoff Reservoir	
Normal maximum water surface elevation	985.0 feet above msl
Normal operating range	4.5 feet (980.0 to 984.5 feet above msl)
Reservoir length	Approximately 3.0 miles ^a
Shoreline length	Approximately 10.3 miles ^a
Original gross storage	4,252 acre-feet
Usable capacity (at normal maximum water surface elevation)	2,434 acre-feet
Surface area (at normal maximum water surface elevation)	175 acres (985.0 feet above msl)

K1 Powerhouse and Associated Facilities	
K1 Intake Structure	- Reinforced concrete structure with two 8.5-foot x 21.4-foot fixed-wheel gates, with trash racks - Elevation invert 942.0 feet
Tunnel	16,913-foot-long tunnel - Approximately 17-foot x 17-foot rectangular tunnel cross section near the intake - Capacity of 1,700 cfs
Surge chamber	Simple
Penstocks ^b	- K1 Penstock No. 1: 913 feet long - K1 Penstock No. 3: 946 feet long
Tailrace	Powerhouse discharges directly to the San Joaquin River
K1 Powerhouse	
Location	Located 8 miles downstream from Kerckhoff Dam ^c
Date of commission	August 15, 1920
Structure	Reinforced concrete
Construction material	Reinforced concrete with natural rock walls below ground
Approximate size	45 feet x 99 feet (main floor)
Authorized installed capacity	22,720 kW
Normal operating capacity	25,200 kW
Turbine	
Number of units	Two
Type	Vertical reaction-type Francis turbine
Manufacturer	Allis-Chalmers
Rated output	15,000 hp each at 360 RPM
Licensed nameplate capacity	15,000 hp
K1 Powerhouse (continued)	
Static head	350 feet
Maximum flow	1,500 cfs (design) 1,156 cfs (actual)
Generator	
Number and Type	- Three-phase 60-cycle, 0.8 power factor, 6,600-volt revolving field - Two units
Manufacturer	Allis-Chalmers
Authorized installed capacity	Each unit: 11,360 kW (14,200 kVA) for a total of 22,720 kW
Normal operating capacity	Each unit: 12,600 kW for a total of 25,200 kW
Voltage	6,600 volt
Average annual energy	176 million kWh
K2 Powerhouse and Associated Facilities	
K2 Intake Structure	- Reinforced concrete structure equipped with two 10.6-foot x 24.6-foot fixed-wheel gates, with trash racks - Elevation invert 934.0 feet

Tunnel	21,632 feet long with a 24-foot diameter
Surge tank/chamber	Simple
Penstock	One 1,013-foot-long penstock
Tailrace	Concrete discharge channel with 40-foot-wide base and 4 to 1 side slopes
Discharge tunnel to tailrace	717 feet long with a 25-foot diameter
K2 Powerhouse	
Location	Underground powerhouse located 9.8 miles downstream of Kerckhoff Dam ^c
Date of commission	May 6, 1983
Structure	Underground, in a circular rock chamber
Construction material	Excavated rock chamber
Approximate size	85 feet in diameter, 124 feet high
Authorized installed capacity	140,000 kW
Normal operating capacity	155,000 kW
Turbine	
Number of units	One
Type	Vertical shaft, Francis type
Manufacturer	Hitachi
Rated output	190,000 hp at 180 RPM
Normal maximum gross head	421 feet
Maximum hydraulic capacity	5,100 cfs
Generator	
Number and type	One unit, 3-phase, 60 hertz, 0.90 power factor
Manufacturer	General Electric
Authorized installed capacity	140,000 kW (155,000 kVA)
Normal operating capacity	155,000 kW
Voltage	13,800 volts
Average Annual Energy	290 million kWh

Notes: cfs – cubic feet per second
HLZ – helicopter landing zone
hp – horsepower
kV – kilovolt
kVA – kilovolt ampere
kW – kilowatt
kWh – kilowatt-hour
msl – mean sea level
RPM – revolutions per minute

a Mileage is at normal maximum water surface elevation (985.0 feet above msl) and reflects latest information based on geographic information system analysis.

b K1 Penstock No. 2 was abandoned in place and removed from the Project license in 2013.

c Mileage reflects latest information based on geographic information system analysis.

Appendix A2

Maps, June 2023

APPENDIX A-2 MAPS — ACCESSIBLE SUMMARY FOR FERC FILING

This narrative summary is provided ahead of the map figures to give readers and listeners a structured understanding of the information presented, ensuring that the intent, organization, and content of the maps are accessible regardless of the user's ability to visually interpret complex cartographic documents.

Appendix A-2 contains map figures prepared in support of the Kerckhoff Hydroelectric Project (FERC Project No.96) Final License Application (March 2023). The maps visually depict the location, extent, and configuration of existing project facilities and features, as well as surrounding land ownership and recreation areas within the project vicinity.

Because the figures include dense symbology, overlapping labels, and multiple infrastructure elements displayed simultaneously, this written summary is provided as an overview and interpretive aid for accessibility and clarity. The summary is intended to help the viewer or listener understand the maps before or while reviewing the figures, and it serves as a functional equivalent description consistent with Section 508 requirements.

Map A2-1: Overview of Major Project Facilities and Land Ownership

Map A2-1 presents a regional-scale overview of the Kerckhoff Hydroelectric Project along the San Joaquin River. It illustrates the general project setting and identifies major components, including:

- Kerckhoff Dam and Kerckhoff Reservoir
- Kerckhoff 1 Powerhouse (above ground) and Kerckhoff 2 Powerhouse (underground)
- Associated tunnels, adits, penstocks, powerlines, and project access roads
- Nearby non-project facilities, such as A.G. Wishon Powerhouse and San Joaquin No. 1A Powerhouse

The map also shows surrounding recreation and jurisdictional areas, including Sierra National Forest, San Joaquin River Gorge Recreation Area, Millerton Lake State Recreation Area, and Smalley Cove Recreation Area. Land ownership and management are identified for PG&E, the Bureau of Land Management, Bureau of Reclamation, U.S. Forest Service, the State of California, and private lands.

Maps A2-2a through A2-2e: Project Facilities and Features (Sheets 1–5 of 5)

Together, Maps A2-2a through A2-2e provide a series of detailed, large-scale views of the Kerckhoff Project facilities. Each sheet covers a different portion of the project area while using consistent legends and symbols.

Common Elements Shown Across All Sheets

Across the five sheets, the maps identify:

- Project facilities such as dams, powerhouses, tunnels, intakes, penstocks, surge chambers, switchyards, communication buildings, and gages
- Water conveyance features, including tunnels, adits, instream flow pipes, and runoff piping
- Electrical and communication infrastructure, including fiber optics and 12-kilovolt pole lines
- Transportation and access features, such as paved and unpaved project roads, shared BLM and U.S. Forest Service roads, locked gates, boat docks, and trails
- Recreation features, including Smalley Cove Recreation Area, trails, boat barriers, log booms, and designated access points
- Helicopter Landing Zones (HLZs) used for inspections, construction, maintenance, and emergency access
- FERC project boundary, shown relative to lakes, rivers, streams, and adjacent lands

Land ownership and management jurisdictions are consistently depicted on all sheets.

Map A2-2a (Sheet 1 of 5)

This sheet provides an index-style overview showing the spatial relationship between Redinger Lake, Corrine Lake, Kerckhoff Reservoir, Millerton Lake, and the San Joaquin River Project Bypass Reach. It establishes the location of the downstream detailed sheets and highlights the primary project area.

Map A2-2b (Sheet 2 of 5)

Map A2-2b focuses on the Smalley Cove Recreation Area and adjacent river corridor. It shows:

- Recreation facilities and access roads
- Boat docks and barriers
- HLZs, including those near Smalley Cove and the J-2 low-flow site
- The proximity of non-project facilities such as A.G. Wishon Powerhouse

Map A2-2c (Sheet 3 of 5)

This sheet centers on Kerckhoff Dam and the areas immediately surrounding it. It depicts:

- Intake structures for Kerckhoff 1 and Kerckhoff 2
- Tunnel portals, adits, access paths, and gaging cableways
- Storage areas and dam-related access routes
- HLZs near key operational features

Map A2-2d (Sheet 4 of 5)

Map A2-2d illustrates the area around Kerckhoff 1 Powerhouse and its support infrastructure. Features include:

- Powerhouse structures, switchyard, surge chamber, and headworks
- Warehouses, control houses, flood walls, and laydown areas
- A network of access roads, including shared BLM roads
- Communication and power lines supporting the facility

Map A2-2e (Sheet 5 of 5)

This sheet focuses on the Kerckhoff 2 Powerhouse area. It shows:

- The underground powerhouse, discharge tunnel, surge tank, and switchyard
- Construction and operational access tunnels
- Staging areas and multiple access roads
- HLZs associated with Kerckhoff 2 facilities
- Connections to nearby trails and Millerton Lake

Overall Intent of Appendix A-2

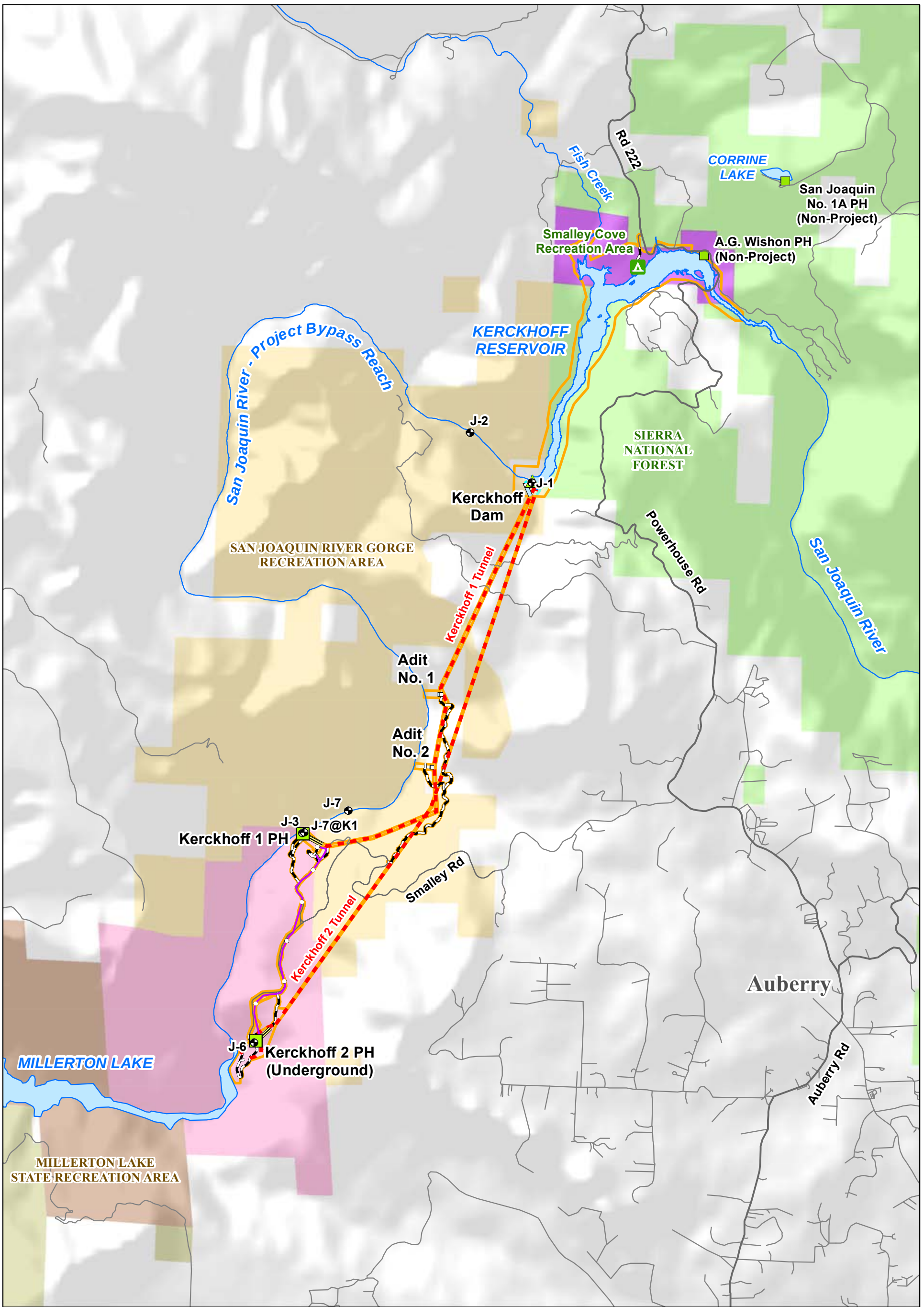
Taken together, the maps in Appendix A-2 provide a comprehensive visual description of the existing Kerckhoff Hydroelectric Project facilities, their relationship to the surrounding landscape, and their operation within the San Joaquin River corridor.



Maps



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PG&E Project Facilities

Powerhouse

Dam

Water Conduit

Penstock

12kV and Fiber Optics Line

Project Road

Recreation Area

FERC Project Boundary

Other Features

Other Road

Watercourse

Water Body

Gage

Land Ownership*

Bureau of Land Management (BLM)

Bureau of Reclamation lands including those under BLM management

Bureau of Reclamation lands under State of California management

State of California

U.S. Forest Service

PG&E

Private (Blank)

*SOURCE: BLM, 2020

Pacific Gas and Electric Company

PG&E Kerckhoff Project (FERC No. 96)

Map A2-1

Overview of Major Project Facilities and Land Ownership

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Projection: UTM, Zone 11 North

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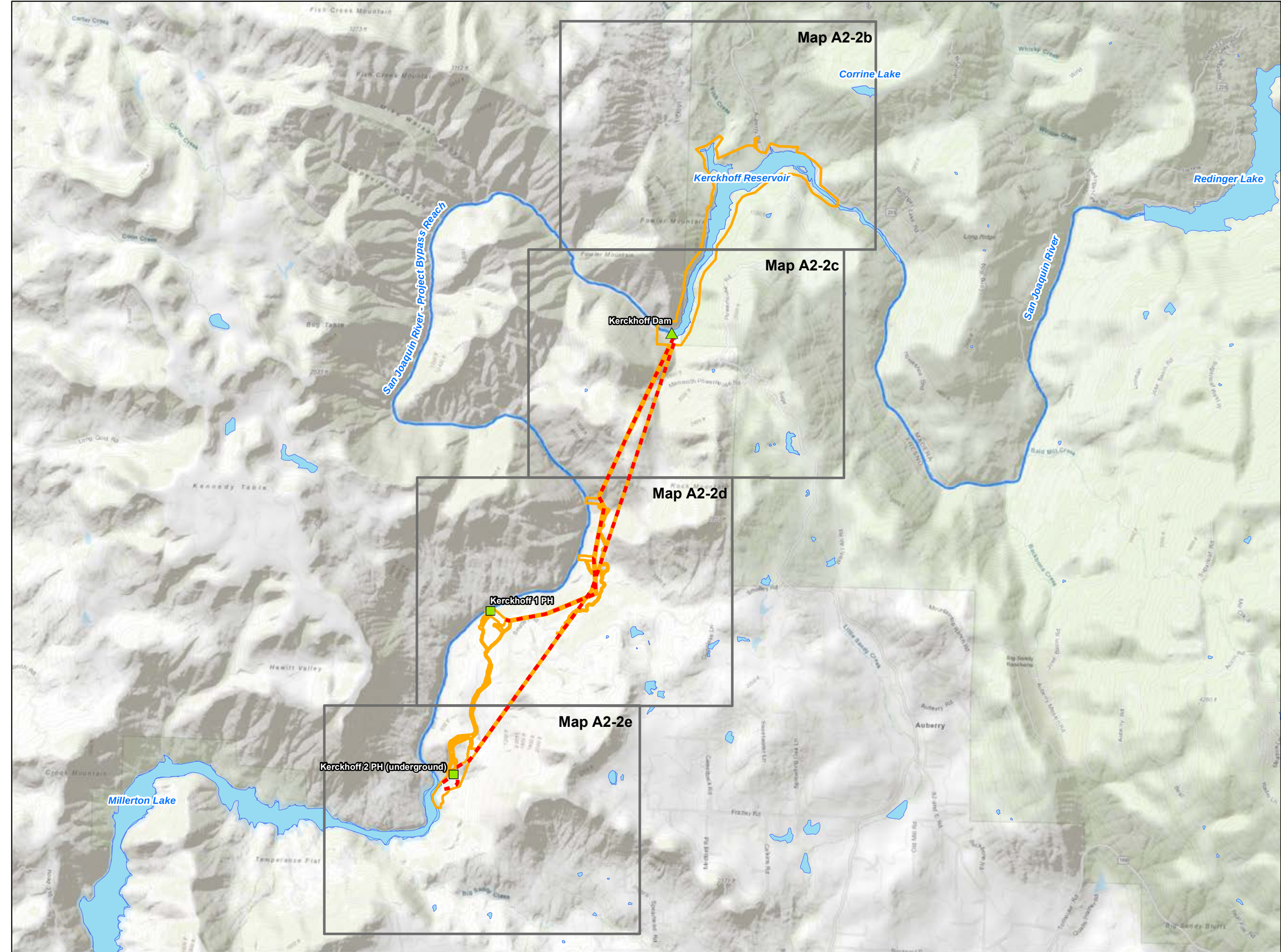
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- PG&E Project Facilities**
- ▲ Dam
 - Powerhouse
 - Tunnel
 - ▭ FERC Project Boundary
- Other Features**
- Lake/Reservoir
 - River/Stream



PG&E Kerckhoff Project (FERC No. 96)

Map A2-2a
Project Facilities and Features
(Sheet 1 of 5)

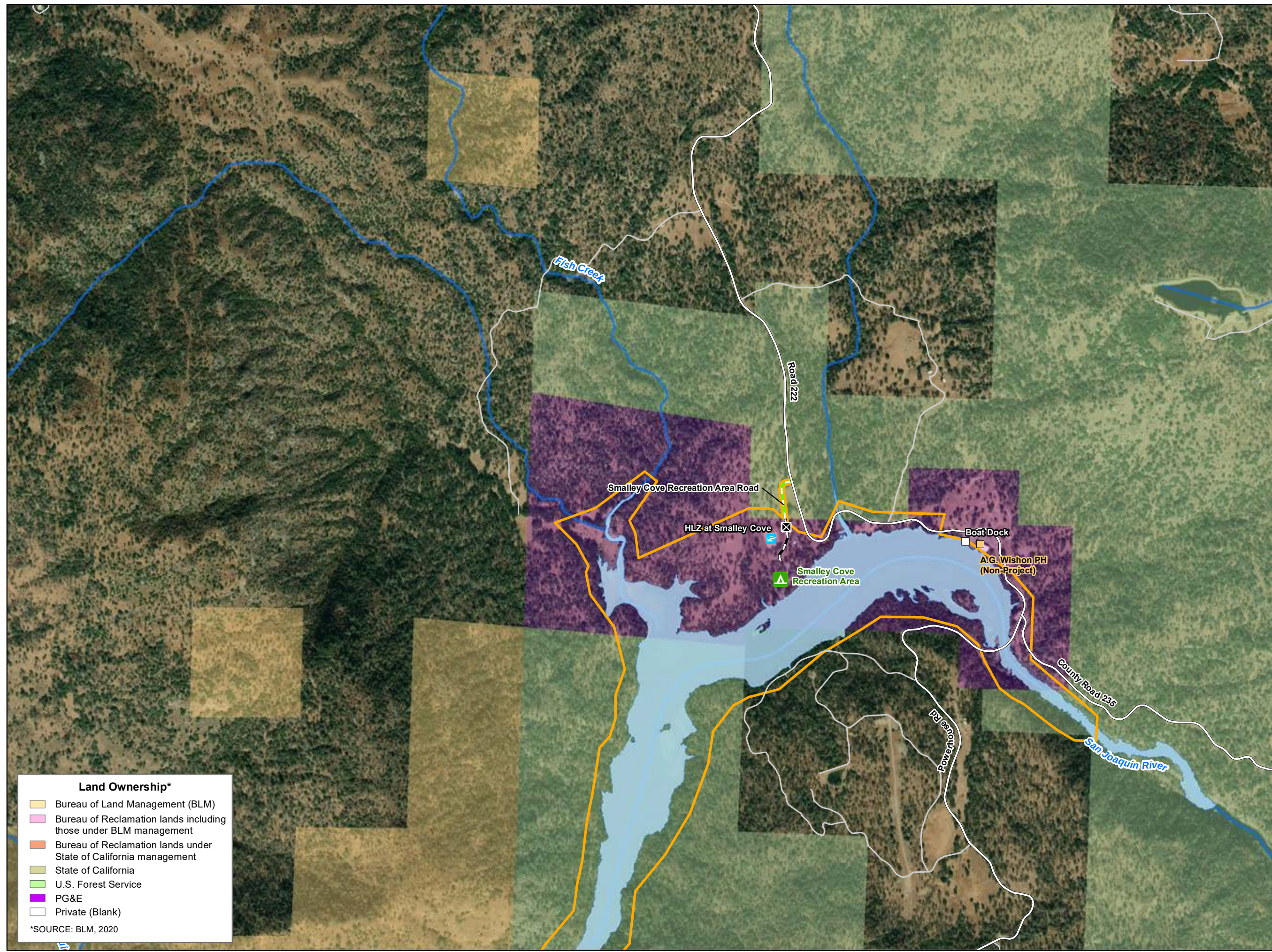


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Land Ownership*

Bureau of Land Management (BLM)

Bureau of Reclamation lands including those under BLM management

Bureau of Reclamation lands under State of California management

State of California

U.S. Forest Service

PG&E

Private (Blank)

*SOURCE: BLM, 2020

PG&E Project Facilities

Dam

Powerhouse

Switchyard

Water Conveyance Feature

Gage

Helicopter Landing Zone (HLZ)

Building

Ancillary and Other Facilities

Tunnel

Penstock

Adit

Instream Flow Pipe

Runoff Piping

Fiber Optics & 12kV Pole Line

6.6 kV Line

Boat Barrier

Log Boom

Project Trail

Fence

FERC Project Boundary

Project Recreation Facilities

Smalley Cove Recreation Area

Transportation System Features

Locked Access Gate

Project Road

BLM Shared

USFS Shared

Non-Project Public Access Road

Other Road

Other Features

Lake/Reservoir

River/Stream

Non-Project Facilities

A.G. Wishon Powerhouse

Map 2b

Map 2c

Map 2d

Map 2e

Pacific Gas and Electric Company

PG&E Kerckhoff Project (FERC No. 96)

Map A2-2b

Project Facilities and Features

(Sheet 2 of 5)

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Feet

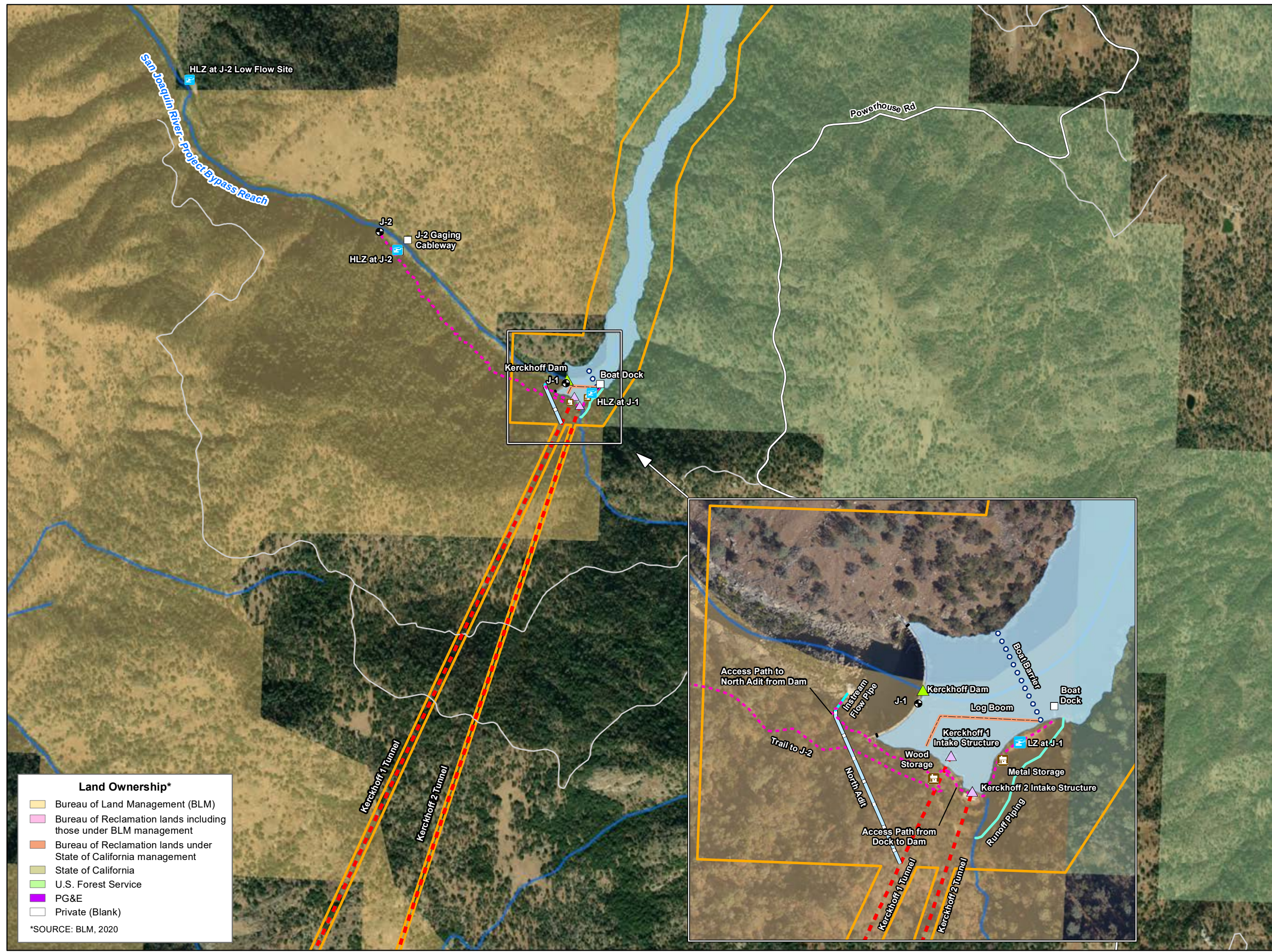
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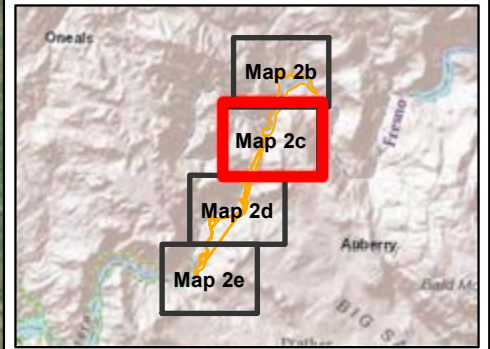


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- PG&E Project Facilities**
- Dam
 - Powerhouse
 - Switchyard
 - Water Conveyance Feature
 - Gage
 - Helicopter Landing Zone (HLZ)
 - Building
 - Ancillary and Other Facilities
 - Tunnel
 - Penstock
 - Adit
 - Instream Flow Pipe
 - Runoff Piping
 - Fiber Optics & 12kV Pole Line
 - 6.6 kV Line
 - Boat Barrier
 - Log Boom
 - Project Trail
 - Fence
 - FERC Project Boundary
- Project Recreation Facilities**
- Smalley Cove Recreation Area
- Transportation System Features**
- Locked Access Gate
 - Project Road
 - BLM Shared
 - USFS Shared
 - Non-Project Public Access Road
 - Other Road
- Other Features**
- Lake/Reservoir
 - River/Stream
- Non-Project Facilities**
- A.G. Wishon Powerhouse

- Land Ownership***
- Bureau of Land Management (BLM)
 - Bureau of Reclamation lands including those under BLM management
 - Bureau of Reclamation lands under State of California management
 - State of California
 - U.S. Forest Service
 - PG&E
 - Private (Blank)
- *SOURCE: BLM, 2020



Pacific Gas and Electric Company

PG&E Kerckhoff Project (FERC No. 96)

Map A2-2c

Project Facilities and Features
(Sheet 3 of 5)

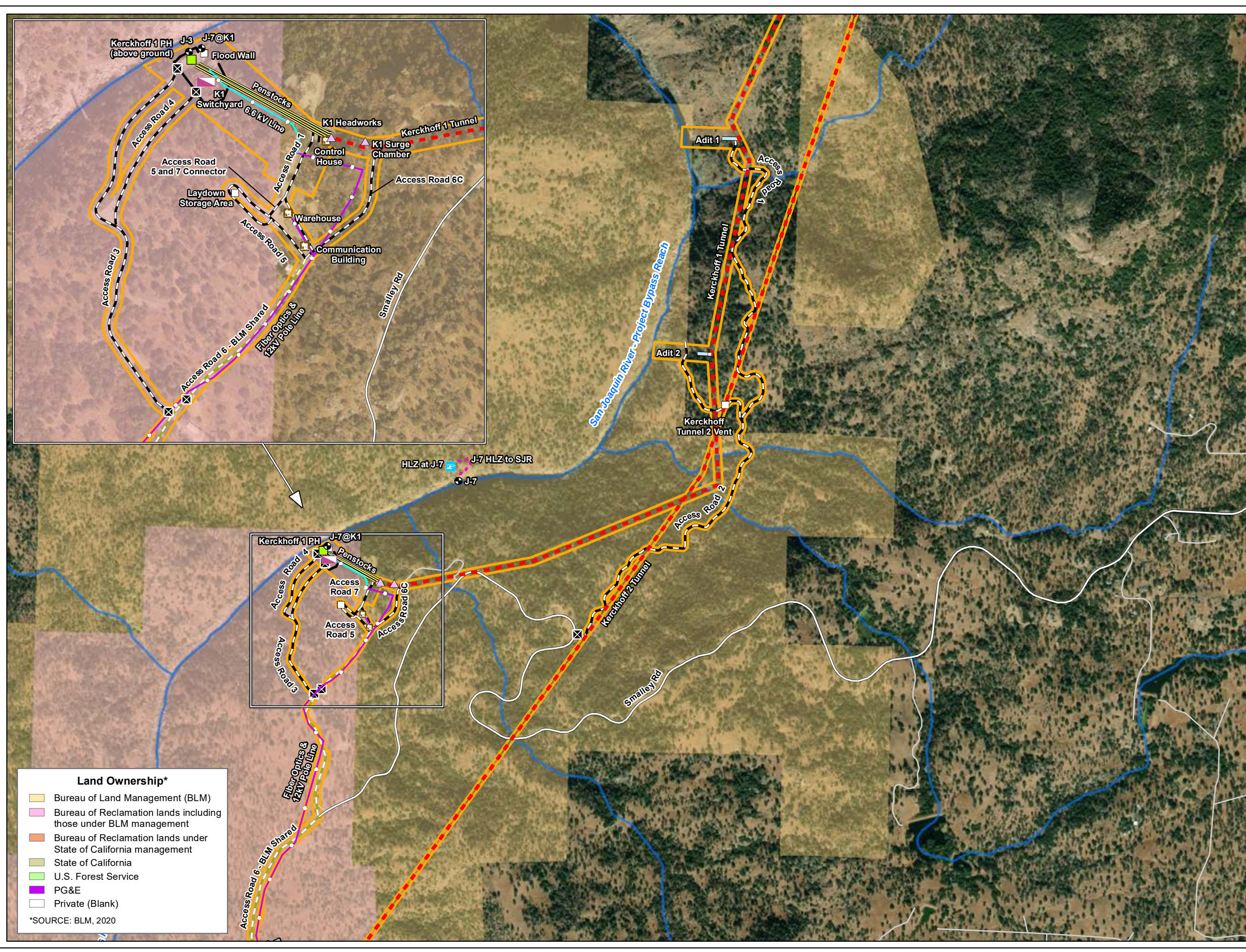
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Scale: 0 500 1,000 Feet

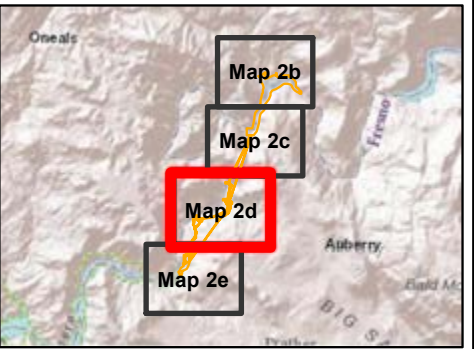


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- PG&E Project Facilities**
- ▲ Dam
 - Powerhouse
 - Switchyard
 - ▲ Water Conveyance Feature
 - Gage
 - Helicopter Landing Zone (HLZ)
 - Building
 - Ancillary and Other Facilities
 - Tunnel
 - Penstock
 - Adit
 - Instream Flow Pipe
 - Runoff Piping
 - Fiber Optics & 12kV Pole Line
 - 6.6 kV Line
 - Boat Barrier
 - Log Boom
 - Project Trail
 - Fence
 - FERC Project Boundary
- Project Recreation Facilities**
- ▲ Smalley Cove Recreation Area
- Transportation System Features**
- Locked Access Gate
 - Project Road
 - BLM Shared
 - USFS Shared
 - Non-Project Public Access Road
 - Other Road
- Other Features**
- Lake/Reservoir
 - River/Stream
- Non-Project Facilities**
- A.G. Wishon Powerhouse

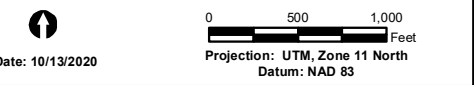
- Land Ownership***
- Bureau of Land Management (BLM)
 - Bureau of Reclamation lands including those under BLM management
 - Bureau of Reclamation lands under State of California management
 - State of California
 - U.S. Forest Service
 - PG&E
 - Private (Blank)
- *SOURCE: BLM, 2020



PG&E Kerckhoff Project (FERC No. 96)

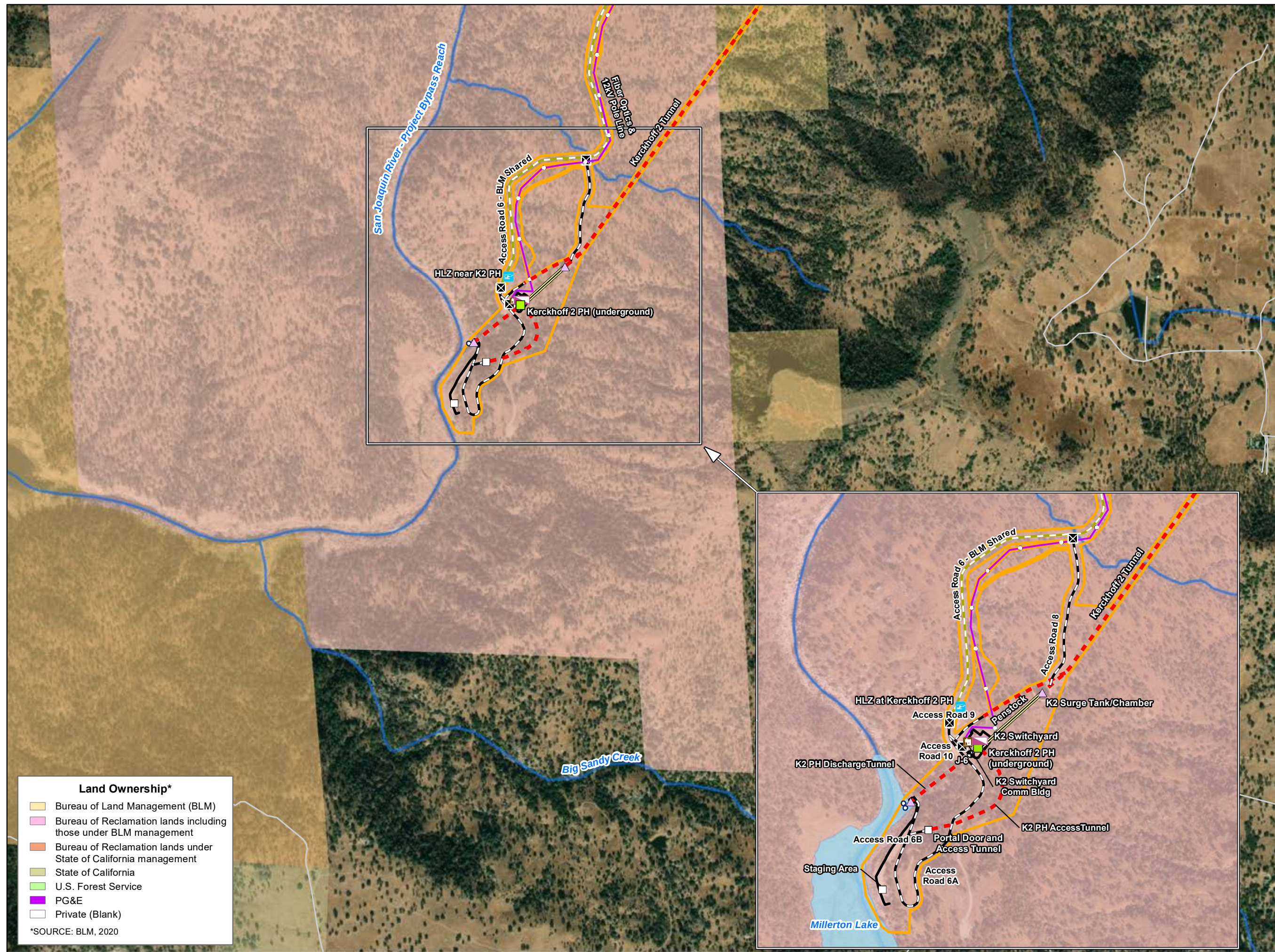
Map A2-2d

Project Facilities and Features
(Sheet 4 of 5)





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Land Ownership*

- Bureau of Land Management (BLM)
- Bureau of Reclamation lands including those under BLM management
- Bureau of Reclamation lands under State of California management
- State of California
- U.S. Forest Service
- PG&E
- Private (Blank)

*SOURCE: BLM, 2020

PG&E Project Facilities

- Dam
- Powerhouse
- Switchyard
- Water Conveyance Feature
- Gage
- Helicopter Landing Zone (HLZ)
- Building
- Ancillary and Other Facilities
- Tunnel
- Penstock
- Adit
- Instream Flow Pipe
- Runoff Piping
- Fiber Optics & 12kV Pole Line
- 6.6 kV Line
- Boat Barrier
- Log Boom
- Project Trail
- Fence
- FERC Project Boundary

Project Recreation Facilities

- Smalley Cove Recreation Area

Transportation System Features

- Locked Access Gate
- Project Road
- BLM Shared
- USFS Shared
- Non-Project Public Access Road
- Other Road

Other Features

- Lake/Reservoir
- River/Stream

Non-Project Facilities

- A.G. Wishon Powerhouse

Map A2-2e

Project Facilities and Features
(Sheet 5 of 5)

PG&E Kerckhoff Project (FERC No. 96)

Map A2-2e

Project Facilities and Features
(Sheet 5 of 5)

Scale: 0 500 1,000 Feet

Projection: UTM, Zone 11 North
Datum: NAD 83

Date: 10/13/2020

Appendix A3

Maps

APPENDIX A-3 MAPS — ACCESSIBLE SUMMARY

This written summary is provided in advance of the Appendix A-3 map figures as an overview and orientation aid. The maps in Appendix A-3 contain a high level of technical detail and visual information that may be difficult to interpret when viewed without full visual context or when accessed using assistive technology.

The purpose of this summary is to:

Explain what the maps collectively show before the reader views them

Identify the types of facilities, boundary changes, and land jurisdictions depicted

Provide a plain-language narrative equivalent to the visual information in the maps

Help viewers or listeners understand the intent, scale, and organization of the map series

This summary does not replace the maps. Instead, it is intended to support understanding by describing the overall structure and purpose of Appendix A-3 prior to reviewing the individual figures. Readers may reference this overview before, during, or after viewing the maps to better interpret the information presented.

Appendix A-3 contains a series of maps prepared in support of proposed Federal Energy Regulatory Commission (FERC) boundary modifications and related project features for the **PG&E Kerckhoff Hydroelectric Project (FERC No. 96)**. The maps collectively illustrate:

- Existing project facilities and infrastructure
- Proposed additions to, and reductions of, the FERC project boundary
- Land ownership and management jurisdictions
- Recreation features and proposed improvements
- Locations of support infrastructure such as gages, access roads, tunnels, and helicopter landing zones

Because the maps are visually complex and include numerous symbols, labels, and overprinted features, this narrative summary is provided as a **functional equivalent description** for accessibility and interpretability.

Map A3-1: Overview of Major Project Facilities and Land Jurisdictions

This overview map presents the full extent of the Kerckhoff Project area along the **San Joaquin River**, including:

- Kerckhoff Dam, Kerckhoff Reservoir, Kerckhoff 1 Powerhouse, and Kerckhoff 2 Powerhouse (underground)
- Associated tunnels, penstocks, adits, powerhouses, gages, and project access roads
- Nearby non-project facilities such as A.G. Wishon Powerhouse (non-project)

The map identifies surrounding land management agencies, including the **U.S. Forest Service, Bureau of Land Management (BLM), Bureau of Reclamation, State of California, PG&E**, and private lands. It also distinguishes **existing FERC project boundaries** and **proposed boundary additions and reductions**.

Maps A3-2a through A3-2o: Proposed FERC Boundary Modifications (Sheets 1–15)

These fifteen detailed map sheets present all proposed boundary modifications at a local scale. Together, they document refinements to the FERC project boundary to better align with actual operational needs, infrastructure footprints, and land management responsibilities.

Common Themes Across Maps A3-2a to A3-2o

Across these sheets, the proposed boundary changes include:

Reductions:

- Removal of areas outside of operational necessity, such as full 50-foot buffers around the **Kerckhoff Reservoir Normal Maximum Water Surface Elevation (NMWSE at 985 feet MSL, NGVD29)** where such buffers exceed project requirements
- Corrections to align the FERC boundary with historical metes and bounds descriptions
- Exclusion of non-project or publicly used roads and areas that are not required for project operations

Additions:

- Inclusion of areas required for operation and maintenance of project facilities, including:
 - Powerhouses, dams, tunnels, penstocks, surge chambers, headworks, switchyards, and communication buildings
 - Access roads, construction access corridors, and drainage features

- Fiber optics and 12 kV electrical lines supporting project operations
- Gaging stations and gaging cableways
- Helicopter Landing Zones (HLZs) used for inspection, emergency access, and maintenance

- **Geographic Areas Covered**

The boundary modification maps address areas around:

- Kerckhoff Reservoir shoreline and adjacent slopes
- Kerckhoff Dam and intake structures
- North and South adits and tunnel portals
- Kerckhoff 1 facilities near Smalley Road
- Kerckhoff 2 underground powerhouse area, including surge tank, discharge tunnel, switchyard, and staging areas
- Shared access roads managed by BLM that remain outside the FERC boundary where appropriate

Map A3-3: Proposed New Recreation Day Use Area and Reconstructed Trail

This map illustrates a proposed **recreation day-use area (DUA)** near **Millerton Lake** and the **San Joaquin River Project Bypass Reach**. Features include:

- A designated parking area and picnic facilities
- Vehicle control barriers
- A reconstructed and connected trail network that ties into existing regional trails, including the **San Joaquin River Trail**
- Continued BLM management of the land, with the recreation features incorporated into the proposed FERC project boundary

This map clarifies how recreational access is improved while maintaining agency management roles.

Map A3-4: Approximate Location of San Joaquin River Above Kerckhoff Reservoir Inflow Gage

This map shows the approximate location of a **potential new gaging station** upstream of **Kerckhoff Reservoir**, near **Powerhouse Road Bridge**. It identifies:

- The San Joaquin River channel above reservoir inflow
- Relationship to nearby powerhouses and roads

- The reservoir's NMWSE and proposed FERC project boundary

This gage location supports improved flow monitoring and compliance.

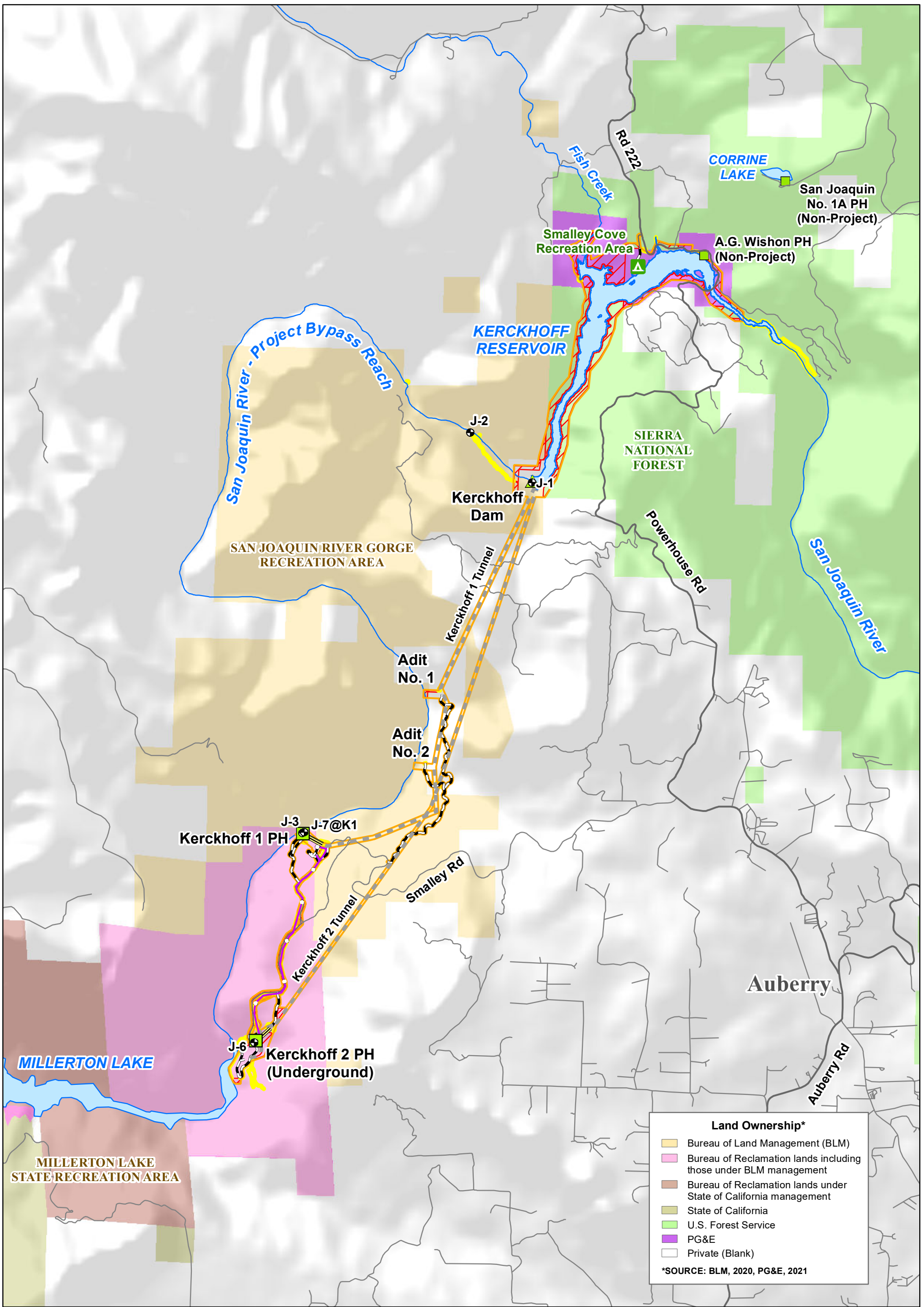
OVERALL INTENT OF APPENDIX A-3

Collectively, the maps in Appendix A-3 demonstrate that the proposed FERC boundary modifications:

- Improve accuracy and consistency with existing infrastructure
- Remove unnecessary land from the project boundary where it is no longer needed
- Add areas essential for safe operation, maintenance, monitoring, and emergency access
- Clarify land ownership and management responsibilities
- Support recreation, environmental monitoring, and regulatory compliance

This appendix is intended to provide FERC with clear spatial documentation supporting boundary revisions that reflect current and anticipated project conditions.

Appendix A-3 Maps



- PG&E Project Facilities**
- Powerhouse
 - Dam
 - Water Conduit
 - Penstock
 - 12kV and Fiber Optics Line
 - Project Road
 - Recreation Area
 - FERC Project Boundary

- Other Features**
- Other Road
 - Watercourse
 - Water Body
 - Gage

- Proposed FERC Boundary Modifications**
- Boundary Addition
 - Boundary Reduction

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PG&E Kerckhoff Project (FERC No. 96)

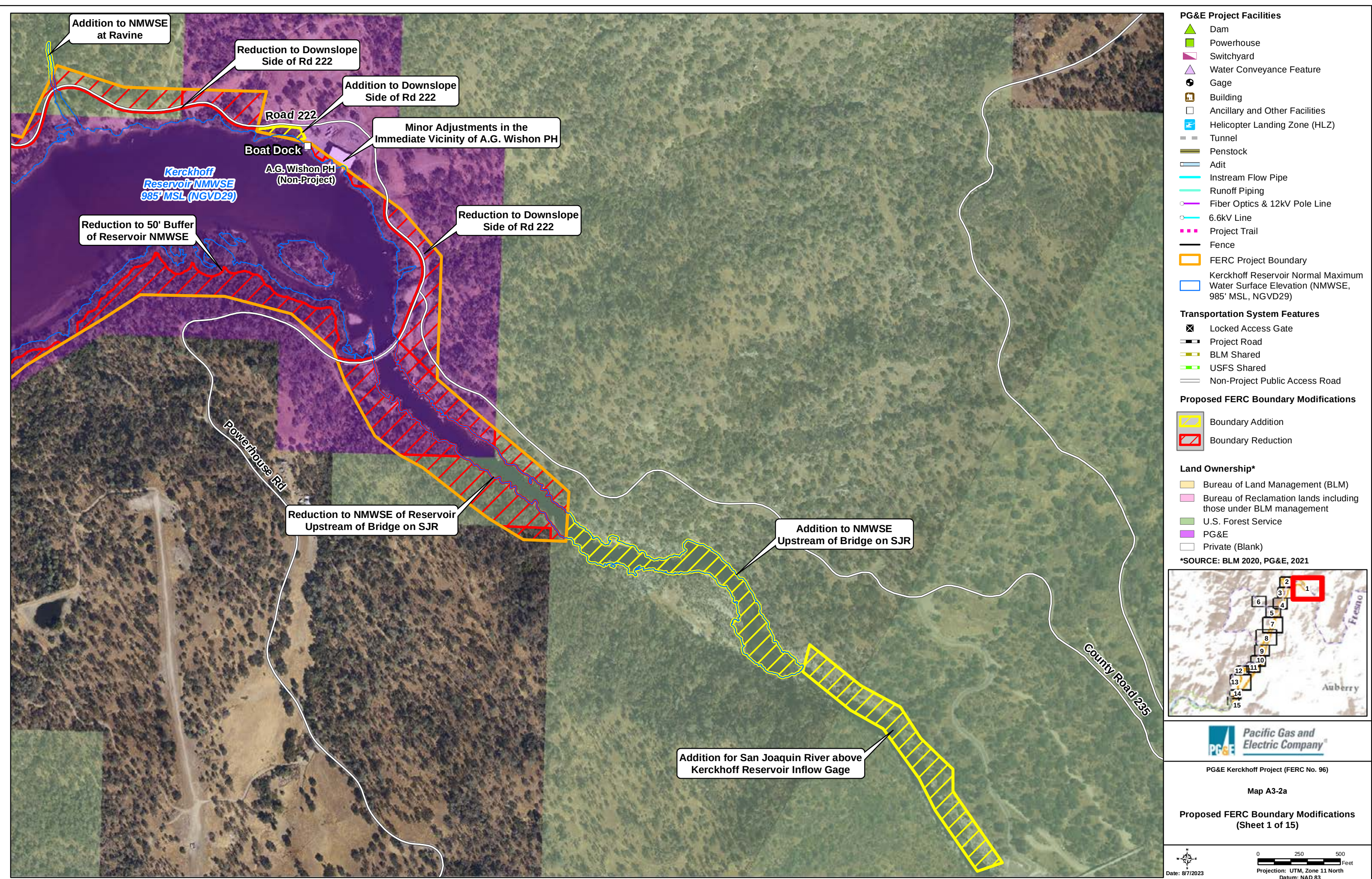
Map A3-1

Overview of Major Project Facilities and Land Ownership

0 0.5 1 Miles

Projection: UTM, Zone 11 North
Datum: NAD 83

8/7/2023



PG&E Project Facilities

- Dam
- Powerhouse
- Switchyard
- Water Conveyance Feature
- Gage
- Building
- Ancillary and Other Facilities
- Helicopter Landing Zone (HLZ)
- Tunnel
- Penstock
- Adit
- Instream Flow Pipe
- Runoff Piping
- Fiber Optics & 12kV Pole Line
- 6.6kV Line
- Project Trail
- Fence
- FERC Project Boundary
- Kerckhoff Reservoir Normal Maximum Water Surface Elevation (NMWSE, 985' MSL, NGVD29)

Transportation System Features

- Locked Access Gate
- Project Road
- BLM Shared
- USFS Shared
- Non-Project Public Access Road

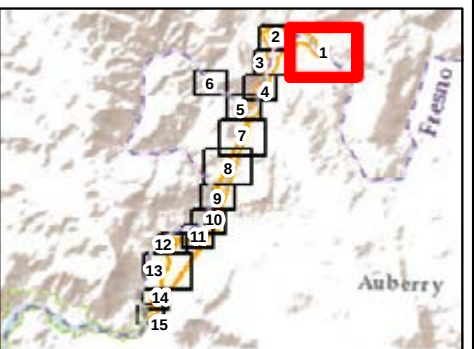
Proposed FERC Boundary Modifications

- Boundary Addition
- Boundary Reduction

Land Ownership*

- Bureau of Land Management (BLM)
- Bureau of Reclamation lands including those under BLM management
- U.S. Forest Service
- PG&E
- Private (Blank)

*SOURCE: BLM 2020, PG&E, 2021





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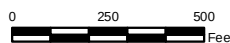
PG&E Kerckhoff Project (FERC No. 96)

Map A3-2a

Proposed FERC Boundary Modifications
(Sheet 1 of 15)

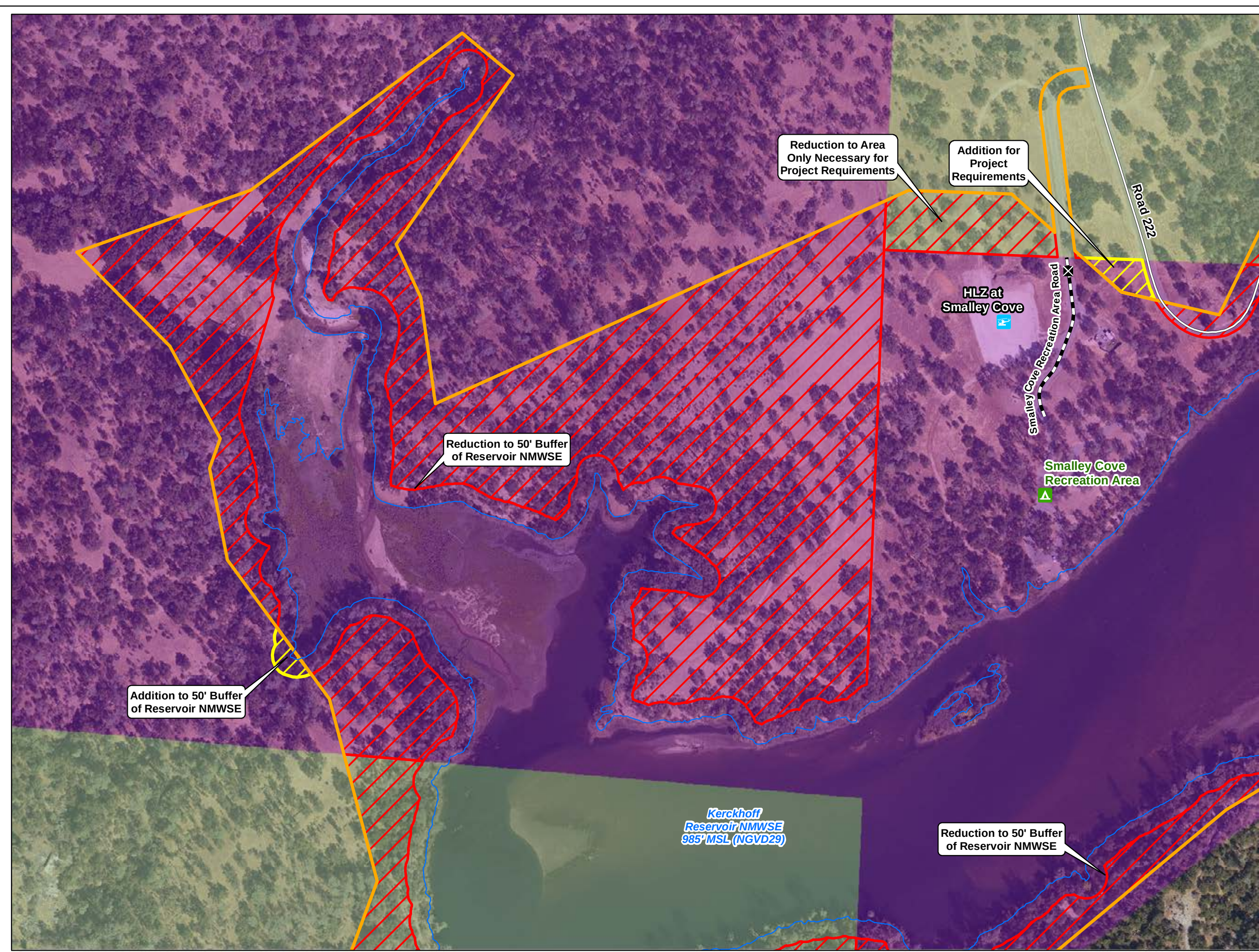


Date: 8/7/2023



0 250 500 Feet

Projection: UTM, Zone 11 North
Datum: NAD 83



PG&E Project Facilities

- Dam
- Powerhouse
- Switchyard
- Water Conveyance Feature
- Gage
- Building
- Ancillary and Other Facilities
- Helicopter Landing Zone (HLZ)
- Tunnel
- Penstock
- Adit
- Instream Flow Pipe
- Runoff Piping
- Fiber Optics & 12kV Pole Line
- 6.6kV Line
- Project Trail
- Fence
- FERC Project Boundary

Transportation System Features

- Locked Access Gate
- Project Road
- BLM Shared
- USFS Shared
- Non-Project Public Access Road

Proposed FERC Boundary Modifications

- Boundary Addition
- Boundary Reduction

Land Ownership*

- Bureau of Land Management (BLM)
- Bureau of Reclamation lands including those under BLM management
- U.S. Forest Service
- PG&E
- Private (Blank)

*SOURCE: BLM 2020, PG&E, 2021

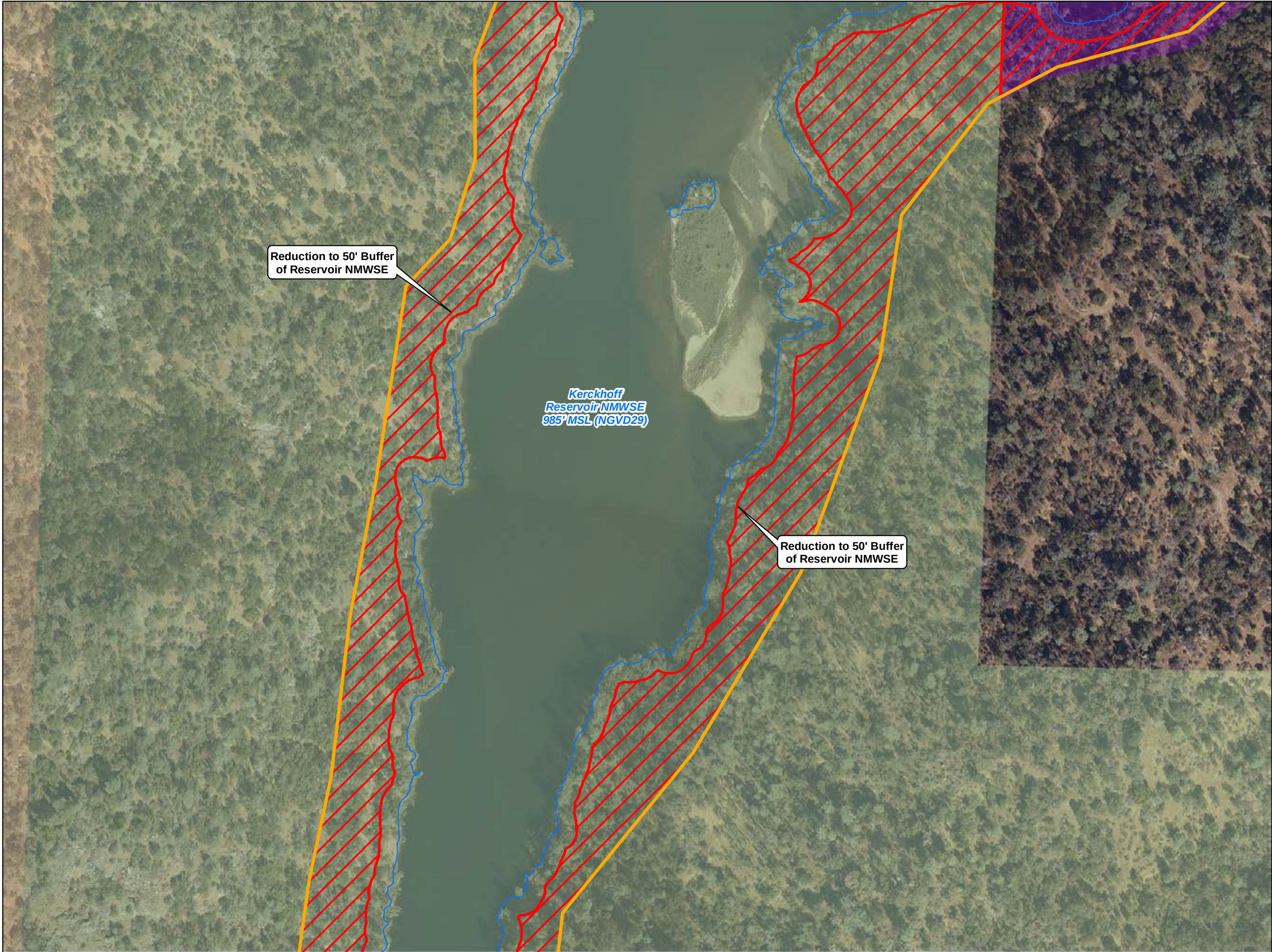
PG&E Kerckhoff Project (FERC No. 96)

Map A3-2b

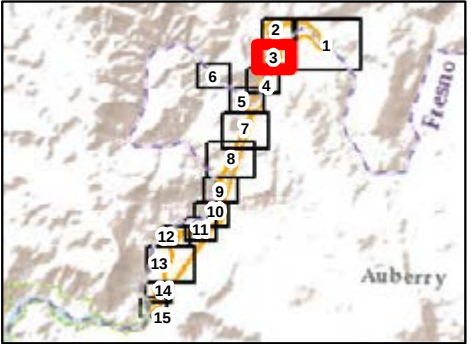
Proposed FERC Boundary Modifications
(Sheet 2 of 15)

Date: 8/7/2023

Projection: UTM, Zone 11 North
Datum: NAD 83



- PG&E Project Facilities**
- Dam
 - Powerhouse
 - Switchyard
 - Water Conveyance Feature
 - Gage
 - Building
 - Ancillary and Other Facilities
 - Helicopter Landing Zone (HLZ)
 - Tunnel
 - Penstock
 - Adit
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 - Runoff Piping
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- Boundary Addition
 - Boundary Reduction
- Land Ownership***
- Bureau of Land Management (BLM)
 - Bureau of Reclamation lands including those under BLM management
 - U.S. Forest Service
 - PG&E
 - Private (Blank)
- *SOURCE: BLM 2020, PG&E, 2021**



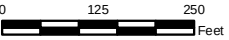
PG&E Kerckhoff Project (FERC No. 96)

Map A3-2c

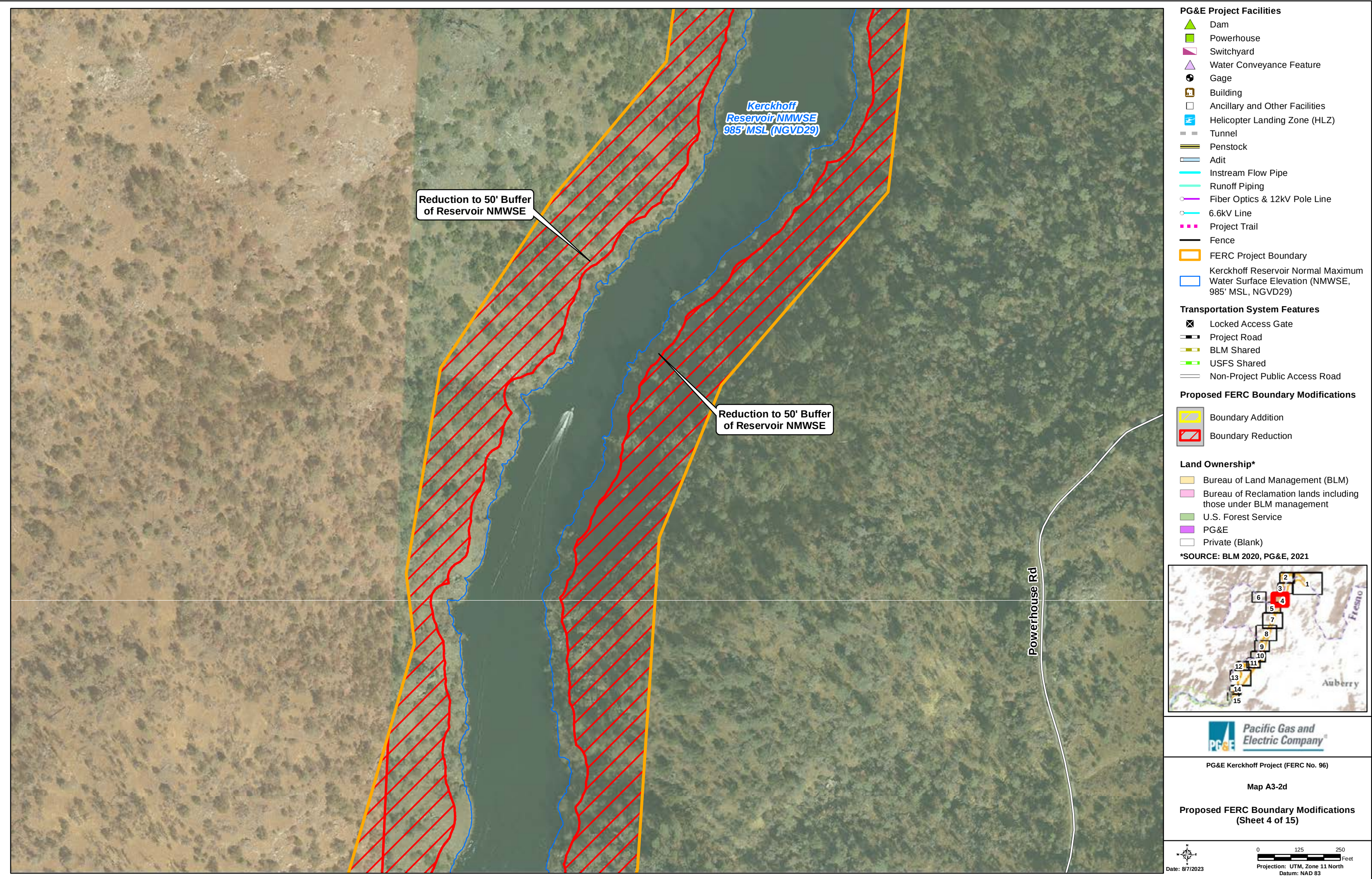
Proposed FERC Boundary Modifications
(Sheet 3 of 15)



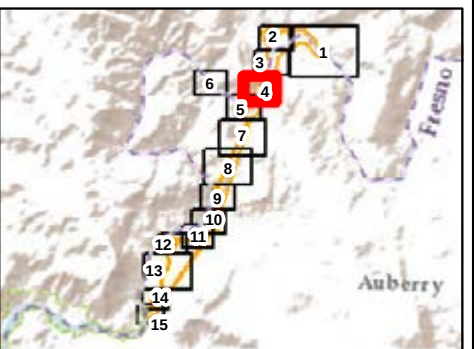
Date: 8/7/2023



Projection: UTM, Zone 11 North
Datum: NAD 83



- PG&E Project Facilities**
- Dam
 - Powerhouse
 - Switchyard
 - Water Conveyance Feature
 - Gage
 - Building
 - Ancillary and Other Facilities
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 - USFS Shared
 - Non-Project Public Access Road
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 - Boundary Reduction
- Land Ownership***
- Bureau of Land Management (BLM)
 - Bureau of Reclamation lands including those under BLM management
 - U.S. Forest Service
 - PG&E
 - Private (Blank)
- *SOURCE: BLM 2020, PG&E, 2021





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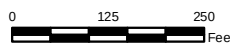
PG&E Kerckhoff Project (FERC No. 96)

Map A3-2d

Proposed FERC Boundary Modifications
(Sheet 4 of 15)

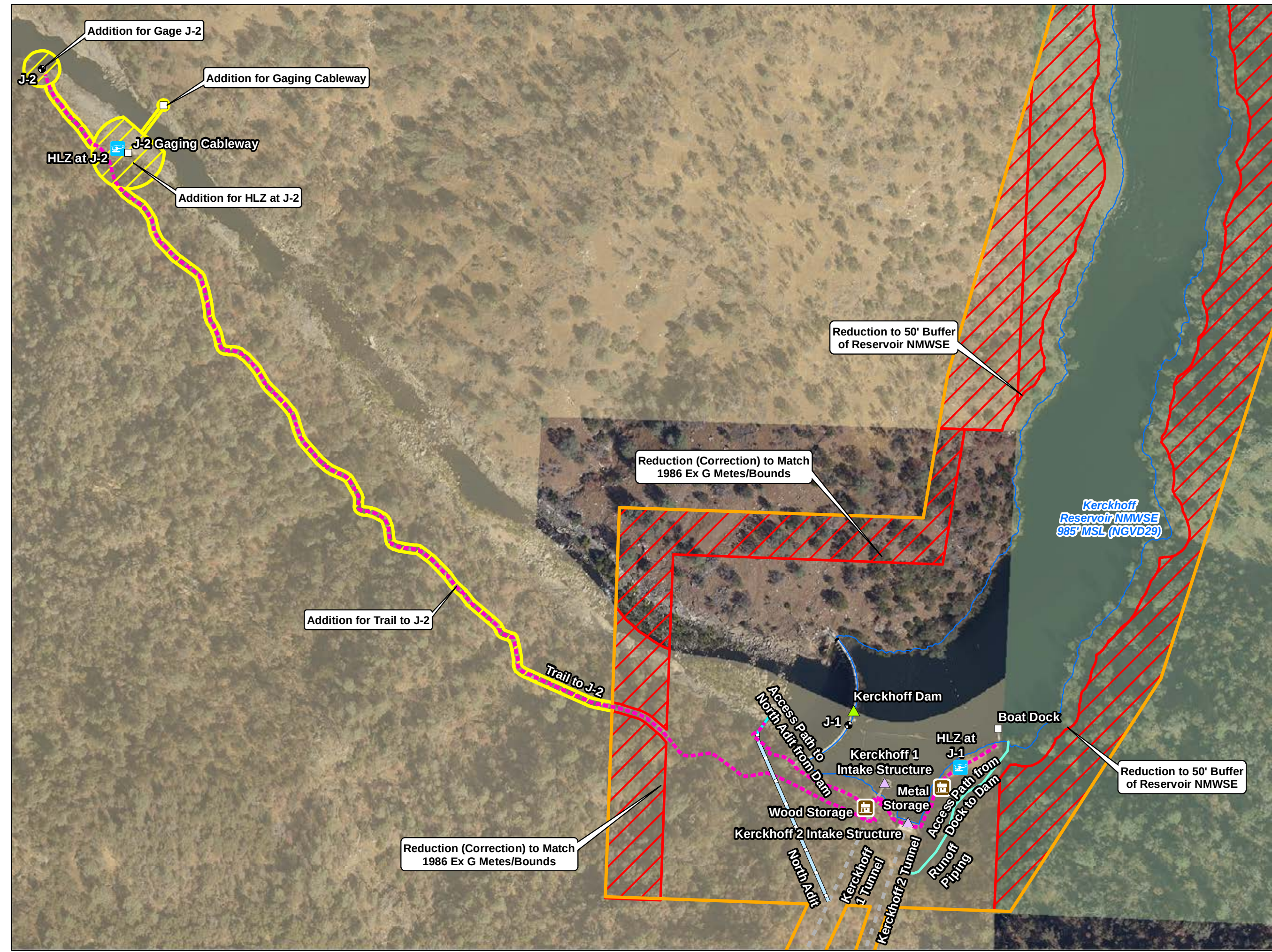


Date: 8/7/2023

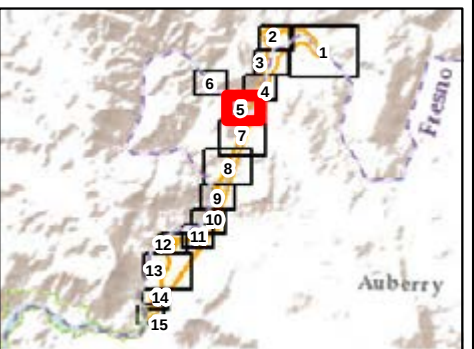


0 125 250 Feet

Projection: UTM, Zone 11 North
Datum: NAD 83



- PG&E Project Facilities**
- Dam
 - Powerhouse
 - Switchyard
 - Water Conveyance Feature
 - Gage
 - Building
 - Ancillary and Other Facilities
 - Helicopter Landing Zone (HLZ)
 - Tunnel
 - Penstock
 - Adit
 - Instream Flow Pipe
 - Runoff Piping
 - Fiber Optics & 12kV Pole Line
 - 6.6kV Line
 - Project Trail
 - Fence
 - FERC Project Boundary
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- Transportation System Features**
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 - Project Road
 - BLM Shared
 - USFS Shared
 - Non-Project Public Access Road
- Proposed FERC Boundary Modifications**
- Boundary Addition
 - Boundary Reduction
- Land Ownership***
- Bureau of Land Management (BLM)
 - Bureau of Reclamation lands including those under BLM management
 - U.S. Forest Service
 - PG&E
 - Private (Blank)
- *SOURCE: BLM 2020, PG&E, 2021



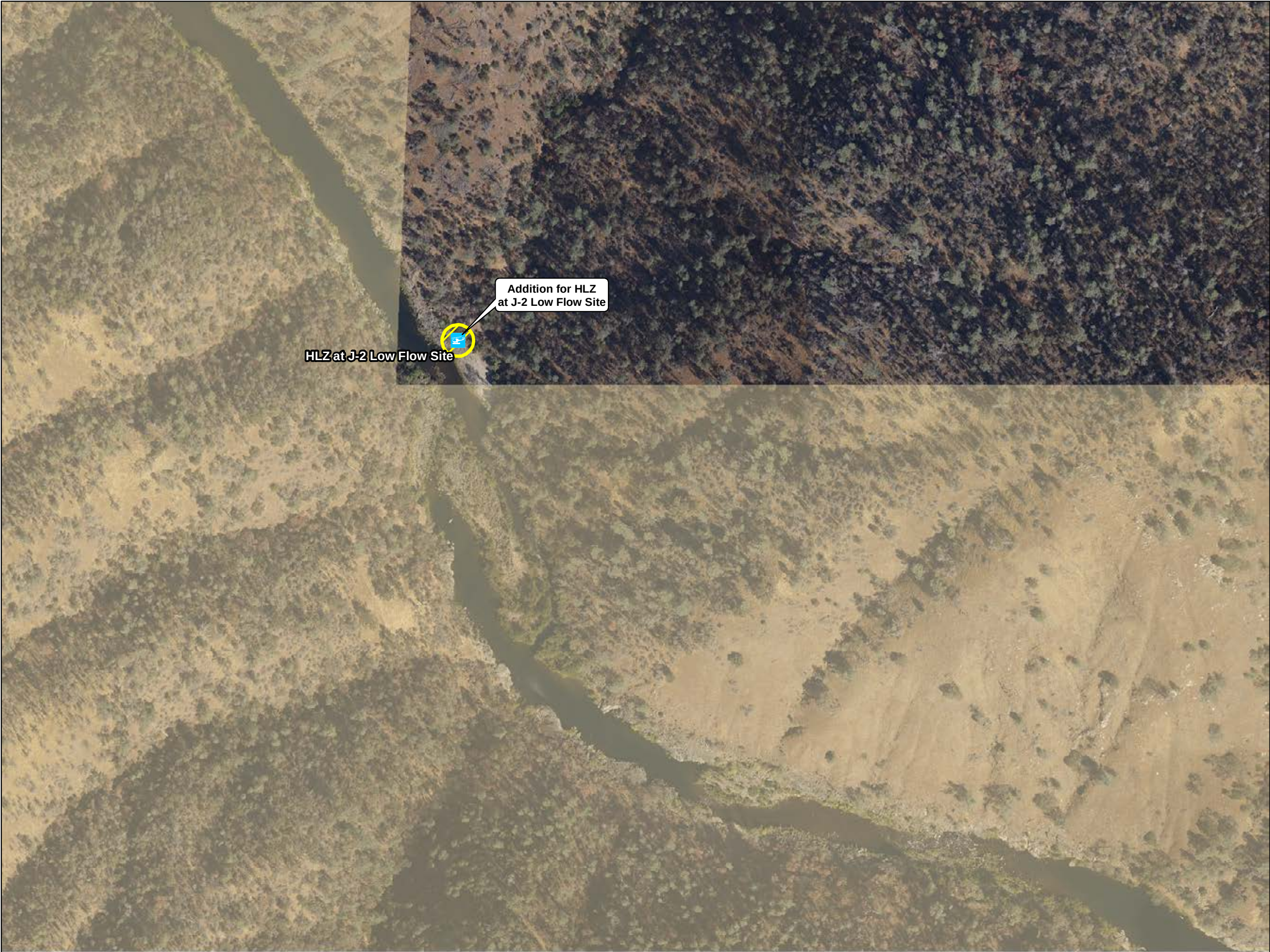
Pacific Gas and Electric Company

PG&E Kerckhoff Project (FERC No. 96)

Map A3-2e

Proposed FERC Boundary Modifications
(Sheet 5 of 15)

Date: 8/7/2023 Projection: UTM, Zone 11 North Datum: NAD 83



PG&E Project Facilities

Dam

Powerhouse

Switchyard

Water Conveyance Feature

Gage

Building

Ancillary and Other Facilities

Helicopter Landing Zone (HLZ)

Tunnel

Penstock

Adit

Instream Flow Pipe

Runoff Piping

Fiber Optics & 12kV Pole Line

6.6kV Line

Project Trail

Fence

FERC Project Boundary

Kerckhoff Reservoir Normal Maximum Water Surface Elevation (NMWSE, 985' MSL, NGVD29)

Transportation System Features

Locked Access Gate

Project Road

BLM Shared

USFS Shared

Non-Project Public Access Road

Proposed FERC Boundary Modifications

Boundary Addition

Boundary Reduction

Land Ownership*

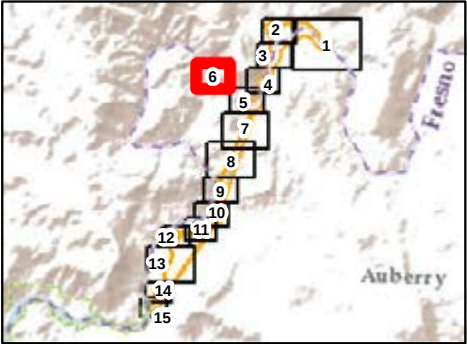
Bureau of Land Management (BLM)

Bureau of Reclamation lands including those under BLM management

U.S. Forest Service

PG&E

Private (Blank)

***SOURCE: BLM 2020, PG&E, 2021**

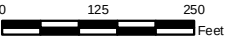
PG&E Kerckhoff Project (FERC No. 96)

Map A3-2f

Proposed FERC Boundary Modifications
(Sheet 6 of 15)



Date: 8/7/2023



Projection: UTM, Zone 11 North
Datum: NAD 83



PG&E Project Facilities

Dam

Powerhouse

Switchyard

Water Conveyance Feature

Gage

Building

Ancillary and Other Facilities

Helicopter Landing Zone (HLZ)

Tunnel

Penstock

Adit

Instream Flow Pipe

Runoff Piping

Fiber Optics & 12kV Pole Line

6.6kV Line

Project Trail

Fence

FERC Project Boundary

Kerckhoff Reservoir Normal Maximum Water Surface Elevation (NMWSE, 985' MSL, NGVD29)

Transportation System Features

Locked Access Gate

Project Road

BLM Shared

USFS Shared

Non-Project Public Access Road

Proposed FERC Boundary Modifications

Boundary Addition

Boundary Reduction

Land Ownership*

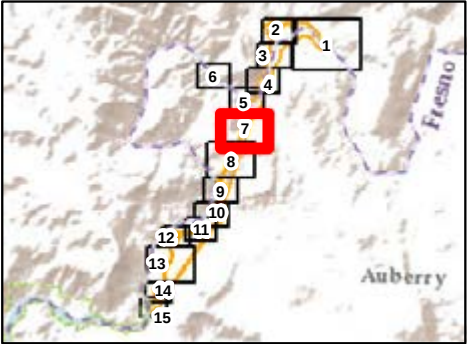
Bureau of Land Management (BLM)

Bureau of Reclamation lands including those under BLM management

U.S. Forest Service

PG&E

Private (Blank)

***SOURCE: BLM 2020, PG&E, 2021**

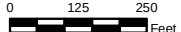
PG&E Kerckhoff Project (FERC No. 96)

Map A3-2g

Proposed FERC Boundary Modifications
(Sheet 7 of 15)



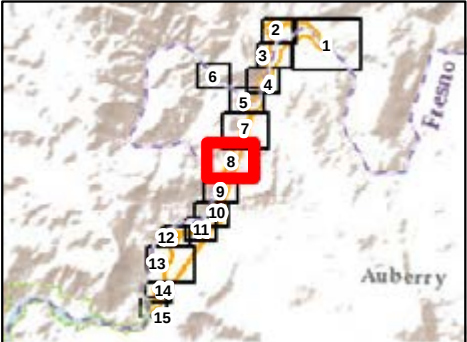
Date: 8/7/2023



Projection: UTM, Zone 11 North
Datum: NAD 83



- PG&E Project Facilities**
- Dam
 - Powerhouse
 - Switchyard
 - Water Conveyance Feature
 - Gage
 - Building
 - Ancillary and Other Facilities
 - Helicopter Landing Zone (HLZ)
 - Tunnel
 - Penstock
 - Adit
 - Instream Flow Pipe
 - Runoff Piping
 - Fiber Optics & 12kV Pole Line
 - 6.6kV Line
 - Project Trail
 - Fence
 - FERC Project Boundary
 - Kerckhoff Reservoir Normal Maximum Water Surface Elevation (NMWSE, 985' MSL, NGVD29)
- Transportation System Features**
- Locked Access Gate
 - Project Road
 - BLM Shared
 - USFS Shared
 - Non-Project Public Access Road
- Proposed FERC Boundary Modifications**
- Boundary Addition
 - Boundary Reduction
- Land Ownership***
- Bureau of Land Management (BLM)
 - Bureau of Reclamation lands including those under BLM management
 - U.S. Forest Service
 - PG&E
 - Private (Blank)
- *SOURCE: BLM 2020, PG&E, 2021**



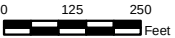
PG&E Kerckhoff Project (FERC No. 96)

Map A3-2h

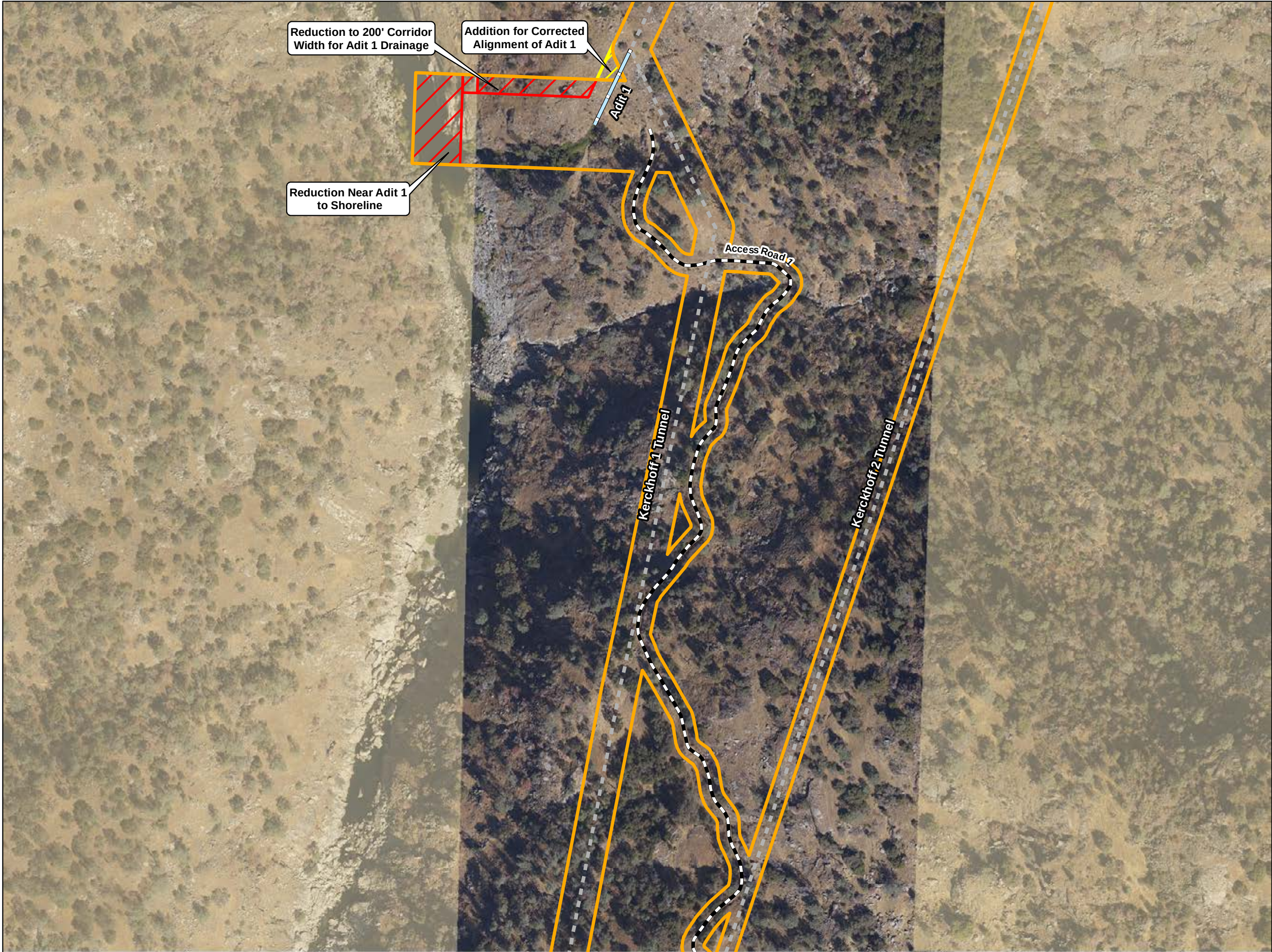
Proposed FERC Boundary Modifications
(Sheet 8 of 15)



Date: 8/7/2023



Projection: UTM, Zone 11 North
Datum: NAD 83



PG&E Project Facilities

Dam

Powerhouse

Switchyard

Water Conveyance Feature

Gage

Building

Ancillary and Other Facilities

Helicopter Landing Zone (HLZ)

Tunnel

Penstock

Adit

Instream Flow Pipe

Runoff Piping

Fiber Optics & 12kV Pole Line

6.6kV Line

Project Trail

Fence

FERC Project Boundary

Kerckhoff Reservoir Normal Maximum Water Surface Elevation (NMWSE, 985' MSL, NGVD29)

Transportation System Features Locked Access Gate Project Road BLM Shared USFS Shared Non-Project Public Access Road**Proposed FERC Boundary Modifications** Boundary Addition Boundary Reduction**Land Ownership*** Bureau of Land Management (BLM) Bureau of Reclamation lands including those under BLM management U.S. Forest Service PG&E Private (Blank)

***SOURCE: BLM 2020, PG&E, 2021**



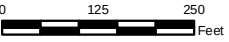
PG&E Kerckhoff Project (FERC No. 96)

Map A3-2i

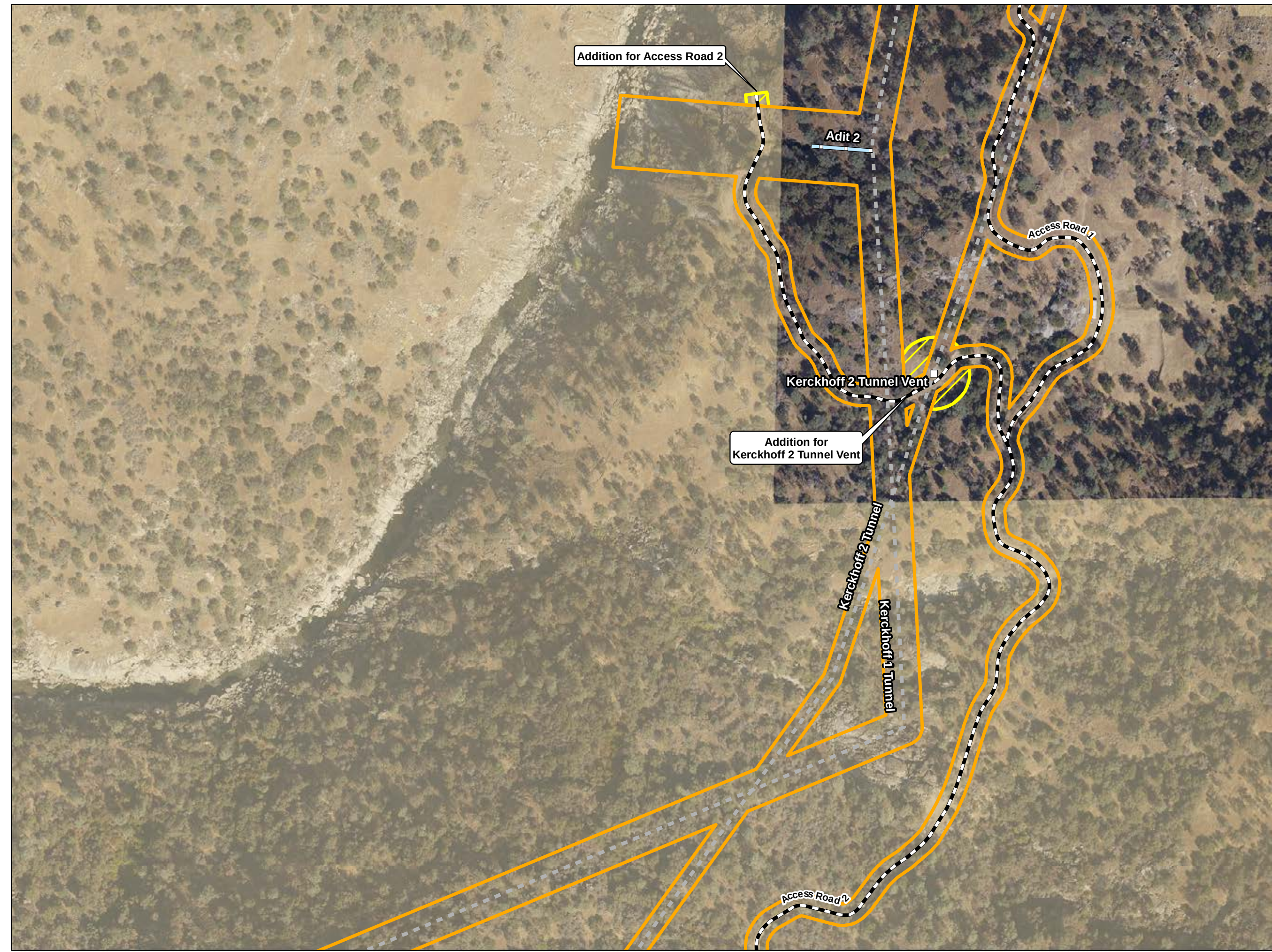
Proposed FERC Boundary Modifications
(Sheet 9 of 15)



Date: 8/7/2023



Projection: UTM, Zone 11 North
Datum: NAD 83



PG&E Project Facilities

- Dam
- Powerhouse
- Switchyard
- Water Conveyance Feature
- Gage
- Building
- Ancillary and Other Facilities
- Helicopter Landing Zone (HLZ)
- Tunnel
- Penstock
- Adit
- Instream Flow Pipe
- Runoff Piping
- Fiber Optics & 12kV Pole Line
- 6.6kV Line
- Project Trail
- Fence
- FERC Project Boundary
- Kerckhoff Reservoir Normal Maximum Water Surface Elevation (NMWSE, 985' MSL, NGVD29)

Transportation System Features

- Locked Access Gate
- Project Road
- BLM Shared
- USFS Shared
- Non-Project Public Access Road

Proposed FERC Boundary Modifications

- Boundary Addition
- Boundary Reduction

Land Ownership*

- Bureau of Land Management (BLM)
- Bureau of Reclamation lands including those under BLM management
- U.S. Forest Service
- PG&E
- Private (Blank)

*SOURCE: BLM 2020, PG&E, 2021

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PG&E Kerckhoff Project (FERC No. 96)

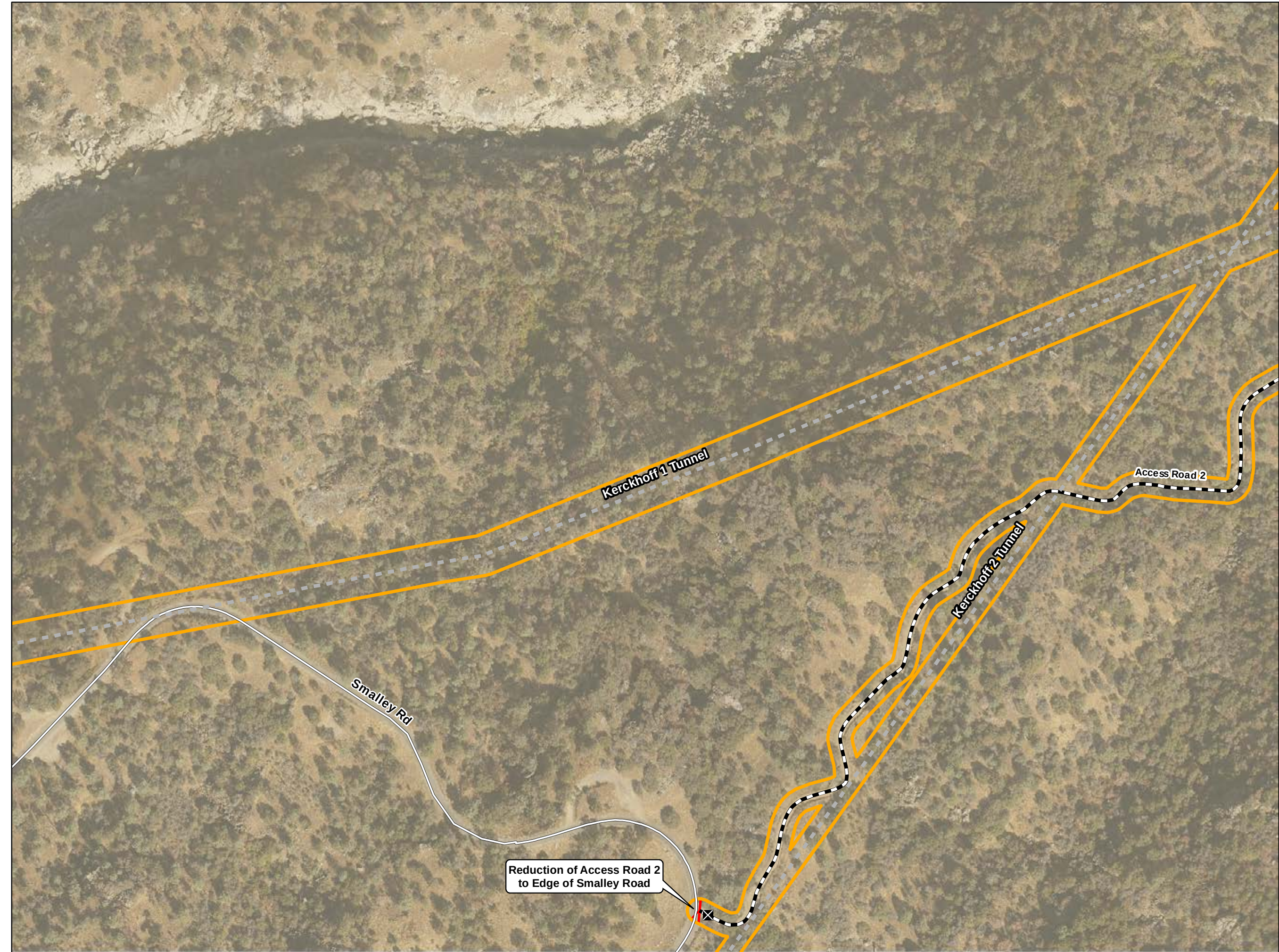
Map A3-2j

Proposed FERC Boundary Modifications
(Sheet 10 of 15)

Date: 8/7/2023

0 125 250 Feet

Projection: UTM, Zone 11 North
Datum: NAD 83



PG&E Project Facilities

Dam

Powerhouse

Switchyard

Water Conveyance Feature

Gage

Building

Ancillary and Other Facilities

Helicopter Landing Zone (HLZ)

Tunnel

Penstock

Adit

Instream Flow Pipe

Runoff Piping

Fiber Optics & 12kV Pole Line

6.6kV Line

Project Trail

Fence

FERC Project Boundary

Kerckhoff Reservoir Normal Maximum Water Surface Elevation (NMWSE, 985' MSL, NGVD29)

Transportation System Features

Locked Access Gate

Project Road

BLM Shared

USFS Shared

Non-Project Public Access Road

Proposed FERC Boundary Modifications

Boundary Addition

Boundary Reduction

Land Ownership*

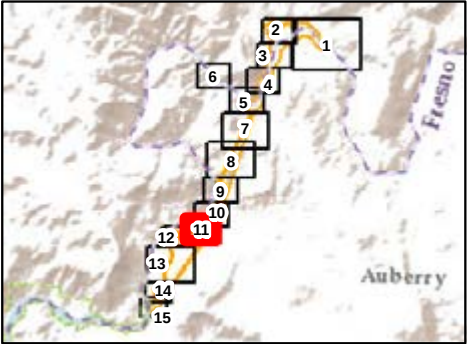
Bureau of Land Management (BLM)

Bureau of Reclamation lands including those under BLM management

U.S. Forest Service

PG&E

Private (Blank)

***SOURCE: BLM 2020, PG&E, 2021**

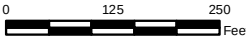
PG&E Kerckhoff Project (FERC No. 96)

Map A3-2k

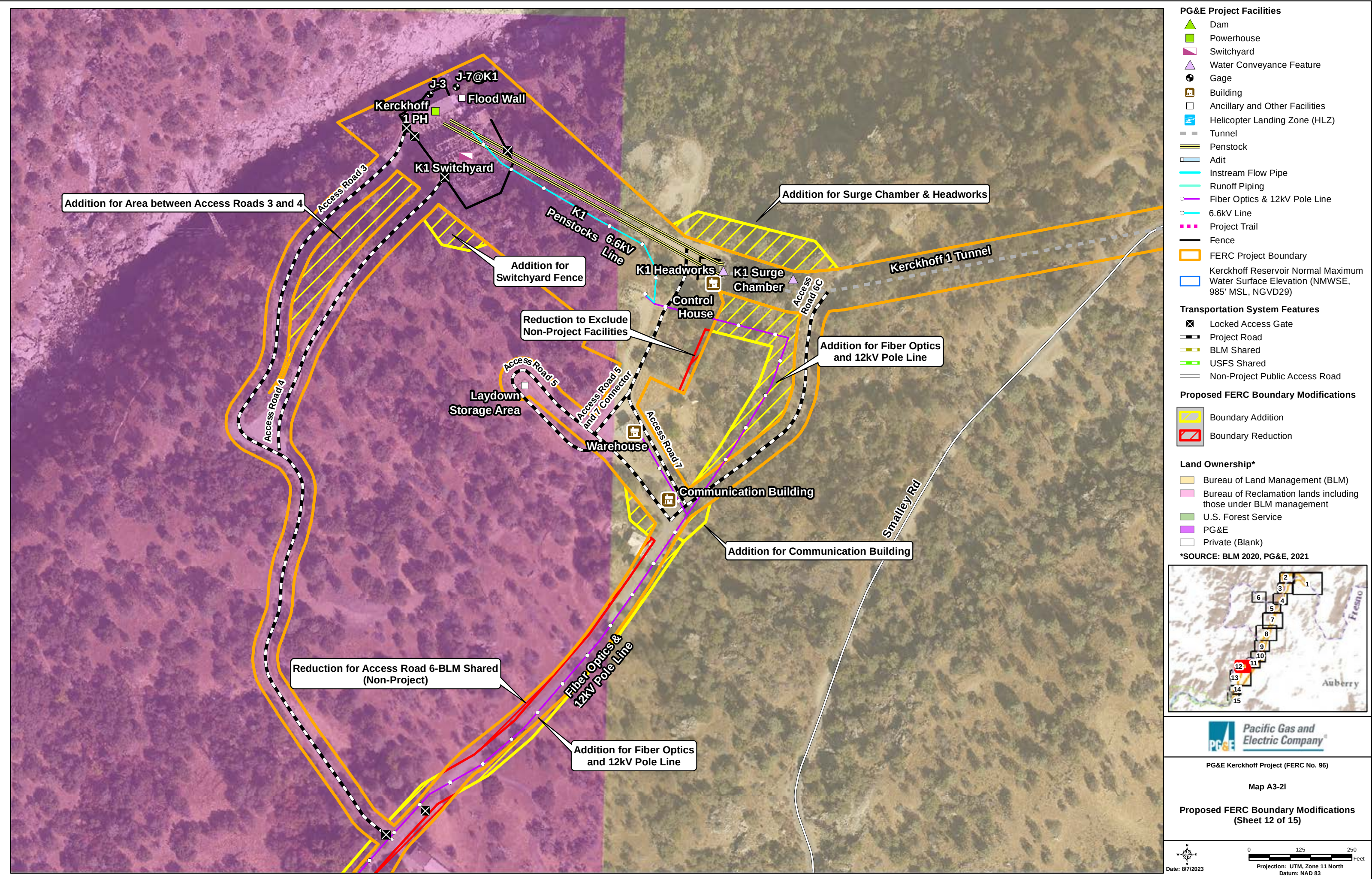
Proposed FERC Boundary Modifications
(Sheet 11 of 15)



Date: 8/7/2023



Projection: UTM, Zone 11 North
Datum: NAD 83



PG&E Project Facilities

Dam

Powerhouse

Switchyard

Water Conveyance Feature

Gage

Building

Ancillary and Other Facilities

Helicopter Landing Zone (HLZ)

Tunnel

Penstock

Adit

Instream Flow Pipe

Runoff Piping

Fiber Optics & 12kV Pole Line

6.6kV Line

Project Trail

Fence

FERC Project Boundary

Kerckhoff Reservoir Normal Maximum Water Surface Elevation (NMWSE, 985' MSL, NGVD29)

Transportation System Features

Locked Access Gate

Project Road

BLM Shared

USFS Shared

Non-Project Public Access Road

Proposed FERC Boundary Modifications

Boundary Addition

Boundary Reduction

Land Ownership*

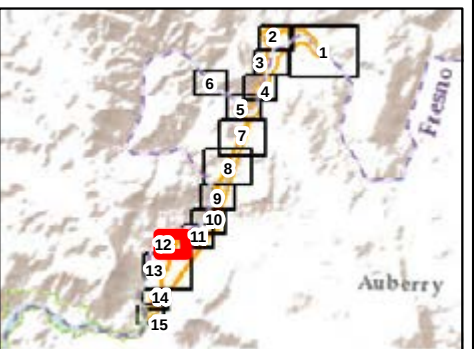
Bureau of Land Management (BLM)

Bureau of Reclamation lands including those under BLM management

U.S. Forest Service

PG&E

Private (Blank)

***SOURCE: BLM 2020, PG&E, 2021**

PG&E Kerckhoff Project (FERC No. 96)

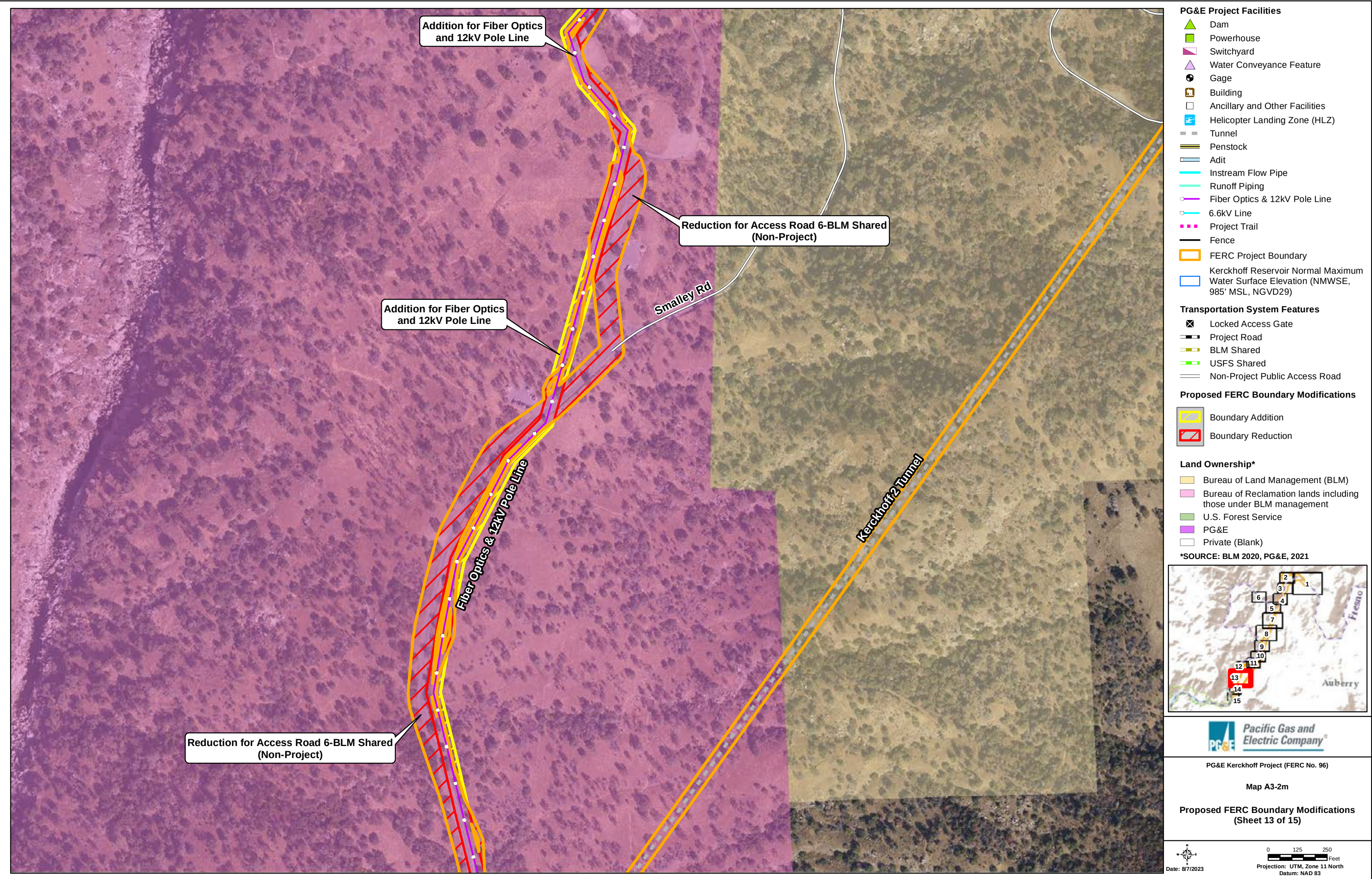
Map A3-2I

Proposed FERC Boundary Modifications
(Sheet 12 of 15)

Date: 8/7/2023

0 125 250 Feet

Projection: UTM, Zone 11 North
Datum: NAD 83



PG&E Project Facilities

- Dam
- Powerhouse
- Switchyard
- Water Conveyance Feature
- Gage
- Building
- Ancillary and Other Facilities
- Helicopter Landing Zone (HLZ)
- Tunnel
- Penstock
- Adit
- Instream Flow Pipe
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Transportation System Features

- Locked Access Gate
- Project Road
- BLM Shared
- USFS Shared
- Non-Project Public Access Road

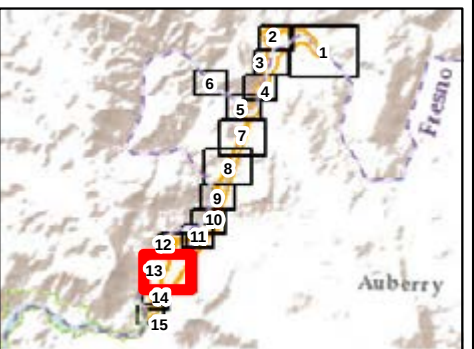
Proposed FERC Boundary Modifications

- Boundary Addition
- Boundary Reduction

Land Ownership*

- Bureau of Land Management (BLM)
- Bureau of Reclamation lands including those under BLM management
- U.S. Forest Service
- PG&E
- Private (Blank)

*SOURCE: BLM 2020, PG&E, 2021



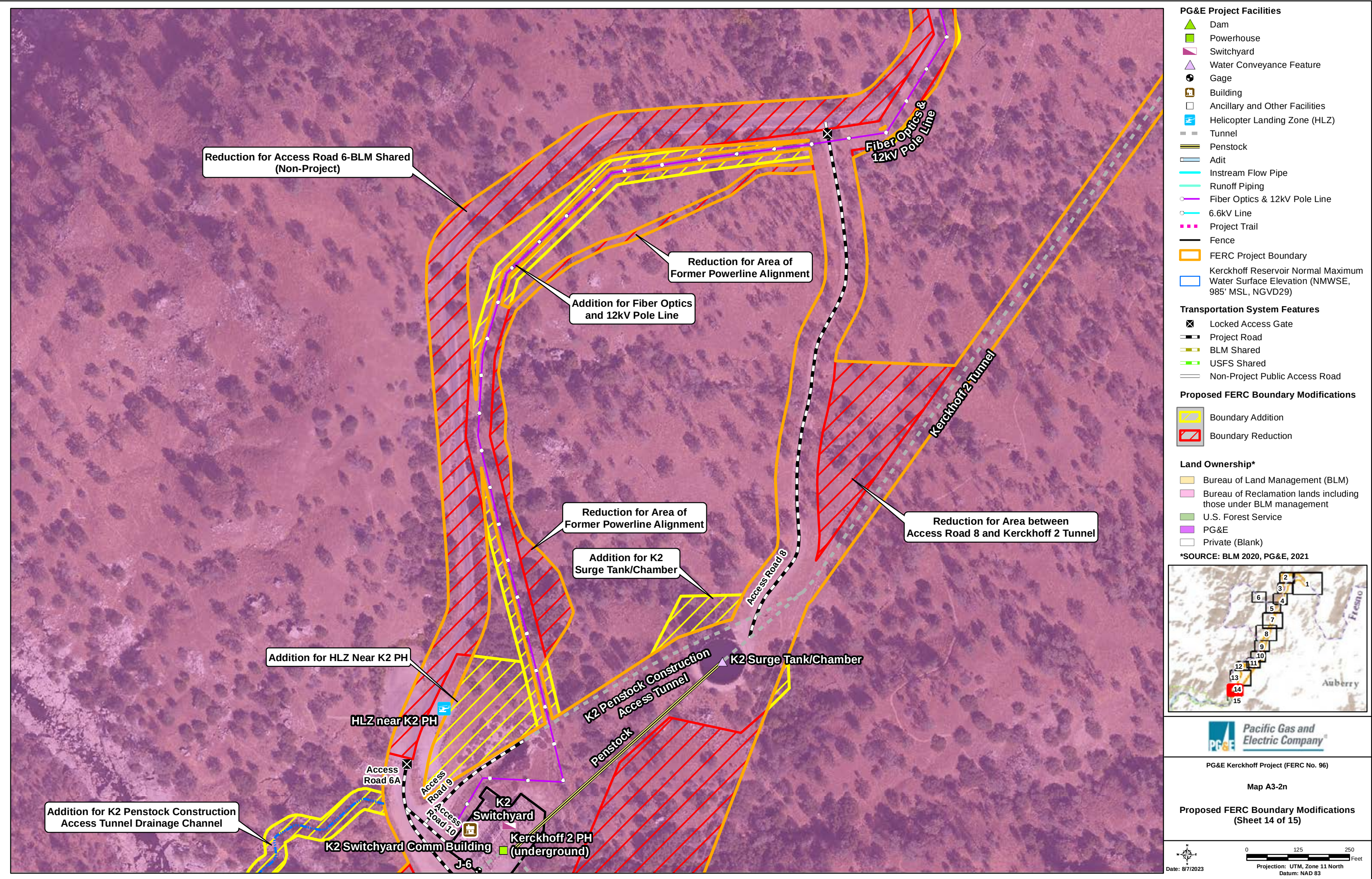
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PG&E Kerckhoff Project (FERC No. 96)

Map A3-2m

Proposed FERC Boundary Modifications
(Sheet 13 of 15)

Date: 8/7/2023 Projection: UTM, Zone 11 North Datum: NAD 83



PG&E Project Facilities

Dam

Powerhouse

Switchyard

Water Conveyance Feature

Gage

Building

Ancillary and Other Facilities

Helicopter Landing Zone (HLZ)

Tunnel

Penstock

Adit

Instream Flow Pipe

Runoff Piping

Fiber Optics & 12kV Pole Line

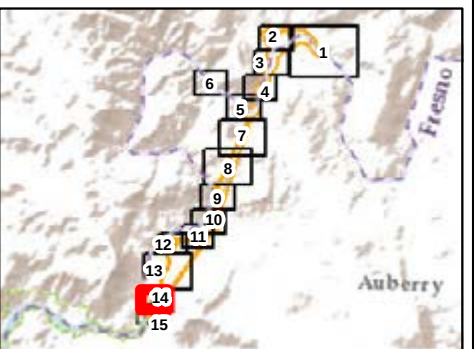
6.6kV Line

Project Trail

Fence

FERC Project Boundary

Kerckhoff Reservoir Normal Maximum Water Surface Elevation (NMWSE, 985' MSL, NGVD29)

Transportation System Features Locked Access Gate Project Road BLM Shared USFS Shared Non-Project Public Access Road**Proposed FERC Boundary Modifications** Boundary Addition Boundary Reduction**Land Ownership*** Bureau of Land Management (BLM) Bureau of Reclamation lands including those under BLM management U.S. Forest Service PG&E Private (Blank)***SOURCE: BLM 2020, PG&E, 2021**

Pacific Gas and Electric Company

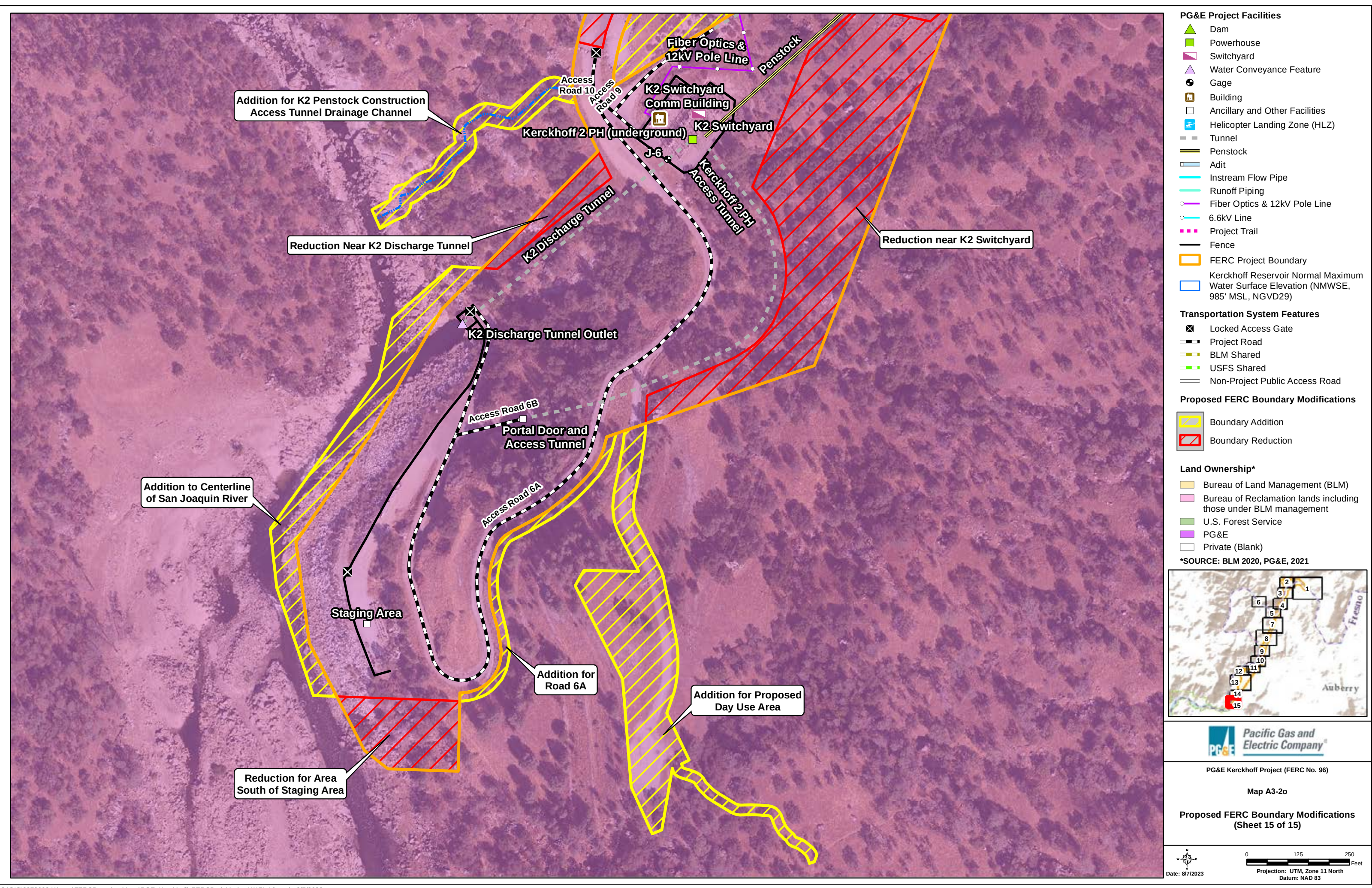
PG&E Kerckhoff Project (FERC No. 96)

Map A3-2n

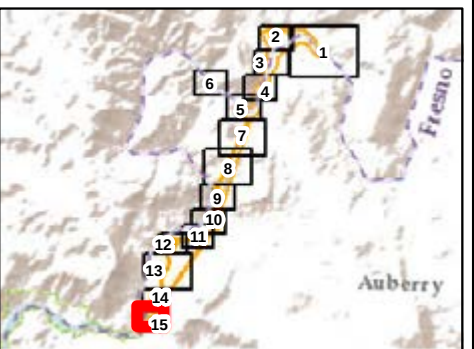
Proposed FERC Boundary Modifications
(Sheet 14 of 15)

Date: 8/7/2023

Projection: UTM, Zone 11 North
Datum: NAD 83



- PG&E Project Facilities**
- Dam
 - Powerhouse
 - Switchyard
 - Water Conveyance Feature
 - Gage
 - Building
 - Ancillary and Other Facilities
 - Helicopter Landing Zone (HLZ)
 - Tunnel
 - Penstock
 - Adit
 - Instream Flow Pipe
 - Runoff Piping
 - Fiber Optics & 12kV Pole Line
 - 6.6kV Line
 - Project Trail
 - Fence
- Transportation System Features**
- Locked Access Gate
 - Project Road
 - BLM Shared
 - USFS Shared
 - Non-Project Public Access Road
- Proposed FERC Boundary Modifications**
- Boundary Addition
 - Boundary Reduction
- Land Ownership***
- Bureau of Land Management (BLM)
 - Bureau of Reclamation lands including those under BLM management
 - U.S. Forest Service
 - PG&E
 - Private (Blank)
- *SOURCE: BLM 2020, PG&E, 2021



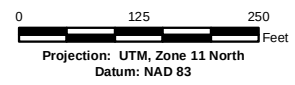
PG&E Kerckhoff Project (FERC No. 96)

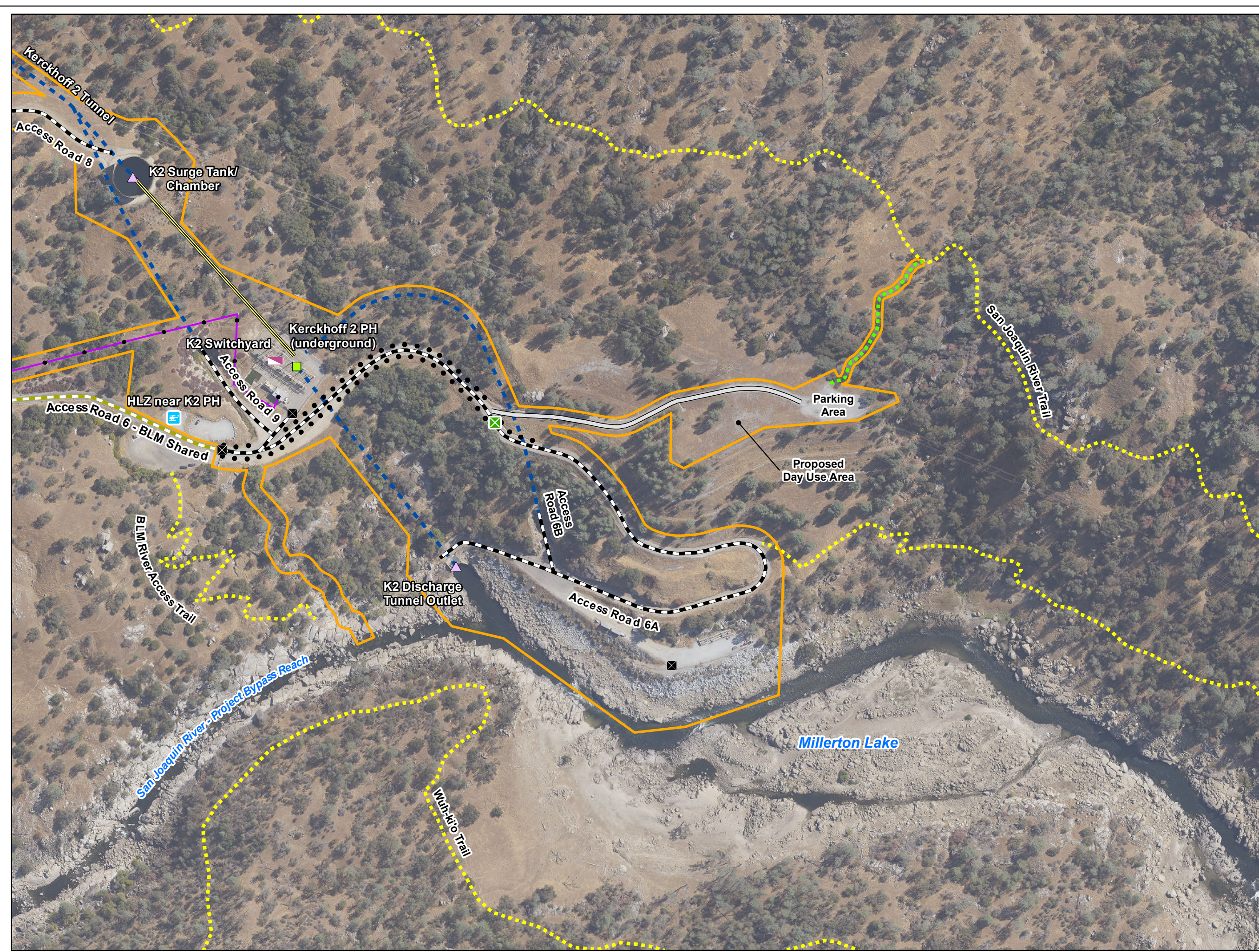
Map A3-2o

Proposed FERC Boundary Modifications
(Sheet 15 of 15)



Date: 8/7/2023





Project Facilities

- Switchyard
- Powerhouse
- Helicopter Landing Zone (HLZ)
- Water Conveyance Feature
- Tunnel
- Penstock
- Fiber Optics & 12kV Pole Line
- Proposed FERC Project Boundary

Transportation System Features

- Locked Access Gate
- Project Road
- BLM Shared Road
- Existing Non-Project Trail

Proposed DUA Project Features*

- Paved Access Road
- DUA Connecting Trail
- Vehicle Control Barriers
- Locked Access Gate

*NOTE: All DUA features (e.g. picnic area) are not shown/symbolized as their exact locations within the proposed FERC boundary have yet to be determined.

All land in the map extent is owned by the United States and is under Bureau of Reclamation jurisdiction. By interagency agreement, the Bureau of Land Management manages this land on behalf of the Bureau of Reclamation.



PG&E Kerckhoff Project (FERC No. 96)

Map A3-3

**Proposed Recreation Day Use Area
and Reconstructed Trail**



Date: 7/28/2023

0 100 200 Feet

Projection: UTM, Zone 11 North

Datum: NAD 83

Appendix B

Flow Data

Appendix B provides modeled flow data for the Project in the tables below, based on the information provided in the 2023 Second Supplemental FLA (Tables B-1 through B-8) and additional analysis for WY 2018-2023 (Table B-9).

Table B-1 Average Monthly Flows in the San Joaquin River (SJR) below Kerckhoff Dam (WY 1985–2017).

Month	Dry WYs (cfs)			Normal WYs (cfs)			All WYs (cfs)		
	Without Project	Historical (Gage J-2)	Current Operations	Without Project	Historical (Gage J-2)	Current Operations	Without Project	Historical (Gage J-2)	Current Operations
October	714.3	127.4	384.4	964.2	116.6	319.3	911.2	118.9	333.1
November	550.1	89.8	179.8	868.1	214.8	360.9	800.7	188.3	322.5
December	513.2	56.6	121.7	1,031.3	64.2	237.6	921.4	62.6	213.0
January	552.0	46.5	51.8	1,675.8	298.5	302.6	1,437.4	245.1	249.4
February	610.6	26.7	28.8	2,043.5	293.5	348.8	1,740.6	237.1	281.2
March	924.1	26.8	28.8	2,761.3	195.2	305.0	2,371.6	159.5	246.4
April	1,418.7	27.2	23.3	3,401.5	242.0	284.2	2,980.9	196.5	228.8
May	1,798.6	23.3	19.5	5,184.5	1,039.4	1,469.9	4,466.3	823.9	1,162.2
June	1,464.4	24.2	22.4	5,809.8	1,637.7	2,270.9	4,888.0	1,295.4	1,794.0
July	1,461.9	30.3	42.3	3,589.0	576.1	883.5	3,137.8	460.4	705.0
August	1,198.5	32.4	25.6	2,098.0	46.1	50.5	1,907.2	43.2	45.2
September	971.7	44.5	19.5	1,655.4	46.3	32.5	1,510.4	45.9	29.7

Source: PG&E. 2023. Second Supplemental FLA. Table 7.2-6.

Table B-2 Average Monthly Flows in the SJR below K2 Powerhouse (WY 1985-2017).

Month	Dry WYs (cfs)			Normal WYs (cfs)			All WYs (cfs)		
	Without Project	Historical (Gage J-2)	Current Operations	Without Project	Historical (Gage J-2)	Current Operations	Without Project	Historical (Gage J-2)	Current Operations
October	714.3	662.2	712.7	964.2	926.5	959.9	911.2	870.4	907.5
November	550.1	527.6	551.5	868.1	864.4	869.4	800.7	793.0	802.0
December	513.2	483.4	513.3	1,031.3	972.2	1,029.8	921.4	868.5	920.3
January	552.0	512.9	551.7	1,675.8	1,584.7	1,677.2	1,437.4	1,357.4	1,438.5
February	610.6	553.4	610.6	2,043.5	1,923.6	2,042.5	1,740.6	1,634.0	1,739.8
March	924.1	860.5	923.0	2,761.3	2,554.8	2,761.7	2,371.6	2,195.4	2,371.7
April	1,418.7	1,363.5	1,418.8	3,401.5	3,137.7	3,400.1	2,980.9	2,761.3	2,979.8
May	1,798.6	1,751.2	1,794.9	5,184.5	4,770.6	5,182.9	4,466.3	4,130.1	4,464.2
June	1,464.4	1,407.2	1,462.2	5,809.8	5,318.5	5,807.0	4,888.0	4,488.9	4,885.4
July	1,461.9	1,430.8	1,461.2	3,589.0	3,193.0	3,588.0	3,137.8	2,819.2	3,136.9
August	1,198.5	1,152.9	1,194.9	2,098.0	1,889.5	2,096.6	1,907.2	1,733.3	1,905.4
September	971.7	925.1	971.3	1,655.4	1,518.3	1,652.5	1,510.4	1,392.5	1,508.0

Source: PG&E. 2023. Second Supplemental FLA. Table 7.2-8.

Table B-3 Median, Minimum, and Maximum of the Median Monthly Flow in the SJR below Kerckhoff Dam (WY 1985–2017).

Month	Median (cfs)			Minimum (cfs)			Maximum (cfs)		
	Without Project	Historical (Gage J-2)	Current Operations	Without Project	Historical (Gage J-2)	Current Operations	Without Project	Historical (Gage J-2)	Current Operations
October	844.7	32.0	32.5	43.0	18.0	19.5	1,598.8	489.2	1,472.0
November	672.6	35.0	32.5	49.7	17.0	19.5	2,159.3	1,973.8	1,237.6
December	706.4	31.0	32.5	147.7	18.0	19.5	3,052.0	268.4	1,287.4
January	789.6	32.0	32.5	47.4	18.0	19.5	6,550.0	529.0	1,824.7
February	1,370.5	31.0	32.5	63.0	18.0	19.5	6,665.2	2,915.0	1,921.9
March	1,820.2	31.0	32.5	85.5	17.9	19.5	5,147.0	955.4	3,137.4
April	2,469.9	31.0	32.5	58.9	17.0	19.5	7,828.6	3,215.0	2,727.6
May	3,140.0	32.0	32.5	52.3	17.0	19.5	11,989.6	6190.0	7,063.4
June	2,916.6	33.0	32.5	345.7	17.0	19.5	13,923.9	8,965.0	9,170.0
July	1,990.6	35.0	32.5	742.2	17.0	20.2	10,598.0	4,710.0	6,180.7
August	1,794.1	36.4	32.5	692.1	17.0	19.5	3,468.0	67.0	46.2
September	1,452.4	34.0	32.5	450.8	17.0	19.5	2,914.5	66.5	32.5

Source: PG&E. 2023. Second Supplemental FLA. Table 7.2-7.

Table B-1 Median, Minimum, and Maximum of the Median Monthly Flow in the SJR below the K2 Powerhouse (WY 1985–2017).

Month	Median (cfs)			Minimum (cfs)			Maximum (cfs)		
	Without Project	Historical (Gages J-2 + J-6)	Current Operations	Without Project	Historical (Gages J-2 + J-6)	Current Operations	Without Project	Historical (Gages J-2 + J-6)	Current Operations
October	844.7	809.0	843.4	43.0	22.0	19.5	1,598.8	1,527.0	1,591.5
November	672.6	693.5	674.7	49.7	20.1	19.5	2,159.3	2,497.8	2,178.0
December	706.4	688.0	687.4	147.7	30.0	152.4	3,052.0	2,920.0	2,862.4
January	789.6	901.6	789.3	47.4	52.1	19.5	6,550.0	5,790.0	6,549.7
February	1,370.5	1,329.0	1,364.3	63.0	53.9	19.5	6,665.2	4,787.4	6,664.9
March	1,820.2	1,719.0	1,770.7	85.5	174.7	43.7	5,147.0	5,079.9	5,146.4
April	2,469.9	2,251.5	2,515.3	58.9	19.7	19.5	7,828.6	5,415.9	7,827.6
May	3,140.0	2,983.6	3,149.5	52.3	42.7	19.5	11,989.6	11,794.0	11,988.3
June	2916.6	2,707.0	2,856.8	345.7	355.7	366.5	13,923.9	11,797.5	13,921.9
July	1,990.6	1,881.4	2,092.4	742.2	914.1	723.6	10,598.0	10,340.0	10,595.6
August	1,794.1	1,669.9	1,775.3	692.1	519.2	747.7	3,468.0	3,443.5	3,596.2
September	1,452.4	1,319.0	1,448.0	450.8	445.8	499.8	2,914.5	2,623.0	2,834.1

Source: PG&E. 2023. Second Supplemental FLA. Table 7.2-9.

Note: Small differences—approximately 2 cfs in each of the monthly medians—occur between the with- and without-Project flows. These differences are the result of evaporation, which is accounted for in the HEC-ResSim reservoir modeling and reduces the with-Project flows compared to the without-Project flows. Also, at times, the reservoir may be surcharging with incoming flows. In one instance, a more substantial difference in the minimum monthly median flow occurs in June when the with-Project flows were 438.0 cfs and without-Project flows were 331.0 cfs. These flows were likely attributable to American shad spawning flow requirements that included up to 1,200 cfs through the K2 Powerhouse from May 15 to June 30.

Table B-2 Average Monthly Flows through K2 Powerhouse (WY 1985–2017).

Month	Dry WYs (cfs)		Normal WYs (cfs)		All WYs (cfs)	
	Historical (Gage J-6)	Current Operations	Historical (Gage J-6)	Current Operations	Historical (Gage J-6)	Current Operations
October	412.2	328.3	671.8	640.6	616.7	574.4
November	202.1	371.6	288.9	508.5	270.5	479.5
December	354.7	391.6	840.7	792.2	737.6	707.3
January	434.1	499.9	1,224.2	1,374.7	1,056.6	1,189.1
February	511.2	581.8	1,535.8	1,693.7	1,319.3	1,458.7
March	805.2	894.2	2,242.5	2,456.8	1,937.6	2,125.3
April	1,285.5	1,395.5	2,712.8	3,115.9	2,410.0	2,751.0
May	1,630.7	1,775.4	3,152.8	3,713.1	2,829.9	3,302.0
June	1,261.9	1,439.8	2,996.8	3,536.1	2,628.8	3,091.4
July	1,394.0	1,418.9	2,360.5	2,704.6	2,155.4	2,431.8
August	1,113.4	1,169.3	1,808.9	2,046.1	1,661.3	1,860.1
September	867.9	951.8	1,468.8	1,620.0	1,341.3	1,478.2

Source: PG&E. 2023. Second Supplemental FLA. Table 7.2-10.

Table B-6 Modeled Flow Statistics in the Project Bypass Reach below Kerckhoff Dam during WYs 1985–2017 under the No-Action Alternative and the Proposed Action.

Month	Daily Exceedance Flows by Month (cfs)			Maximum, Minimum, and Average Daily Flows (cfs)		
	25%	50%	75%	Max	Min	Avg
No-Action Alternative						
Oct	439.6	32.5	32.5	2,663.5	19.5	333.1
Nov	513.9	32.5	32.5	2,821.2	19.5	322.5
Dec	32.5	32.5	32.5	4,786.5	19.5	213.0
Jan	32.5	32.5	32.5	35,167.8	19.5	249.4
Feb	32.5	32.5	32.5	9,671.1	19.5	281.2
Mar	32.5	32.5	32.5	12,743.6	19.5	246.4
Apr	32.5	32.5	32.5	15,341.0	19.5	228.8
May	1,044.4	32.5	32.5	20,490.1	19.5	1,162.2
Jun	2,519.4	32.5	32.5	12,629.2	19.5	1,794.0
Jul	50.0	32.5	32.5	13,247.6	19.7	705.0
Aug	32.5	32.5	32.5	2,817.5	19.5	45.2
Sep	32.5	32.5	32.5	32.5	19.5	29.7
Proposed Action						
Oct	443.5	32.5	32.5	2,883.9	19.5	337.6
Nov	500.0	32.5	32.5	2,821.2	19.5	318.7
Dec	32.5	32.5	32.5	4,769.2	19.5	212.8
Jan	32.5	32.5	32.5	34,325.4	19.5	250.1
Feb	32.5	32.5	32.5	9,628.0	19.5	281.2
Mar	32.5	32.5	32.5	12,606.6	19.5	247.1
Apr	32.5	32.5	32.5	15,178.9	19.5	230.1
May	1,532.9	32.5	32.5	19,912.3	19.5	1,219.8
Jun	2,552.5	32.5	32.5	12,590.0	19.5	1,847.9
Jul	50.0	32.5	32.5	13,140.1	19.7	759.5
Aug	32.5	32.5	32.5	2,783.5	19.5	65.1
Sep	32.5	32.5	32.5	40.2	19.5	29.8
Flow Difference between Proposed Action and No-Action Alternative						
Oct	3.9	-	-	220.4	-	4.4
Nov	(13.9)	-	-	-	-	(3.7)
Dec	-	-	-	(17.3)	-	(0.2)
Jan	-	-	-	(842.4)	-	0.7
Feb	-	-	-	(43.1)	-	-
Mar	-	-	-	(137.0)	-	0.7
Apr	-	-	-	(162.1)	-	1.3
May	488.5	-	-	(577.8)	-	57.6
Jun	33.1	-	-	(39.2)	-	53.9
Jul	-	-	-	(107.5)	-	54.5
Aug	-	-	-	(34.0)	-	19.9
Sep	-	-	-	7.7	-	-

Note: cfs – cubic feet per second
WY – water year
Parentheses indicate a negative value.

Source: PG&E. 2023. Second Supplemental FLA. Table 8.2-1.

Table B-7 Modeled Flow Statistics in the Project Bypass Reach below Kerckhoff Dam during Dry WYs (WY 1985–2017) under the No-Action Alternative and the Proposed Action.

Month	Daily Exceedance Flows by Month (cfs)			Maximum, Minimum, and Average Daily Flows (cfs)		
	25%	50%	75%	Max	Min	Avg
No-Action Alternative						
Oct	435.4	32.5	19.5	2,282.6	19.5	384.4
Nov	197.0	32.5	32.5	1,349.0	19.5	179.8
Dec	32.5	32.5	19.5	908.6	19.5	121.7
Jan	32.5	32.5	19.5	2,556.4	19.5	51.8
Feb	32.5	32.5	19.5	32.5	19.5	28.8
Mar	32.5	32.5	19.5	32.5	19.5	28.8
Apr	32.5	19.5	19.5	32.5	19.5	23.3
May	19.5	19.5	19.5	23.8	19.5	19.5
Jun	20.6	19.5	19.5	50.0	19.5	22.4
Jul	50.0	50.0	37.2	50.0	19.7	42.3
Aug	36.5	19.5	19.5	49.9	19.5	25.6
Sep	19.5	19.5	19.5	19.5	19.5	19.5
Proposed Action						
Oct	440.9	32.5	32.5	2,265.1	19.5	389.1
Nov	188.6	32.5	32.5	1,349.9	19.5	176.5
Dec	32.5	32.5	19.5	905.3	19.5	120.9
Jan	32.5	32.5	19.5	2,486.2	19.5	52.4
Feb	32.5	32.5	19.5	36.7	19.5	28.8
Mar	32.5	32.5	19.5	32.5	19.5	28.8
Apr	32.5	19.5	19.5	32.5	19.5	23.2
May	19.5	19.5	19.5	1,700.0	19.5	105.4
Jun	20.9	19.5	19.5	1,700.0	19.5	62.4
Jul	50.0	50.0	37.4	50.0	19.7	43.5
Aug	47.4	36.4	19.5	50.0	19.5	32.5
Sep	19.5	19.5	19.5	38.7	19.5	19.6
Flow Difference between Proposed Action and No-Action Alternative						
Oct	5.5	-	13.0	(17.5)	-	4.7
Nov	(8.4)	-	-	0.9	-	(3.3)
Dec	-	-	-	(3.3)	-	(0.8)
Jan	-	-	-	(70.3)	-	0.6
Feb	-	-	-	4.2	-	-
Mar	-	-	-	-	-	-
Apr	-	-	-	-	-	(0.1)
May	-	-	-	1,676.2	-	85.9
Jun	0.2	-	-	1,650.0	-	40.1
Jul	-	-	0.2	-	-	1.2
Aug	10.9	16.9	-	0.1	-	6.9
Sep	-	-	-	19.2	-	0.1

Note: cfs – cubic feet per second
WY – water year
Parentheses indicate a negative value.

Source: PG&E. 2023. Second Supplemental FLA. Table 8.2-2.

Table B-8 Modeled Flow Statistics in the Project Bypass Reach below Kerckhoff Dam during Normal WYs (WY 1985–2017) under the No-Action Alternative and the Proposed Action.

Month	Daily Exceedance Flows by Month (cfs)			Maximum, Minimum, and Average Daily Flows (cfs)		
	25%	50%	75%	Max	Min	Avg
No-Action Alternative						
Oct	440.0	32.5	32.5	2,663.5	19.5	319.3
Nov	553.4	32.5	32.5	2,821.2	19.5	360.9
Dec	322.8	32.5	32.5	4,786.5	19.5	237.6
Jan	32.5	32.5	32.5	35,167.8	19.5	302.6
Feb	32.5	32.5	32.5	9,671.1	19.5	348.8
Mar	32.5	32.5	32.5	12,743.6	19.5	305.0
Apr	32.5	32.5	32.5	15,341.0	29.3	284.2
May	2,131.1	32.5	32.5	20,490.1	32.5	1,469.9
Jun	3,902.3	45.5	32.5	12,629.2	32.5	2,270.9
Jul	45.8	32.5	32.5	13,247.6	32.5	883.5
Aug	32.5	32.5	32.5	2,817.5	32.5	50.5
Sep	32.5	32.5	32.5	32.5	32.5	32.5
Proposed Action						
Oct	443.7	32.5	32.5	2,883.9	19.5	323.7
Nov	524.8	32.5	32.5	2,821.2	19.5	357.0
Dec	300.0	32.5	32.5	4,769.2	19.5	237.5
Jan	32.5	32.5	32.5	34,325.4	19.5	303.3
Feb	32.5	32.5	32.5	9,628.0	19.5	348.8
Mar	32.5	32.5	32.5	12,606.6	19.5	305.8
Apr	32.5	32.5	32.5	15,178.9	32.5	285.8
May	2,161.9	32.5	32.5	19,912.3	32.5	1,519.8
Jun	3,891.4	46.1	32.5	12,590.0	32.5	2,328.6
Jul	200.9	32.5	32.5	13,140.1	32.5	952.3
Aug	32.5	32.5	32.5	2,783.5	32.5	73.9
Sep	32.5	32.5	32.5	40.2	32.5	32.5
Flow Difference between Proposed Action and No-Action Alternative						
Oct	3.7	-	-	220.4	-	4.4
Nov	(28.7)	-	-	-	-	(3.9)
Dec	(22.8)	-	-	(17.3)	-	(0.1)
Jan	-	-	-	(842.4)	-	0.7
Feb	-	-	-	(43.1)	-	-
Mar	-	-	-	(137.0)	-	0.9
Apr	-	-	-	(162.1)	3.3	1.6
May	30.7	-	-	(577.8)	-	49.9
Jun	(10.9)	0.6	-	(39.2)	-	57.6
Jul	155.1	-	-	(107.5)	-	68.8
Aug	-	-	-	(34.0)	-	23.4
Sep	-	-	-	7.7	-	-

Note: cfs – cubic feet per second; WY – water year
 Parentheses indicate a negative value.

Source: PG&E. 2023. Second Supplemental FLA. Table 8.2-3.

Table B-9 Average Median, Average Minimum, and Average Maximum of the Monthly Flow Below the K2 Powerhouse and in the SJR below Kerckhoff Dam (WY 2018–2023).

Month	Median (cfs)		Minimum (cfs)		Maximum (cfs)	
	Flow Below K2 Powerhouse	Flow Below Kerckhoff Dam	Flow Below K2 Powerhouse	Flow Below Kerckhoff Dam	Flow Below K2 Powerhouse	Flow Below Kerckhoff Dam
October	646	327	0	43	1767	1240
November	485	327	0	41	1165	1369
December	1042	120	114	43	2294	728
January	1075	143	97	46	1932	937
February	1021	161	0	43	2074	768
March	1637	601	291	43	2935	2728
April	2751	972	849	46	4109	3280
May	3112	1661	1853	244	4187	3678
June	2751	972	849	46	4109	3280
July	2124	835	1141	46	2767	2446
August	1494	178	97	46	2944	1023
September	1602	170	0	46	2843	1209

Appendix C

License Articles and Orders

Table C-1 presents a summary of the Project license articles. This summary is provided for convenience only; the actual license articles should be read for a complete understanding of the articles' intent. Table B-2 provides a summary of other significant FERC orders and Project exhibits related to Project operations.

Table C-1. FERC license articles and related orders for the Project.

License Article	Condition
Article 1	The Project is subject to the provisions, terms, and conditions of the license.
Article 2	No substantial changes may be made in the plans, maps, specifications, and statements in the exhibits until approved by FERC.
Article 3	The Project will be in substantial conformity with the approved exhibits.
Article 4	The Project is subject to inspection by FERC's regional engineer.
Article 5	Requires the Licensee to acquire title in fee or the right to use in perpetuity all lands, other than lands of the United States, necessary or appropriate for Project construction, maintenance, and operation.
Article 6	In the event the Project is taken over by the United States upon termination or transfer of the license, Licensee will be responsible for and will make good any defect of title to or of right of occupancy, which is necessary for Project maintenance and operation.
Article 7	The Commission will determine the actual cost of the original Project and any addition thereto.
Article 8	Requires the Licensee to install and monitor stream gages and gaging stations.
Article 9	Requires the Licensee to install additional capacity or make other changes as directed by FERC.
Article 10	Requires coordination of Project with other power systems in the interest of power and other beneficial public uses of the water.
Article 11	Whenever the Licensee is directly benefited by the construction of other licensee, of a storage reservoir or other headwater benefit, the Licensee will reimburse the owner of the headwater improvement.
Article 12	The United States retains and safeguards the right to use water in such amount as may be necessary for the purposes of navigation and operations controlled for the protection of life, health, and property and in the interest of conservation and utilization for power purposes and other beneficial public uses.
Article 13	Requires the Licensee to permit reasonable use of reservoir or other Project properties as may be ordered by FERC in the interest of comprehensive development of the waterway.
Article 14	Requires the Licensee to avoid interference between Project transmission lines or other Project facilities and any other communication facilities installed before or after construction.
Article 15	Requires the Licensee to construct, maintain, and operate protective devices in the interest of fish and wildlife resource, as ordered by FERC after an opportunity for a hearing.
Article 16	Requires the Licensee to permit the United States to use free of cost Project works or lands to construct fish and wildlife facilities.
Article 17	Requires the Licensee to construct, maintain, and operate reasonable recreational facilities as directed by FERC, or as recommended by other federal or state agency after an opportunity for a hearing.
Article 18	Requires the Licensee to allow the public free access, to a reasonable extent (safety considerations), to Project waters and adjacent Project lands owned by the Licensee.

License Article	Condition
Article 19	Requires the Licensee to take reasonable measures to prevent soil erosion on land adjacent to the stream and prevent stream siltation and other forms of water or air pollution resulting from Project construction, operation, or maintenance.
Article 20	Requires the Licensee to clear and keep clear lands along open conduits, and remove all trees along the periphery of reservoirs that may die during Project operation.
Article 21	Requires the Licensee only conduct dredge and fill activities in association with work specifically authorized under the license; during maintenance of the Project; or after obtaining FERC approval.
Article 22	Requires the Licensee to convey to the United States, free of cost, lands and rights-of-way required to construct, complete, or improve navigation facilities in connection with the Project.
Article 23	Requires that operation of any navigation facilities constructed in connection with the Project are controlled by reasonable rules and regulations in the interest of navigation.
Article 24	Requires the Licensee to provide power, free of cost, to the United States for the operation and maintenance of navigation facilities in the vicinity of the Project.
Article 25	Requires the Licensee to construct, maintain, and operate lights and other signals for the protection of navigation.
Article 26	Requires payment by Licensee for timber cut, used, or destroyed in the construction and maintenance of the Project on lands of the United States.
Article 27	Requires the Licensee to prevent, control, and suppress fires on Project lands.
Article 28	Licensee may not object to or prevent use of water for fire suppression.
Article 29	Requires the Licensee to be liable for destruction of any structures or property of the United States during Project construction, maintenance, or operation.
Article 30	Requires the Licensee to permit any agency of the United States, without charge, to construct or permit conduits, chutes, ditches, railroads, roads, trails, telephone and power lines, and other means of transportation and communication not inconsistent with the Project license.
Article 31	Requires state or federal jurisdictional approval over the location and standards of roads and trails, and other uses of land, including quarries, borrow pits, and spoil disposal areas during construction and maintenance.
Article 32	Requires the Licensee to minimize interference with transmission, telegraph, telephone, etc., wires during construction and maintenance activities.
Article 33	Requires the Licensee to clear and maintain transmission rights-of-way.
Article 34	Requires the Licensee to cooperate with the disposal by the United States of mineral and vegetative materials, under the Act of July 31, 1947.
Article 35	Requires the Licensee to maintain and operate the Project in good faith and comply with terms of the license and, if not, FERC will consider the Licensee's intent to surrender and terminate the license.
Article 36	Right of the Licensee to use or occupy waters or lands of the United States for the purpose of maintaining the Project will cease at the end of the license period, unless the Licensee obtains a new license, or an annual license is issued.
Article 37	Terms and conditions in the license will not be construed as impairing any terms and conditions of the Federal Power Act.
Article 38	Requires the Licensee to implement, and modify when appropriate, the emergency action plan on file with the Commission designed to provide an early warning to upstream and downstream inhabitants and property owners if there should be an impending or actual sudden release of water caused by an accident to, or failure of, Project works.

License Article	Condition
Article 39	Requires the Licensee to install and operate any signs, lights, sirens, barriers, or other safety devices that may reasonably be needed to warn the public of fluctuations in flow from the Project and protect the public in its recreational use of Project lands and waters.
Article 40	Requires the Licensee to operate the Project during flood periods in a manner that will not cause peak river flows below Kerckhoff Dam and powerhouses to exceed the peak flows that would have occurred in the absence of the Project.
Article 41	Requires the Licensee to submit to the Commission a plan for the disposal of tunnel spoil, including measures for landscaping and revegetating any affected land areas and measures for minimizing any adverse impacts on water quality. This shall be done in consultation with the Bureau of Land Management of the Department of the Interior and at least 60 days prior to the commencement of tunnel excavation operations.
Article 42	Requires the Licensee, in consultation with the California State Resources Agency and the U.S. Fish and Wildlife Service of the Department of the Interior, to arrange for a preconstruction survey of all areas proposed to be disturbed by Project construction or operation, to determine the impacts, if any, on endangered or threatened species of flora and fauna.
Article 43	Requires the Licensee to continue to consult and cooperate with the California Department of Fish and Game, the U.S. Fish and Wildlife Service, and Bureau of Land Management of the Department of the Interior, and other appropriate agencies with regard to measures needed to ensure the protection of the natural resources and values of the Project Area, including the existing springs and associated riparian habitat.
Article 44	Requires the Licensee to file for approval a revised Exhibit S, within 3 years after the date of issuance of this license. By the end of the sixth year following commencement of commercial operation of Kerckhoff No.2 power plant, requires the Licensee to have assessed the fishery mitigation plan and determined if modifications should be made to further protect and enhance the fishery. Order approved revised Exhibit S and Wildlife Habitat Plan on August 29, 1984.
Article 45	Requires the Licensee to discharge minimum flows of 25 cfs during Normal years and 15 cfs during Dry years. The permanent American shad spawning season flow release regime shall be implemented each year from May 15 through June 30. Requires additional releases as determined necessary by the California Department of Fish and Game to (1) maintain stream temperatures at or below 27°C upstream of Kerckhoff 2 Powerhouse, and (2) flush sediments that may accumulate in the streambed below Kerckhoff Dam.
Article 46	At least 60 days prior to the start of construction, and after consultation with the California Water Resources Control Board, requires the Licensee to develop and file with the Commission a plan to minimize the quantity of inorganic sediments or other pollutants resulting from construction, operation, or maintenance of the Project, that might enter the Project waters.
Article 47	Requires the Licensee to implement programs to assess and monitor the impacts of construction and operation of the Project on water quality.
Article 48	Requires the Licensee to continue to cooperate with the California State Historic Preservation Officer (SHPO) in carrying out the measures for the protection and salvage of archaeological resources at the Project. The Licensee shall provide funds in a reasonable amount for these protective measures and data recovery work.
Article 49	Requires the Licensee to avoid or minimize any disturbance caused by construction and maintenance of the Project works to the natural, scenic, historical, and recreational values of the Project Area. At least 60 days prior to the start of construction, the Licensee shall submit to the Commission a detailed plan to avoid or minimize any disturbance to these values of the Project Area.

License Article	Condition
Article 50	At least 60 days prior to the start of construction, and after consultation with the U.S. Environmental Protection Agency and other appropriate federal and state agencies, the Licensee shall develop and file with the Commission a plan to protect ambient air quality at the Project during construction activities.
Article 51	Prior to the start of construction, requires the Licensee to prepare a plan for sewage effluent disposal at temporary and permanent Project facilities, in consultation and cooperation with the Bureau of Land Management, California State Water Resources Control Board, and the Fresno County Health Department.
Article 52	Requires the Licensee to prepare a solid waste management plan, in consultation with the California Department of Public Health. The plan shall be filed with the Commission within 1 year after the commencement of commercial operation of the Kerckhoff No. 2 power plant.
Article 53	Requires the Licensee to dispose of all temporary structures, unused timber, brush, refuse, or other material not needed for the purpose of the Project, which result from the clearing of lands or from the maintenance or alteration of the Project.
Article 54	After consultation with the Bureau of Land Management, the Licensee shall develop and file with the Commission, at least 60 days prior to the beginning of construction, a plan to control access into Squaw Leap Management Area.
Article 55	The Licensee shall, prior to May 7, 1985, file for Commission approval to show the Kerckhoff Project as finally constructed and located, and the amount of U.S. lands occupied by it.
Article 56	Requires the Licensee to pay the United States annual charges, effective November 1, 1979.
Article 57	One-half of the Project surplus earnings, if any, accumulated under the license, in excess of the specified rate of return per annum on the net investment, shall be set aside in a Project amortization reserve account as of the end of each fiscal year.
Article 58	Land Management License Article (Deletion of Article 58 and addition of Article 60).
Article 59	The Licensee shall retain a board of three or more qualified, independent engineering consultants to review for safety and adequacy the design, specifications, and construction of the new powerhouse, tunnel, and appurtenant facilities.
Article 60	The Licensee shall have the authority to grant permission for certain types of use and occupancy of Project lands and waters and to convey certain interests in Project lands and waters for certain other types of use and occupancy, without prior Commission approval. The Licensee may exercise the authority only if the proposed use and occupancy is consistent with the purposes of protecting and enhancing the scenic, recreational, and other environmental values of the Project.

Table C-2. Other significant FERC orders for the Project.

Date	Order
November 8, 1979	Order issuing Project license
November 28, 1980	Land Management License Article (deletion of Article 58 and addition of Article 60) – order giving Licensee the authority to grant permission for certain types of use and occupancy of Project lands and waters and to convey certain interests in Project lands and waters for certain other types of use and occupancy, without prior Commission approval
May 18, 1981	Order approving reconstruction of tramway
August 13, 1982	Supplement to Article 59
June 23, 1983	Order revising Article 47 – order requiring establishment of a construction and operational water quality monitoring programs, including filing requirements
June 5, 1984	Order amending license (Article 55) – order requiring filing of “as-built” Exhibits K, L, and M prior to May 7, 1985
August 29, 1984	Order approving revised Exhibit S (including results of pre-operational fisheries studies and fisheries study plan for a 2-year operational study in 1984–1985 to determine operational effects of Kerckhoff 2 Powerhouse on the striped bass and American shad stocks in the San Joaquin River [SJR]) and Wildlife Habitat Plan (watering holes for quail) (Article 44)
June 26, 1985	Order approving as-built exhibits (G, L, M) and revising annual charges (Article 56)
June 10, 1986	Order approving as-built exhibit (Exhibit R)
September 21, 1987	Order requiring PG&E to continue the flow study to determine the flow regime necessary to protect American shad and striped bass spawning, and file results and recommendations within 5 months
May 10, 1988	Order denying appeal and requiring an interim minimum flow and requiring Licensee to conduct the habitat-based flow study on American shad and striped bass spawning required by Commission order dated September 21, 1987
June 16, 1988	Order modifying interim minimum flow release
September 23, 1988	Order on rehearing (habitat-based assessment study to determine the flow needed to facilitate spawning of American shad and striped bass in the SJR)
October 20, 1988	Order amending Article 45, establishing a permanent minimum flow regime. Requires additional releases as determined necessary by the California Department of Fish and Game to (1) maintain stream temperatures at or below 27°C upstream of Kerckhoff 2 Powerhouse, and (2) flush sediments that may accumulate in the streambed below Kerckhoff Dam.
May 12, 1989	Order granting and modifying an interim flow regime and requiring shad monitoring in spring 1989.
May 8, 1990	Order establishing interim instream flow regime and approving further study (annual monitoring of shad spawning success May 15–June 30, including the number of shad eggs and larvae and the percentage of live eggs).
June 25, 1990	Order amending order establishing interim flow regime for American shad to allow for modifications due to the lack of insufficient inflows or operating emergencies.
May 15, 1991	Order establishing the flow regime (at the required interim flow releases for reservoir’s elevation at or below 545 feet msl) and requiring monitoring (errata notice issued June 13, 1991).
June 6, 1991	Order amending Study Plan (Full-Pool Study Plan to determine the permanent flow regime needed to provide surface water velocities suitable for American shad spawning when Millerton Lake is at full-pool level).

Date	Order
May 6, 1992	Order establishing (1992 interim American shad) flow regime and approving Shad Monitoring Plan.
May 26, 1992	Order approving modification of Full-Pool Study Plan for 1992 study, requiring surface water velocity measurements near Kerckhoff 2 Powerhouse tailrace over a range of discharges established as 1992 interim flow releases, with no requirements to sample for the presence of shad eggs and larvae.
April 22, 1993	Order establishing permanent flow release regime (adopting 1992 interim flow regime) for American shad.
March 4, 1996	Order amending license and revising annual charges (Article 56).
August 16, 1996	Order approving revised Exhibit G drawings.
December 22, 1998	Order granting license amendment to allow deletion of transmission lines.
September 12, 2001	Order denying rehearing (Appalachian Group's motion on order issued July 13, 2011).
January 10, 2002	Order permitting a combined answer to motions to intervene and comment (in response to December 13, 2001 notice).
February 9, 2007	Order amending license, revising annual charges, and approving revised Exhibit G drawings and Exhibit M.
April 16, 2013	Order amending license and revising annual charges (Article 56), revised Exhibits M and L (removing Unit No. 2 at Kerckhoff 1 Powerhouse).
December 15, 2014	Letter of exemption from filing FERC Form 80.
June 27, 2018	Order approving change in land rights to grant a deed of conservation easement and agreement for a perpetual conservation easement.

Appendix D

Kerckhoff Air Emissions Modeling

This brief summary is provided ahead of the full Kerckhoff Summary Report to offer readers and listeners a clear, high-level overview of the purpose, scope, and key conclusions of the associated analysis. The report that follows includes detailed tables, calculations, and technical data supporting a comprehensive assessment of air pollutant emissions, greenhouse gas emissions, climate-related risks, and health and equity considerations for the proposed project. This summary distills that detailed information into a plain-language narrative intended to orient the reader prior to review of the full technical report, which is included in its entirety and formatted to meet applicable Section 508 accessibility requirements.

1.0 Summary of Kerckhoff Climate, Emissions, and Equity Analysis

The **Kerckhoff Project** is a proposed industrial project located in **unincorporated Fresno County, California**, within the **San Joaquin Valley Air Basin**. Construction is anticipated to begin in **January 2028**, with operations extending into **2040**. The land use is classified as **General Heavy Industry** at the project/site scale.

2.0 Air Quality and Greenhouse Gas Emissions

Analysis of **construction-phase emissions** shows that all criteria pollutants and greenhouse gas emissions are **below applicable San Joaquin Valley Air Pollution Control District thresholds**. No annual or daily thresholds are exceeded. However, fugitive dust emissions could occur during any ground disturbance activities during construction of the Vista Day Use Area or retirement of the K1 Powerhouse and localized fugitive dust emission impacts is significant and unavoidable with implementation of the AQ-1 or a comparable action, as described in Impact AQ-1 of the Final EIR.

Operational emissions are forecast to remain **below all applicable thresholds** for criteria pollutants and greenhouse gases. The project does not exceed annual or daily limits for reactive organic gases (ROG), nitrogen oxides (NO_x), carbon monoxide (CO), particulate matter (PM₁₀ and PM_{2.5}), or greenhouse gases.

3.0 Climate Risk Assessment

A climate risk screening identified low overall vulnerability for applicable climate hazards. After accounting for project design and adaptation measures:

- Extreme precipitation has a moderate vulnerability score (3).
- **Wildfire** and **snowpack reduction** have **low vulnerability scores (2)**.
- Other hazards (extreme heat, flooding, drought, sea level rise, and air quality degradation) were determined to be **not applicable** to the project location.

4.0 Environmental Justice, Health, and Equity

The project is **not located** within a designated disadvantaged community, low-income community, or Community Air Protection Program area under applicable California statutes. The **CalEnviroScreen score is 10.0**, indicating a relatively low pollution burden, and the **Healthy Places Index score is 55.0**, reflecting generally favorable community health conditions for the census tract.

5.0 Overall Conclusion

The Kerckhoff Project is expected to comply with applicable air quality thresholds, presents **low climate-related risk**, and does **not disproportionately affect disadvantaged or environmental justice communities**.

Appendix D1

Kerckhoff Summary

Kerckhoff Summary Report

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1. Basic Project Information

1.1. Basic Project Information

Data Field	Value
Project Name	Kerckhoff
Construction Start Date	1/3/2028
Operational Year	2040
Lead Agency	—
Land Use Scale	Project/site
Analysis Level for Defaults	County
Windspeed (m/s)	2.70
Precipitation (days)	30.4
Location	37.13929135404031, -119.56164855510147
County	Fresno
City	Unincorporated
Air District	San Joaquin Valley APCD
Air Basin	San Joaquin Valley
TAZ	2507
EDFZ	5
Electric Utility	Pacific Gas & Electric Company
Gas Utility	Pacific Gas & Electric
App Version	2022.1.1.29

1.2. Land Use Types

Land Use Subtype	Size	Unit	Lot Acreage	Building Area (sq ft)	Landscape Area (sq ft)	Special Landscape Area (sq ft)	Population	Description
General Heavy Industry	23.1	1000sqft	531	0.00	23,134,700	—	—	—

1.3. User-Selected Emission Reduction Measures by Emissions Sector

No measures selected

2. Emissions Summary

2.1. Construction Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	1.58	1.58	8.03	80.6	0.15	0.31	0.16	0.39	0.31	0.04	0.33	—	16,422	16,422	0.66	0.13	0.40	16,478
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.05	0.05	0.03	0.36	0.00	0.00	0.08	0.08	0.00	0.02	0.02	—	75.9	75.9	< 0.005	< 0.005	0.01	77.2
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.07	0.07	0.35	3.53	0.01	0.01	0.01	0.02	0.01	< 0.005	0.01	—	720	720	0.03	0.01	0.02	722
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.01	0.01	0.06	0.64	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	119	119	< 0.005	< 0.005	< 0.005	120
Exceeds (Annual)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Threshold	—	10.0	10.0	100	27.0	—	—	15.0	—	—	15.0	—	—	—	—	—	—	—
Unmit.	—	No	No	No	No	—	—	No	—	—	No	—	—	—	—	—	—	—

2.4. Operations Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.06	0.05	0.06	0.62	< 0.005	< 0.005	0.20	0.20	< 0.005	0.05	0.05	25.7	643	668	2.67	0.04	0.11	748
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.06	0.05	0.07	0.49	< 0.005	< 0.005	0.20	0.20	< 0.005	0.05	0.05	25.7	625	651	2.67	0.04	< 0.005	730
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.04	0.04	0.05	0.36	< 0.005	< 0.005	0.14	0.14	< 0.005	0.04	0.04	25.7	576	602	2.67	0.04	0.03	681
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.01	0.01	0.01	0.07	< 0.005	< 0.005	0.03	0.03	< 0.005	0.01	0.01	4.26	95.4	99.7	0.44	0.01	0.01	113
Exceeds (Annual)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Threshold	—	10.0	10.0	100	27.0	—	—	15.0	—	—	15.0	—	—	—	—	—	—	—
Unmit.	—	No	No	No	No	—	—	No	—	—	No	—	—	—	—	—	—	—

6. Climate Risk Detailed Report

6.2. Initial Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	N/A	N/A	N/A	N/A
Extreme Precipitation	2	0	0	N/A
Sea Level Rise	N/A	N/A	N/A	N/A
Wildfire	1	0	0	N/A
Flooding	N/A	N/A	N/A	N/A

Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	0	0	0	N/A
Air Quality Degradation	N/A	N/A	N/A	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.

The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.

The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores do not include implementation of climate risk reduction measures.

6.3. Adjusted Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	N/A	N/A	N/A	N/A
Extreme Precipitation	2	1	1	3
Sea Level Rise	N/A	N/A	N/A	N/A
Wildfire	1	1	1	2
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	1	1	1	2
Air Quality Degradation	N/A	N/A	N/A	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.

The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.

The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores include implementation of climate risk reduction measures.

7. Health and Equity Details

7.3. Overall Health & Equity Scores

Metric	Result for Project Census Tract
CalEnviroScreen 4.0 Score for Project Location (a)	10.0

Healthy Places Index Score for Project Location (b)	55.0
Project Located in a Designated Disadvantaged Community (Senate Bill 535)	No
Project Located in a Low-Income Community (Assembly Bill 1550)	No
Project Located in a Community Air Protection Program Community (Assembly Bill 617)	No

a: The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.
b: The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

7.5. Evaluation Scorecard

Health & Equity Evaluation Scorecard not completed.

Appendix D2

Kerkhoff Detailed Report

This brief summary is provided in advance of the full Kerckhoff Detailed Report to give readers and listeners an accessible, high-level overview of the purpose, scope, and conclusions of the underlying analysis. The source document that follows contains extensive tables, calculations, and technical data supporting a comprehensive evaluation of air quality emissions, greenhouse gas emissions, climate risk, and health and equity considerations for the proposed project. This summary condenses that large volume of information into a plain-language description intended to help orient the reader before reviewing the detailed report, which is included in full and has been formatted to meet Section 508 accessibility requirements.

1.0 Summary of Kerckhoff Detailed Report

This document presents a comprehensive air quality, greenhouse gas (GHG), climate risk, and health and equity evaluation for the proposed Kerckhoff Project activities. The analysis supports regulatory review and FERC licensing by documenting emissions, compliance with applicable thresholds, and potential environmental and community effects.

2.0 Project Overview

The Kerckhoff Project is located in Fresno County, California, within the San Joaquin Valley Air Basin and San Joaquin Valley Air Pollution Control District jurisdiction. The project area is classified as General Heavy Industry and includes approximately 531 acres. Construction activities are planned between 2027 and 2036, with project operations extending through at least 2040. Project components include installation of a flow gage, improvements at Smalley Cove, a dam upgrade, Vista Day Use Area construction, trail reconstruction, and upgrades at the K1 Powerhouse.

3.0 Emissions Analysis

The report evaluates criteria air pollutants and greenhouse gas emissions from both construction and operational activities. Emissions were quantified for all applicable sources, including off-road equipment, worker vehicles, and operational activities. No emission reduction measures were applied; therefore, all values reflect unmitigated, conservative (worst-case) conditions.

Construction emissions were evaluated by year and activity. Across all construction phases, the maximum annual emissions of reactive organic gases, nitrogen oxides, carbon monoxide, particulate matter (PM₁₀ and PM_{2.5}), and GHGs were all well below applicable San Joaquin Valley APCD thresholds.

Operational emissions were evaluated by sector, including mobile, water, and waste sources. Annual operational emissions for all criteria pollutants and GHGs also remain below regulatory significance thresholds.

No exceedances of daily or annual air quality or GHG thresholds were identified for either construction or operational conditions.

4.0 Climate Risk Evaluation

The report includes a climate risk assessment addressing potential exposure to hazards such as extreme heat, wildfire, and changes in snowpack. Identified risks are generally low to moderate. No sea level rise exposure is present due to the inland project location. No specific climate risk reduction measures were required based on the assessed vulnerability.

5.0 Health and Environmental Justice

Health and equity metrics were evaluated using CalEnviroScreen and the Healthy Places Index. The project area is not located within a designated disadvantaged, low-income, or AB 617 community. Overall pollution burden and population vulnerability scores are low, indicating no disproportionate impact on sensitive or underserved communities.

6.0 Conclusion

The analysis demonstrates that the Kerckhoff Project complies with applicable air quality and greenhouse gas thresholds under unmitigated conditions. Emissions are low, localized, and temporary during construction, and minimal during operation. Climate risks and health and equity impacts are limited. Based on the findings presented, no significant air quality, climate, or environmental justice impacts are anticipated as a result of the proposed project activities.

Kerckhoff Detailed Report

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1.1. Basic Project Information

Data Field	Value
Project Name	Kerckhoff
Construction Start Date	1/3/2028
Operational Year	2040
Lead Agency	—
Land Use Scale	Project/site
Analysis Level for Defaults	County
Windspeed (m/s)	2.70
Precipitation (days)	30.4
Location	37.13929135404031, -119.56164855510147
County	Fresno
City	Unincorporated
Air District	San Joaquin Valley APCD
Air Basin	San Joaquin Valley
TAZ	2507
EDFZ	5
Electric Utility	Pacific Gas & Electric Company
Gas Utility	Pacific Gas & Electric
App Version	2022.1.1.29

1.2. Land Use Types

Land Use Subtype	Size	Unit	Lot Acreage	Building Area (sq ft)	Landscape Area (sq ft)	Special Landscape Area (sq ft)	Population	Description
General Heavy Industry	23.1	1000sqft	531	0.00	23,134,700	—	—	—

1.3. User-Selected Emission Reduction Measures by Emissions Sector

No measures selected

2. Emissions Summary

2.1. Construction Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	1.58	1.58	8.03	80.6	0.15	0.31	0.16	0.39	0.31	0.04	0.33	—	16,422	16,422	0.66	0.13	0.40	16,478
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.05	0.05	0.03	0.36	0.00	0.00	0.08	0.08	0.00	0.02	0.02	—	75.9	75.9	< 0.005	< 0.005	0.01	77.2
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.07	0.07	0.35	3.53	0.01	0.01	0.01	0.02	0.01	< 0.005	0.01	—	720	720	0.03	0.01	0.02	722
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.01	0.01	0.06	0.64	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	119	119	< 0.005	< 0.005	< 0.005	120
Exceeds (Annual)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Threshold	—	10.0	10.0	100	27.0	—	—	15.0	—	—	15.0	—	—	—	—	—	—	—
Unmit.	—	No	No	No	No	—	—	No	—	—	No	—	—	—	—	—	—	—

2.2. Construction Emissions by Year, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily - Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2027	0.22	0.22	0.86	8.89	0.02	0.03	0.08	0.11	0.03	0.02	0.05	—	1,778	1,778	0.07	0.02	0.28	1,785
2028	0.13	0.12	0.67	4.68	0.01	0.01	0.08	0.09	0.01	0.02	0.03	—	901	901	0.04	0.01	0.25	906
2030	0.50	0.49	2.41	23.1	0.04	0.08	0.16	0.24	0.08	0.04	0.12	—	4,477	4,477	0.18	0.04	0.40	4,493
2036	1.58	1.58	8.03	80.6	0.15	0.31	0.08	0.39	0.31	0.02	0.33	—	16,422	16,422	0.66	0.13	0.09	16,478
Daily - Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2027	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
2028	0.05	0.05	0.03	0.36	0.00	0.00	0.08	0.08	0.00	0.02	0.02	—	75.9	75.9	< 0.005	< 0.005	0.01	77.2
2030	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
2036	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2027	0.01	0.01	0.02	0.24	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	48.5	48.5	< 0.005	< 0.005	< 0.005	48.7
2028	0.01	0.01	0.01	0.12	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	25.0	25.0	< 0.005	< 0.005	0.02	25.3
2030	0.02	0.02	0.08	0.72	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	139	139	0.01	< 0.005	0.01	139
2036	0.07	0.07	0.35	3.53	0.01	0.01	< 0.005	0.02	0.01	< 0.005	0.01	—	720	720	0.03	0.01	< 0.005	722
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2027	< 0.005	< 0.005	< 0.005	0.04	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	8.03	8.03	< 0.005	< 0.005	< 0.005	8.07
2028	< 0.005	< 0.005	< 0.005	0.02	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	4.15	4.15	< 0.005	< 0.005	< 0.005	4.18
2030	< 0.005	< 0.005	0.02	0.13	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	22.9	22.9	< 0.005	< 0.005	< 0.005	23.0
2036	0.01	0.01	0.06	0.64	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	119	119	< 0.005	< 0.005	< 0.005	120

2.4. Operations Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
---------	-----	-----	-----	----	-----	-------	-------	-------	--------	--------	--------	------	-------	------	-----	-----	---	------

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.06	0.05	0.06	0.62	< 0.005	< 0.005	0.20	0.20	< 0.005	0.05	0.05	25.7	643	668	2.67	0.04	0.11	748
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.06	0.05	0.07	0.49	< 0.005	< 0.005	0.20	0.20	< 0.005	0.05	0.05	25.7	625	651	2.67	0.04	< 0.005	730
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.04	0.04	0.05	0.36	< 0.005	< 0.005	0.14	0.14	< 0.005	0.04	0.04	25.7	576	602	2.67	0.04	0.03	681
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.01	0.01	0.01	0.07	< 0.005	< 0.005	0.03	0.03	< 0.005	0.01	0.01	4.26	95.4	99.7	0.44	0.01	0.01	113
Exceeds (Annual)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Threshold	—	10.0	10.0	100	27.0	—	—	15.0	—	—	15.0	—	—	—	—	—	—	—
Unmit.	—	No	No	No	No	—	—	No	—	—	No	—	—	—	—	—	—	—

2.5. Operations Emissions by Sector, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Sector	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.06	0.05	0.06	0.62	< 0.005	< 0.005	0.20	0.20	< 0.005	0.05	0.05	—	201	201	< 0.005	0.01	0.11	204
Area	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Energy	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Water	—	—	—	—	—	—	—	—	—	—	—	10.3	441	451	1.12	0.03	—	490
Waste	—	—	—	—	—	—	—	—	—	—	—	15.5	0.00	15.5	1.55	0.00	—	54.1

Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00
Total	0.06	0.05	0.06	0.62	< 0.005	< 0.005	0.20	0.20	< 0.005	0.05	0.05	25.7	643	668	2.67	0.04	0.11	748
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.06	0.05	0.07	0.49	< 0.005	< 0.005	0.20	0.20	< 0.005	0.05	0.05	—	184	184	< 0.005	0.01	< 0.005	187
Area	0.00	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Energy	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Water	—	—	—	—	—	—	—	—	—	—	—	10.3	441	451	1.12	0.03	—	490
Waste	—	—	—	—	—	—	—	—	—	—	—	15.5	0.00	15.5	1.55	0.00	—	54.1
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00
Total	0.06	0.05	0.07	0.49	< 0.005	< 0.005	0.20	0.20	< 0.005	0.05	0.05	25.7	625	651	2.67	0.04	< 0.005	730
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.04	0.04	0.05	0.36	< 0.005	< 0.005	0.14	0.14	< 0.005	0.04	0.04	—	135	135	< 0.005	0.01	0.03	137
Area	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Energy	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Water	—	—	—	—	—	—	—	—	—	—	—	10.3	441	451	1.12	0.03	—	490
Waste	—	—	—	—	—	—	—	—	—	—	—	15.5	0.00	15.5	1.55	0.00	—	54.1
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00
Total	0.04	0.04	0.05	0.36	< 0.005	< 0.005	0.14	0.14	< 0.005	0.04	0.04	25.7	576	602	2.67	0.04	0.03	681
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.01	0.01	0.01	0.07	< 0.005	< 0.005	0.03	0.03	< 0.005	0.01	0.01	—	22.3	22.3	< 0.005	< 0.005	0.01	22.7
Area	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Energy	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Water	—	—	—	—	—	—	—	—	—	—	—	1.70	73.1	74.7	0.19	0.01	—	81.1
Waste	—	—	—	—	—	—	—	—	—	—	—	2.56	0.00	2.56	0.26	0.00	—	8.96
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00
Total	0.01	0.01	0.01	0.07	< 0.005	< 0.005	0.03	0.03	< 0.005	0.01	0.01	4.26	95.4	99.7	0.44	0.01	0.01	113

3. Construction Emissions Details

3.1. Installation of Flow Gage (2027) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.16	0.16	0.83	8.41	0.02	0.03	—	0.03	0.03	—	0.03	—	1,691	1,691	0.07	0.01	—	1,697
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.02	0.23	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	46.3	46.3	< 0.005	< 0.005	—	46.5
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	< 0.005	0.04	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	7.67	7.67	< 0.005	< 0.005	—	7.70
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.06	0.06	0.03	0.47	0.00	0.00	0.08	0.08	0.00	0.02	0.02	—	87.2	87.2	< 0.005	< 0.005	0.28	88.6
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	2.20	2.20	< 0.005	< 0.005	< 0.005	2.23
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.36	0.36	< 0.005	< 0.005	< 0.005	0.37
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.3. Smalley Cove Improvements (2028) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.07	0.65	4.24	0.01	0.01	—	0.01	0.01	—	0.01	—	816	816	0.03	0.01	—	819
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipm ent	< 0.005	< 0.005	0.01	0.07	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	13.4	13.4	< 0.005	< 0.005	—	13.5
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipm ent	< 0.005	< 0.005	< 0.005	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	2.22	2.22	< 0.005	< 0.005	—	2.23
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.06	0.05	0.02	0.44	0.00	0.00	0.08	0.08	0.00	0.02	0.02	—	85.5	85.5	< 0.005	< 0.005	0.25	86.9
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	1.29	1.29	< 0.005	< 0.005	< 0.005	1.31
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.21	0.21	< 0.005	< 0.005	< 0.005	0.22
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.5. Upgrade to Dam (2028) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.06	0.05	0.02	0.44	0.00	0.00	0.08	0.08	0.00	0.02	0.02	—	85.5	85.5	< 0.005	< 0.005	0.25	86.9
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.05	0.05	0.03	0.36	0.00	0.00	0.08	0.08	0.00	0.02	0.02	—	75.9	75.9	< 0.005	< 0.005	0.01	77.2
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	< 0.005	0.05	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	10.3	10.3	< 0.005	< 0.005	0.01	10.5
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	1.71	1.71	< 0.005	< 0.005	< 0.005	1.74
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.7. Vista Day Area Construction (2030) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.12	0.12	0.91	7.06	0.02	0.02	—	0.02	0.02	—	0.02	—	1,337	1,337	0.05	0.01	—	1,342
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipm ent	0.01	0.01	0.06	0.48	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	91.6	91.6	< 0.005	< 0.005	—	91.9
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipm ent	< 0.005	< 0.005	0.01	0.09	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	15.2	15.2	< 0.005	< 0.005	—	15.2
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.05	0.05	0.02	0.38	0.00	0.00	0.08	0.08	0.00	0.02	0.02	—	82.4	82.4	< 0.005	< 0.005	0.20	83.0
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.02	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	5.20	5.20	< 0.005	< 0.005	0.01	5.28
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.86	0.86	< 0.005	< 0.005	< 0.005	0.87
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.9. Trail Segment Reconstruction (2030) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.28	0.28	1.46	15.2	0.03	0.06	—	0.06	0.06	—	0.06	—	2,975	2,975	0.12	0.02	—	2,985
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.02	0.21	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	40.7	40.7	< 0.005	< 0.005	—	40.9
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	< 0.005	0.04	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	6.75	6.75	< 0.005	< 0.005	—	6.77
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Worker	0.05	0.05	0.02	0.38	0.00	0.00	0.08	0.08	0.00	0.02	0.02	—	82.4	82.4	< 0.005	< 0.005	0.20	83.0
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	1.04	1.04	< 0.005	< 0.005	< 0.005	1.06
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.17	0.17	< 0.005	< 0.005	< 0.005	0.17
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.11. K1 Powerhouse (2036) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.54	1.54	8.02	80.4	0.15	0.31	—	0.31	0.31	—	0.31	—	16,346	16,346	0.66	0.13	—	16,402
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.07	0.35	3.52	0.01	0.01	—	0.01	0.01	—	0.01	—	717	717	0.03	0.01	—	719
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.06	0.64	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	119	119	< 0.005	< 0.005	—	119
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.01	0.28	0.00	0.00	0.08	0.08	0.00	0.02	0.02	—	76.0	76.0	< 0.005	< 0.005	0.09	76.4
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	3.07	3.07	< 0.005	< 0.005	< 0.005	3.08
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.51	0.51	< 0.005	< 0.005	< 0.005	0.51
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

4. Operations Emissions Details

4.1. Mobile Emissions by Land Use

4.1.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Heavy Industry	0.06	0.05	0.06	0.62	< 0.005	< 0.005	0.20	0.20	< 0.005	0.05	0.05	—	201	201	< 0.005	0.01	0.11	204
Total	0.06	0.05	0.06	0.62	< 0.005	< 0.005	0.20	0.20	< 0.005	0.05	0.05	—	201	201	< 0.005	0.01	0.11	204
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Heavy Industry	0.06	0.05	0.07	0.49	< 0.005	< 0.005	0.20	0.20	< 0.005	0.05	0.05	—	184	184	< 0.005	0.01	< 0.005	187
Total	0.06	0.05	0.07	0.49	< 0.005	< 0.005	0.20	0.20	< 0.005	0.05	0.05	—	184	184	< 0.005	0.01	< 0.005	187
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Heavy Industry	0.01	0.01	0.01	0.07	< 0.005	< 0.005	0.03	0.03	< 0.005	0.01	0.01	—	22.3	22.3	< 0.005	< 0.005	0.01	22.7
Total	0.01	0.01	0.01	0.07	< 0.005	< 0.005	0.03	0.03	< 0.005	0.01	0.01	—	22.3	22.3	< 0.005	< 0.005	0.01	22.7

4.2. Energy

4.2.1. Electricity Emissions By Land Use - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Heavy Industry	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Heavy Industry	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Heavy Industry	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00

4.2.3. Natural Gas Emissions By Land Use - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Heavy Industry	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Heavy Industry	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Heavy Industry	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00

4.3. Area Emissions by Source

4.3.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Source	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	0.00	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.00	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	0.00	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.00	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	0.00	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	0.00	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.00	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00

4.4. Water Emissions by Land Use

4.4.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

General Heavy Industry	—	—	—	—	—	—	—	—	—	—	—	10.3	441	451	1.12	0.03	—	490
Total	—	—	—	—	—	—	—	—	—	—	—	10.3	441	451	1.12	0.03	—	490
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Heavy Industry	—	—	—	—	—	—	—	—	—	—	—	10.3	441	451	1.12	0.03	—	490
Total	—	—	—	—	—	—	—	—	—	—	—	10.3	441	451	1.12	0.03	—	490
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Heavy Industry	—	—	—	—	—	—	—	—	—	—	—	1.70	73.1	74.7	0.19	0.01	—	81.1
Total	—	—	—	—	—	—	—	—	—	—	—	1.70	73.1	74.7	0.19	0.01	—	81.1

4.5. Waste Emissions by Land Use

4.5.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Heavy Industry	—	—	—	—	—	—	—	—	—	—	—	15.5	0.00	15.5	1.55	0.00	—	54.1
Total	—	—	—	—	—	—	—	—	—	—	—	15.5	0.00	15.5	1.55	0.00	—	54.1
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

General Heavy Industry	—	—	—	—	—	—	—	—	—	—	—	15.5	0.00	15.5	1.55	0.00	—	54.1
Total	—	—	—	—	—	—	—	—	—	—	—	15.5	0.00	15.5	1.55	0.00	—	54.1
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Heavy Industry	—	—	—	—	—	—	—	—	—	—	—	2.56	0.00	2.56	0.26	0.00	—	8.96
Total	—	—	—	—	—	—	—	—	—	—	—	2.56	0.00	2.56	0.26	0.00	—	8.96

4.6. Refrigerant Emissions by Land Use

4.6.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Heavy Industry	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Heavy Industry	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Heavy Industry	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00

Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00
-------	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	------	------

4.7. Offroad Emissions By Equipment Type

4.7.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipm ent Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.8. Stationary Emissions By Equipment Type

4.8.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipm ent Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.9. User Defined Emissions By Equipment Type

4.9.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipm ent Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10. Soil Carbon Accumulation By Vegetation Type

4.10.1. Soil Carbon Accumulation By Vegetation Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Vegetati on	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
-------------	-----	-----	-----	----	-----	-------	-------	-------	--------	--------	--------	------	-------	------	-----	-----	---	------

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.2. Above and Belowground Carbon Accumulation by Land Use Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.3. Avoided and Sequestered Emissions by Species - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Species	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

5. Activity Data

5.1. Construction Schedule

Phase Name	Phase Type	Start Date	End Date	Days Per Week	Work Days per Phase	Phase Description
Installation of Flow Gage	Building Construction	8/2/2027	8/13/2027	5.00	10.0	—
Smalley Cove Improvements	Building Construction	8/7/2028	8/14/2028	5.00	6.00	—
Upgrade to Dam	Building Construction	9/4/2028	11/8/2028	5.00	48.0	—
Vista Day Area Construction	Building Construction	8/5/2030	9/6/2030	5.00	25.0	—
Trail Segment Reconstruction	Building Construction	8/5/2030	8/9/2030	5.00	5.00	—
K1 Powerhouse	Building Construction	4/7/2036	4/28/2036	5.00	16.0	—

5.2. Off-Road Equipment

5.2.1. Unmitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Installation of Flow Gage	Off-Highway Trucks	Diesel	Tier 4 Final	1.00	8.00	376	0.38
Installation of Flow Gage	Other General Industrial Equipment	Diesel	Tier 4 Final	1.00	2.50	367	0.29
Installation of Flow Gage	Tractors/Loaders/Back hoes	Diesel	Tier 4 Final	1.00	2.50	82.0	0.20
Smalley Cove Improvements	Dumpers/Tenders	Diesel	Tier 4 Final	1.00	1.30	84.0	0.37
Smalley Cove Improvements	Graders	Diesel	Tier 4 Final	1.00	2.70	367	0.29
Smalley Cove Improvements	Off-Highway Trucks	Diesel	Tier 4 Final	1.00	8.00	82.0	0.20

Smalley Cove Improvements	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	5.30	14.0	0.74
Smalley Cove Improvements	Tractors/Loaders/Back hoes	Diesel	Tier 4 Final	1.00	2.70	46.0	0.45
Smalley Cove Improvements	Tractors/Loaders/Back hoes	Diesel	Tier 4 Final	1.00	2.70	84.0	0.37
Smalley Cove Improvements	Plate Compactors	Diesel	Tier 4 Final	1.00	2.70	8.00	0.43
Vista Day Area Construction	Dumpers/Tenders	Diesel	Tier 4 Final	2.00	3.20	367	0.29
Vista Day Area Construction	Excavators	Diesel	Tier 4 Final	1.00	1.30	82.0	0.20
Vista Day Area Construction	Graders	Diesel	Tier 4 Final	1.00	1.60	14.0	0.74
Vista Day Area Construction	Off-Highway Trucks	Diesel	Tier 4 Final	1.00	8.00	84.0	0.37
Vista Day Area Construction	Other Construction Equipment	Diesel	Tier 4 Final	1.00	0.60	46.0	0.45
Vista Day Area Construction	Pavers	Diesel	Tier 4 Final	1.00	0.60	81.0	0.42
Vista Day Area Construction	Plate Compactors	Diesel	Tier 4 Final	1.00	1.60	8.00	0.43
Vista Day Area Construction	Skid Steer Loaders	Diesel	Tier 4 Final	1.00	1.60	71.0	0.37
Vista Day Area Construction	Tractors/Loaders/Back hoes	Diesel	Tier 4 Final	1.00	1.30	84.0	0.37
Trail Segment Reconstruction	Off-Highway Trucks	Diesel	Tier 4 Final	2.00	8.00	376	0.38
Trail Segment Reconstruction	Other General Industrial Equipment	Diesel	Tier 4 Final	2.00	8.00	82.0	0.20
K1 Powerhouse	Cranes	Diesel	Tier 4 Final	1.00	2.00	367	0.29
K1 Powerhouse	Off-Highway Trucks	Diesel	Tier 4 Final	16.0	6.00	376	0.38
K1 Powerhouse	Off-Highway Trucks	Diesel	Tier 4 Final	2.00	0.50	14.0	0.74

K1 Powerhouse	Other General Industrial Equipment	Diesel	Tier 4 Final	1.00	2.00	84.0	0.37
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5.3. Construction Vehicles

5.3.1. Unmitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Upgrade to Dam	—	—	—	—
Upgrade to Dam	Worker	15.0	7.70	LDA,LDT1,LDT2
Upgrade to Dam	Vendor	0.00	4.00	HHDT,MHDT
Upgrade to Dam	Hauling	0.00	20.0	HHDT
Upgrade to Dam	Onsite truck	—	—	HHDT
Smalley Cove Improvements	—	—	—	—
Smalley Cove Improvements	Worker	15.0	7.70	LDA,LDT1,LDT2
Smalley Cove Improvements	Vendor	0.00	4.00	HHDT,MHDT
Smalley Cove Improvements	Hauling	0.00	20.0	HHDT
Smalley Cove Improvements	Onsite truck	—	—	HHDT
Installation of Flow Gage	—	—	—	—
Installation of Flow Gage	Worker	15.0	7.70	LDA,LDT1,LDT2
Installation of Flow Gage	Vendor	0.00	4.00	HHDT,MHDT
Installation of Flow Gage	Hauling	0.00	20.0	HHDT
Installation of Flow Gage	Onsite truck	—	—	HHDT
Vista Day Area Construction	—	—	—	—
Vista Day Area Construction	Worker	15.0	7.70	LDA,LDT1,LDT2
Vista Day Area Construction	Vendor	0.00	4.00	HHDT,MHDT
Vista Day Area Construction	Hauling	0.00	20.0	HHDT
Vista Day Area Construction	Onsite truck	—	—	HHDT
Trail Segment Reconstruction	—	—	—	—
Trail Segment Reconstruction	Worker	15.0	7.70	LDA,LDT1,LDT2

Trail Segment Reconstruction	Vendor	0.00	4.00	HHDT,MHDT
Trail Segment Reconstruction	Hauling	0.00	20.0	HHDT
Trail Segment Reconstruction	Onsite truck	—	—	HHDT
K1 Powerhouse	—	—	—	—
K1 Powerhouse	Worker	15.0	7.70	LDA,LDT1,LDT2
K1 Powerhouse	Vendor	0.00	4.00	HHDT,MHDT
K1 Powerhouse	Hauling	0.00	20.0	HHDT
K1 Powerhouse	Onsite truck	—	—	HHDT

5.4. Vehicles

5.4.1. Construction Vehicle Control Strategies

Non-applicable. No control strategies activated by user.

5.5. Architectural Coatings

Phase Name	Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)
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5.6. Dust Mitigation

5.6.1. Construction Earthmoving Activities

Phase Name	Material Imported (cy)	Material Exported (cy)	Acres Graded (acres)	Material Demolished (sq. ft.)	Acres Paved (acres)
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5.6.2. Construction Earthmoving Control Strategies

Non-applicable. No control strategies activated by user.

5.7. Construction Paving

Land Use	Area Paved (acres)	% Asphalt
General Heavy Industry	0.00	0%

5.8. Construction Electricity Consumption and Emissions Factors

kWh per Year and Emission Factor (lb/MWh)

Year	kWh per Year	CO2	CH4	N2O
2028	0.00	204	0.03	< 0.005
2030	0.00	204	0.03	< 0.005
2036	0.00	204	0.03	< 0.005
2027	0.00	204	0.03	< 0.005

5.9. Operational Mobile Sources

5.9.1. Unmitigated

Land Use Type	Trips/Weekday	Trips/Saturday	Trips/Sunday	Trips/Year	VMT/Weekday	VMT/Saturday	VMT/Sunday	VMT/Year
General Heavy Industry	23.1	0.00	0.00	6,031	288	0.00	0.00	75,027

5.10. Operational Area Sources

5.10.1. Hearths

5.10.1.1. Unmitigated

5.10.2. Architectural Coatings

Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)
0	0.00	0.00	0.00	—

5.10.3. Landscape Equipment

Season	Unit	Value
Snow Days	day/yr	0.00

Summer Days	day/yr	180
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5.11. Operational Energy Consumption

5.11.1. Unmitigated

Electricity (kWh/yr) and CO2 and CH4 and N2O and Natural Gas (kBTU/yr)

Land Use	Electricity (kWh/yr)	CO2	CH4	N2O	Natural Gas (kBTU/yr)
General Heavy Industry	0.00	204	0.0330	0.0040	0.00

5.12. Operational Water and Wastewater Consumption

5.12.1. Unmitigated

Land Use	Indoor Water (gal/year)	Outdoor Water (gal/year)
General Heavy Industry	5,349,738	317,574,909

5.13. Operational Waste Generation

5.13.1. Unmitigated

Land Use	Waste (ton/year)	Cogeneration (kWh/year)
General Heavy Industry	28.7	—

5.14. Operational Refrigeration and Air Conditioning Equipment

5.14.1. Unmitigated

Land Use Type	Equipment Type	Refrigerant	GWP	Quantity (kg)	Operations Leak Rate	Service Leak Rate	Times Serviced
General Heavy Industry	Other commercial A/C and heat pumps	R-410A	2,088	0.30	4.00	4.00	18.0

5.15. Operational Off-Road Equipment

5.15.1. Unmitigated

Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
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5.16. Stationary Sources

5.16.1. Emergency Generators and Fire Pumps

Equipment Type	Fuel Type	Number per Day	Hours per Day	Hours per Year	Horsepower	Load Factor
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5.16.2. Process Boilers

Equipment Type	Fuel Type	Number	Boiler Rating (MMBtu/hr)	Daily Heat Input (MMBtu/day)	Annual Heat Input (MMBtu/yr)
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5.17. User Defined

Equipment Type	Fuel Type
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5.18. Vegetation

5.18.1. Land Use Change

5.18.1.1. Unmitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres
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5.18.1. Biomass Cover Type

5.18.1.1. Unmitigated

Biomass Cover Type	Initial Acres	Final Acres
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5.18.2. Sequestration

5.18.2.1. Unmitigated

Tree Type	Number	Electricity Saved (kWh/year)	Natural Gas Saved (btu/year)
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6. Climate Risk Detailed Report

6.1. Climate Risk Summary

Cal-Adapt midcentury 2040–2059 average projections for four hazards are reported below for your project location. These are under Representation Concentration Pathway (RCP) 8.5 which assumes GHG emissions will continue to rise strongly through 2050 and then plateau around 2100.

Climate Hazard	Result for Project Location	Unit
Temperature and Extreme Heat	36.0	annual days of extreme heat
Extreme Precipitation	9.85	annual days with precipitation above 20 mm
Sea Level Rise	0.00	meters of inundation depth
Wildfire	21.4	annual hectares burned

Temperature and Extreme Heat data are for grid cell in which your project are located. The projection is based on the 98th historical percentile of daily maximum/minimum temperatures from observed historical data (32 climate model ensemble from Cal-Adapt, 2040–2059 average under RCP 8.5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.

Extreme Precipitation data are for the grid cell in which your project are located. The threshold of 20 mm is equivalent to about $\frac{3}{4}$ an inch of rain, which would be light to moderate rainfall if received over a full day or heavy rain if received over a period of 2 to 4 hours. Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.

Sea Level Rise data are for the grid cell in which your project are located. The projections are from Radke et al. (2017), as reported in Cal-Adapt (Radke et al., 2017, CEC-500-2017-008), and consider inundation location and depth for the San Francisco Bay, the Sacramento-San Joaquin River Delta and California coast resulting different increments of sea level rise coupled with extreme storm events. Users may select from four scenarios to view the range in potential inundation depth for the grid cell. The four scenarios are: No rise, 0.5 meter, 1.0 meter, 1.41 meters

Wildfire data are for the grid cell in which your project are located. The projections are from UC Davis, as reported in Cal-Adapt (2040–2059 average under RCP 8.5), and consider historical data of climate, vegetation, population density, and large (> 400 ha) fire history. Users may select from four model simulations to view the range in potential wildfire probabilities for the grid cell. The four simulations make different assumptions about expected rainfall and temperature are: Warmer/drier (HadGEM2-ES), Cooler/wetter (CNRM-CM5), Average conditions (CanESM2), Range of different rainfall and temperature possibilities (MIROC5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.

6.2. Initial Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	N/A	N/A	N/A	N/A
Extreme Precipitation	2	0	0	N/A
Sea Level Rise	N/A	N/A	N/A	N/A

Wildfire	1	0	0	N/A
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	0	0	0	N/A
Air Quality Degradation	N/A	N/A	N/A	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.

The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.

The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores do not include implementation of climate risk reduction measures.

6.3. Adjusted Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	N/A	N/A	N/A	N/A
Extreme Precipitation	2	1	1	3
Sea Level Rise	N/A	N/A	N/A	N/A
Wildfire	1	1	1	2
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	1	1	1	2
Air Quality Degradation	N/A	N/A	N/A	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.

The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.

The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores include implementation of climate risk reduction measures.

6.4. Climate Risk Reduction Measures

7. Health and Equity Details

7.1. CalEnviroScreen 4.0 Scores

The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Exposure Indicators	—
AQ-Ozone	84.6
AQ-PM	57.8
AQ-DPM	1.07
Drinking Water	87.5
Lead Risk Housing	23.1
Pesticides	26.4
Toxic Releases	38.8
Traffic	4.86
Effect Indicators	—
CleanUp Sites	18.7
Groundwater	61.9
Haz Waste Facilities/Generators	16.6
Impaired Water Bodies	43.8
Solid Waste	88.9
Sensitive Population	—
Asthma	11.0
Cardio-vascular	5.30
Low Birth Weights	15.7
Socioeconomic Factor Indicators	—
Education	43.4
Housing	2.99
Linguistic	2.81
Poverty	39.2
Unemployment	—

7.2. Healthy Places Index Scores

The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Economic	—
Above Poverty	65.59733094
Employed	22.03259335
Median HI	44.10368279
Education	—
Bachelor's or higher	57.08969588
High school enrollment	100
Preschool enrollment	51.87989221
Transportation	—
Auto Access	85.40998332
Active commuting	4.093417169
Social	—
2-parent households	73.98947774
Voting	75.77312973
Neighborhood	—
Alcohol availability	93.4813294
Park access	16.97677403
Retail density	3.592968048
Supermarket access	25.15077634
Tree canopy	89.84986526
Housing	—
Homeownership	81.26523803
Housing habitability	83.93430001
Low-inc homeowner severe housing cost burden	61.94020275
Low-inc renter severe housing cost burden	83.11305017

Uncrowded housing	75.52932119
Health Outcomes	—
Insured adults	62.95393302
Arthritis	0.0
Asthma ER Admissions	90.8
High Blood Pressure	0.0
Cancer (excluding skin)	0.0
Asthma	0.0
Coronary Heart Disease	0.0
Chronic Obstructive Pulmonary Disease	0.0
Diagnosed Diabetes	0.0
Life Expectancy at Birth	22.0
Cognitively Disabled	25.4
Physically Disabled	37.2
Heart Attack ER Admissions	93.6
Mental Health Not Good	0.0
Chronic Kidney Disease	0.0
Obesity	0.0
Pedestrian Injuries	74.1
Physical Health Not Good	0.0
Stroke	0.0
Health Risk Behaviors	—
Binge Drinking	0.0
Current Smoker	0.0
No Leisure Time for Physical Activity	0.0
Climate Change Exposures	—
Wildfire Risk	1.8
SLR Inundation Area	0.0

Children	65.5
Elderly	12.6
English Speaking	92.2
Foreign-born	4.1
Outdoor Workers	37.8
Climate Change Adaptive Capacity	—
Impervious Surface Cover	99.1
Traffic Density	3.6
Traffic Access	0.0
Other Indices	—
Hardship	40.2
Other Decision Support	—
2016 Voting	74.3

7.3. Overall Health & Equity Scores

Metric	Result for Project Census Tract
CalEnviroScreen 4.0 Score for Project Location (a)	10.0
Healthy Places Index Score for Project Location (b)	55.0
Project Located in a Designated Disadvantaged Community (Senate Bill 535)	No
Project Located in a Low-Income Community (Assembly Bill 1550)	No
Project Located in a Community Air Protection Program Community (Assembly Bill 617)	No

a: The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.

b: The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

7.4. Health & Equity Measures

No Health & Equity Measures selected.

7.5. Evaluation Scorecard

Health & Equity Evaluation Scorecard not completed.

7.6. Health & Equity Custom Measures

No Health & Equity Custom Measures created.

8. User Changes to Default Data

Screen	Justification
Land Use	per project description
Construction: Construction Phases	Per Project Description
Construction: Off-Road Equipment	per project description
Construction: Architectural Coatings	project description
Operations: Vehicle Data	project description
Construction: Trips and VMT	project description

Appendix D3

Construction Equipment Usage and Workforce

Construction Equipment Usage and Workforce

Tasks/Equipment	Estimated Horsepower	Probable Fuel Type	Equipment Quantity	Estimated Days per Week of Operation	Estimated Hours per Day of Operation	Estimated Duration of Use (weeks)	Estimated Month Start
Smalley Cove Improvements							
Grader			1	2	8	1	August 2028
Backhoe			1	2	8	1	August 2028
Skid-Steer			1	4	8	1	August 2028
Compactor			1	2	8	1	August 2028
Dump Truck			1	1	8	1	August 2028
Work Truck			1	3	8	2	August 2028
Chainsaw			1	2	8	1	August 2028
Construction of Vista Day Use Area (Paved Roadwork, Picnic Sites, Restroom, Bulletin Board, Signage, Paved Parking Area, Iron Ranger, Gates, Fencing, Barriers)							
Grader			1	5	8	1	August 2030
Excavator			1	4	8	1	August 2030
Backhoe			1	4	8	1	August 2030
Skid-Steer			1	5	8	1	August 2030
Compactor			1	5	8	1	August 2030
Paver			1	2	8	1	August 2030
Asphalt Roller			1	2	8	1	August 2030
Dump Truck			2	5	8	2	August 2030
Work Truck			1	5	8	5	August 2030
Trail Segment Reconstruction at Vista Day Use Area							
Crewcab	310	Gas	2	5	8	1	August 2030
Chainshaws			2	5	8	1	August 2030

Tasks/Equipment	Estimated Horsepower	Probable Fuel Type	Equipment Quantity	Estimated Days per Week of Operation	Estimated Hours per Day of Operation	Estimated Duration of Use (weeks)	Estimated Month Start
Installation of One New Flow Gage							
Pickup Truck	250	Gas	1	5	8	2	August 2027
Potential Digger for Conduit Underground (small)			1	5	5	1	August 2027
Backhole (small)			1	5	5	1	August 2027
Upgrade of Two Manual Radial Gates on the Dam							
Boat Ride (5 trips/day for 3 months)			1 boat	4	5	12	September 2028
Helicopter Trip with Equipment			1 ship	4	4	2	September 2028
K1 Powerhouse Proposed Modification/Retirement Actions							
Helicopter (K1 Tunnel Underground)			1 ship	4	4	4	April 2036
Crewcab (K1 Surge Chamber)	310	Gas	1	4	8	2	May 2036
Concrete Truck			1	1	8	1	May 2036
Crewcab (K1 Headworks)	310	Gas	10	4	8	4	June 2036
Crane			1	4	8	1	June 2036
Large Semi to Haul Equipment			1	4	8	1	August 2036
Crewcab (K1 Powerhouse)	310	Gas	5	4	8	2	October 2036
Concrete Truck			1	2	8	1	October 2036

Appendix E

Biological Resources – Terrestrial Data

Appendix E1

IPaC Resources List

Appendix E-1

This summary was prepared to improve document accessibility and compliance with Section 508 of the Rehabilitation Act. It is based on information contained in a longer technical record search report. The summary is intended for informational purposes only and does not replace or supersede the original source document.

To request the source document, please contact:

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This information was developed using the United States Fish and Wildlife Information for Planning and Consultation tool (IPaC).

Biological Resources Record Search Results

E-1.1 INTRODUCTION

This appendix presents the results of biological resources record searches conducted for the proposed project. The purpose of the record search is to identify special-status plant and wildlife species, sensitive natural communities, wetlands, and other regulated biological resources that may occur within or adjacent to the project area and that could be affected by project implementation.

The record search provides a screening-level assessment to inform the environmental impact analysis, identify the need for focused field surveys, and support compliance with applicable federal, state, and local environmental regulations, including the California Environmental Quality Act (CEQA).

E-1.2 PROJECT AREA

The project is located in Fresno and Madera Counties, California. The record search area includes the project footprint and surrounding vicinity where direct or indirect effects could occur as a result of project activities.

Federal biological resources within the project area fall under the jurisdiction of the U.S. Fish and Wildlife Service (USFWS), Sacramento Fish and Wildlife Office.

E-1.3 DATA SOURCES AND METHODS

The biological resources record search was conducted using the following databases and information sources:

- U.S. Fish and Wildlife Service Information for Planning and Consultation (IPaC) system
- California Natural Diversity Database (CNDDB) and related rare species occurrence records
- National Wetlands Inventory (NWI) mapping
- Other publicly available state and federal biological resource databases

These sources compile known species occurrence records, modeled species ranges, and mapped habitat information. Records may include historic and recent observations and may occur beyond the immediate project footprint.

E-1.4 LIMITATIONS OF RECORD SEARCHES

Biological record searches are subject to the following limitations:

- Records identify potential presence only and do not confirm current on-site conditions.
- Absence of records does not confirm absence of species or habitats.
- Species distributions and site conditions may have changed since records were collected.

Confirmation of biological resources requires site-specific field surveys conducted during appropriate seasons and following agency-approved protocols.

E-1.5 SPECIAL-STATUS WILDLIFE SPECIES

The record search identified numerous special-status wildlife species with potential to occur in the project region. These include species listed or protected under the Federal Endangered Species Act (FESA), California Endangered Species Act (CESA), and other conservation designations.

Federally Listed, Proposed, or Candidate Wildlife Species

Species identified include, but are not limited to:

- California condor (Endangered)
- California red-legged frog (Threatened)
- California tiger salamander (Threatened)
- Foothill yellow-legged frog (Endangered)
- Vernal pool fairy shrimp (Threatened)
- Conservancy fairy shrimp (Endangered)
- Valley elderberry longhorn beetle (Threatened)

Other Special-Status Wildlife Species

Additional species of concern identified in the record search include:

- Northwestern pond turtle (Proposed Threatened)
- Western spadefoot (Proposed Threatened)
- Sierra Nevada red fox (State Threatened and Federally Endangered distinct population segment)
- Pallid bat and other sensitive bat species

Potential occurrence is based on proximity of known records and availability of suitable habitat within the project region.

E-1.6 MIGRATORY BIRDS AND EAGLES

The project area is within the range of migratory birds protected under the Migratory Bird Treaty Act (MBTA), including several Birds of Conservation Concern.

The record search also indicates potential presence of Bald Eagle and Golden Eagle. Both species are protected under the Bald and Golden Eagle Protection Act. Breeding seasons generally occur between January and August, depending on species and environmental conditions.

Project activities occurring during nesting periods may require avoidance buffers or additional coordination with wildlife agencies.

E-1.7 SPECIAL-STATUS PLANT SPECIES

The record search identified numerous special-status plant species with documented occurrences in the region. These include species listed as endangered or threatened and species assigned a California Rare Plant Rank (CRPR).

Examples include:

- Mariposa pussypaws (Federally Threatened)
- Succulent owl's-clover (State and Federally Threatened)
- San Joaquin Valley Orcutt grass (State Endangered and Federally Threatened)
- Abrams' onion
- Tree-anemone

Many identified plant species are associated with chaparral, grassland, woodland, and vernal pool habitats. Presence within the project area would depend on site-specific habitat conditions and survey timing.

E-1.8 WETLANDS AND AQUATIC RESOURCES

National Wetlands Inventory mapping indicates the presence of potential jurisdictional waters in the vicinity of the project area, including:

- Freshwater emergent wetlands
- Freshwater forested and shrub wetlands
- Rivers, streams, and lake features

NWI mapping is approximate and intended for planning purposes only. Formal wetland delineation and jurisdictional determinations would be required to confirm the extent and regulatory status of aquatic resources.

E-1.9 SUMMARY AND RELEVANCE TO CEQA ANALYSIS

The biological resources record search indicates the potential for special-status species, sensitive habitats, and regulated waters to occur within or near the project area. These findings inform:

- The need for focused biological surveys
- Impact assessment under CEQA
- Identification of avoidance, minimization, and mitigation measures
- Coordination with applicable resource agencies

The record search results are incorporated into the Biological Resources section of the Draft Environmental Impact Report and support determinations of significance under CEQA.

Appendix E2

Figures

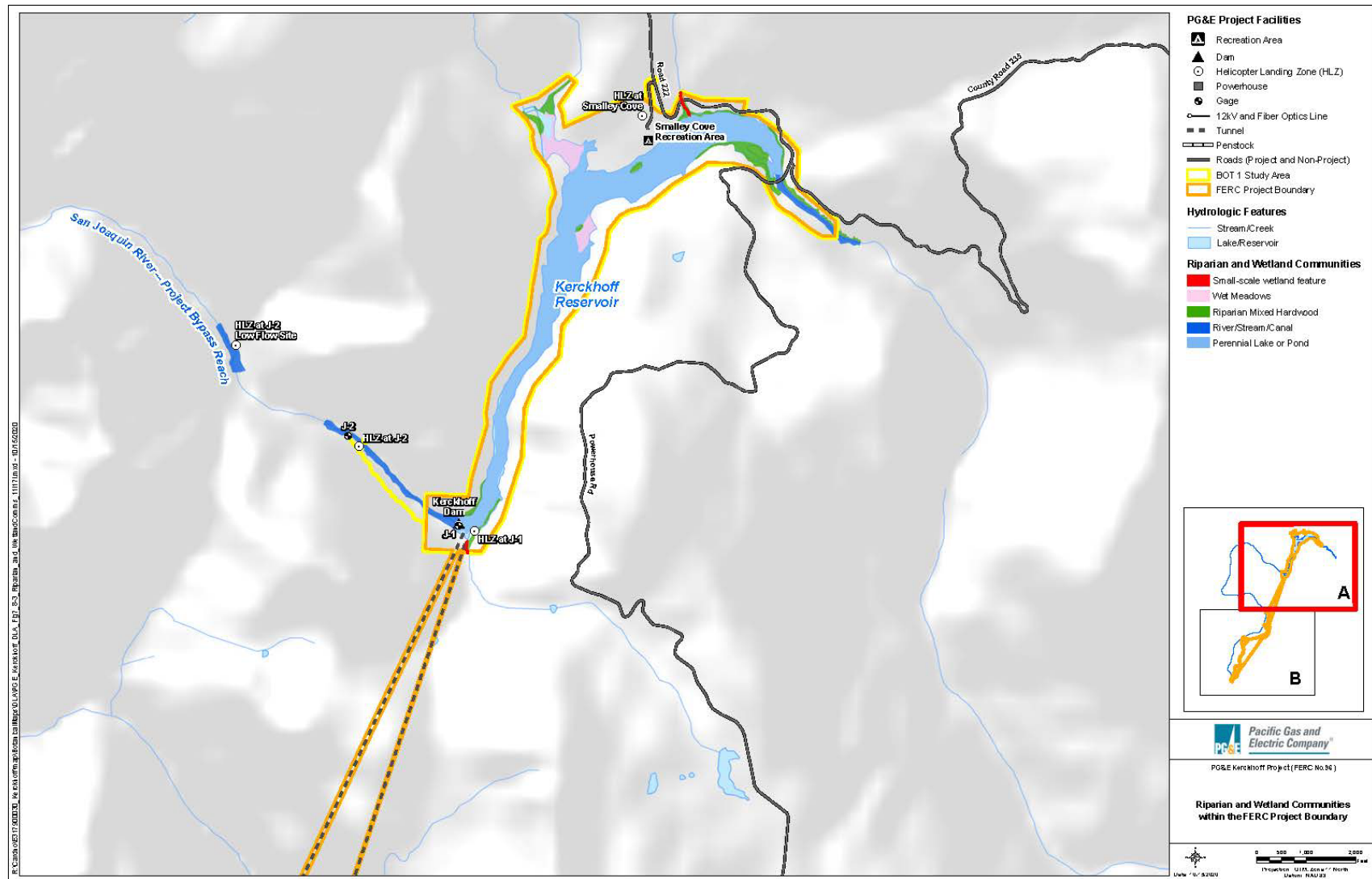


Figure E2-1: Riparian and Wetland Communities within the Existing Hydroelectric Project Boundary (Kerckhoff Reservoir)

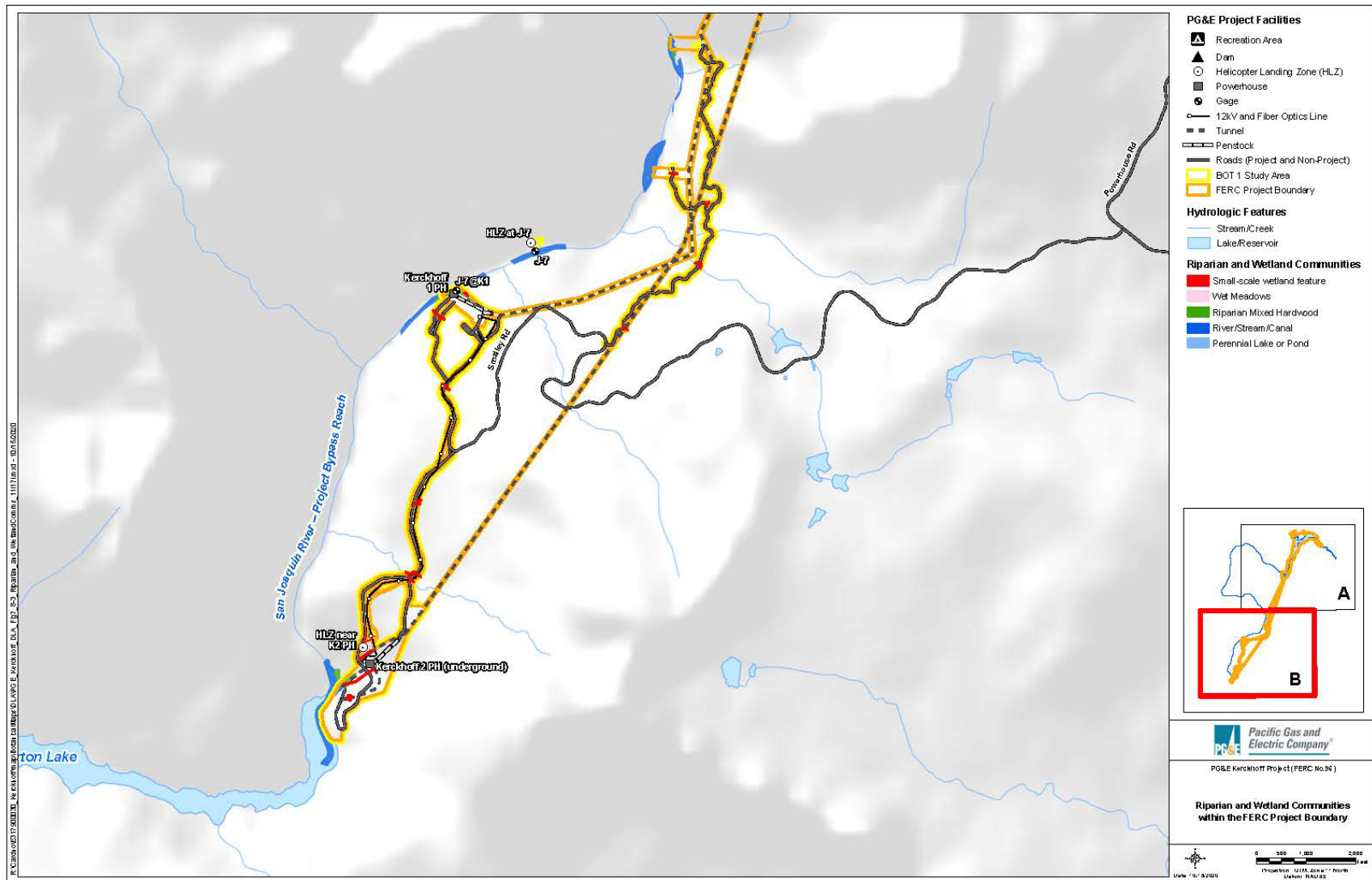


Figure E2-2: Riparian and Wetland Communities within the Existing Hydroelectric Project Boundary (Project Bypass Reach)

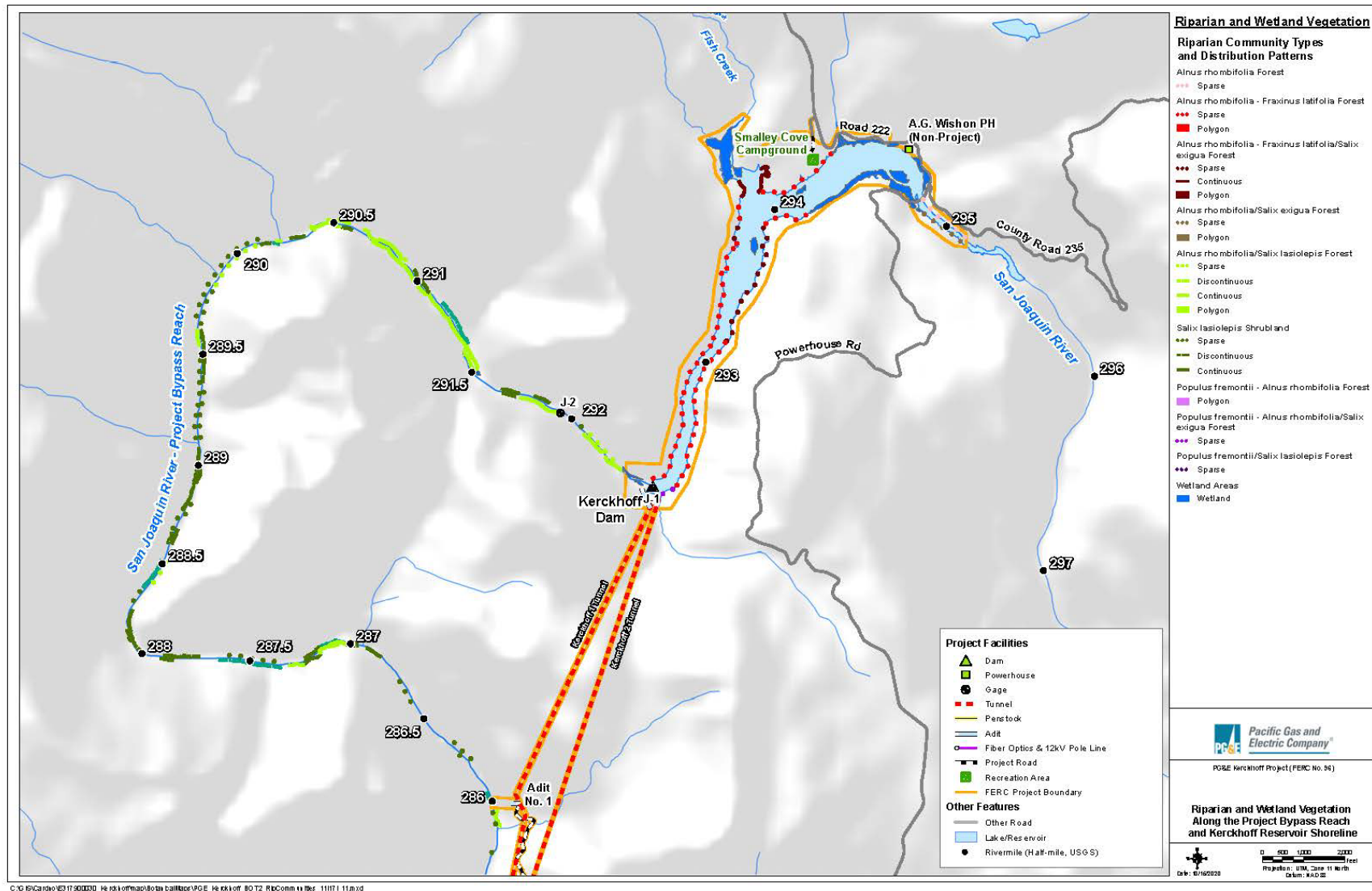


Figure E2-3: Woody Riparian and Wetland Vegetation Along the Kerckhoff Reservoir Shoreline and Northern Portion of the Project Bypass Reach

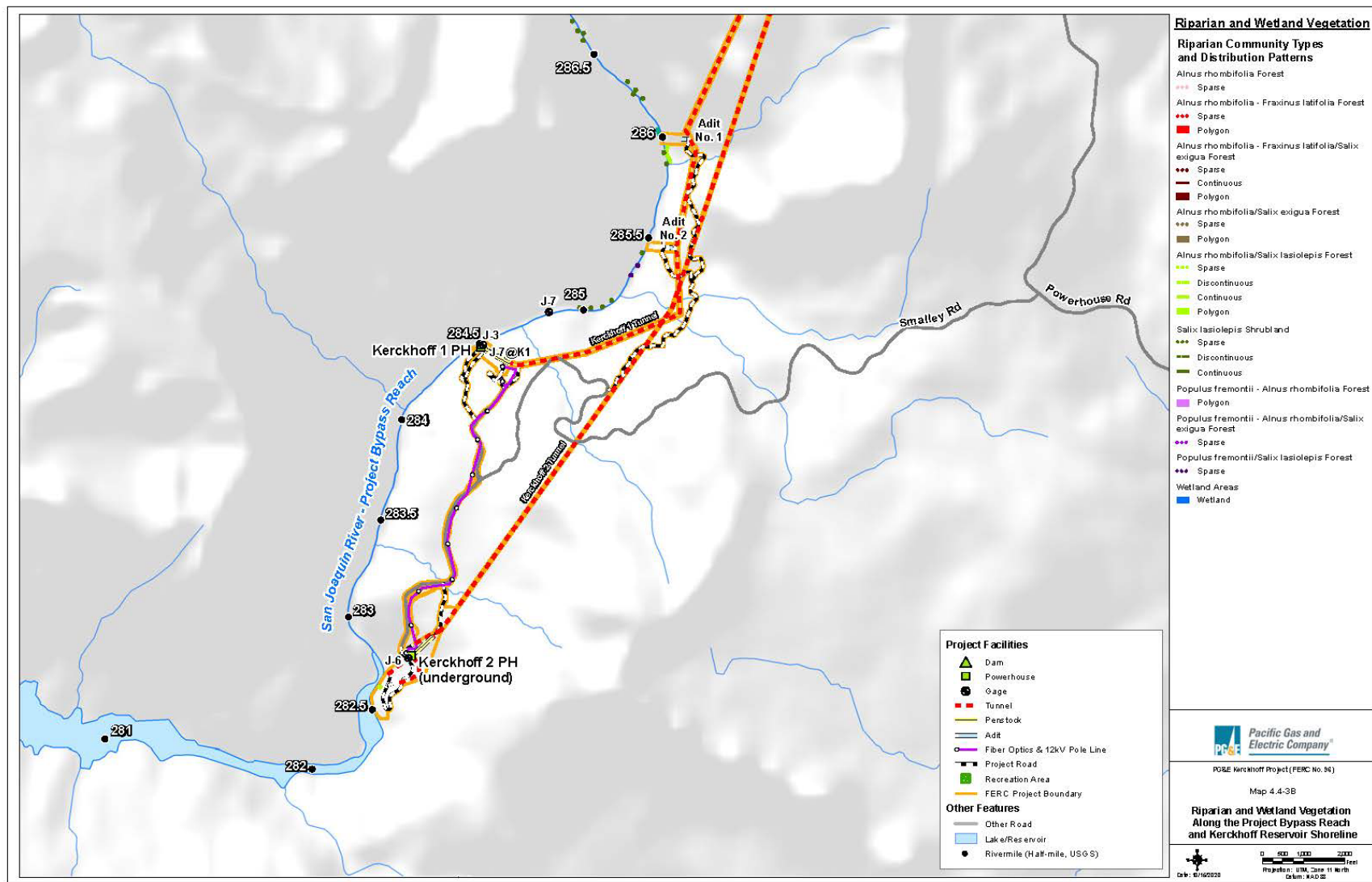


Figure E2-4: Woody Riparian and Wetland Vegetation Along the Southern Portion of the Project Bypass Reach

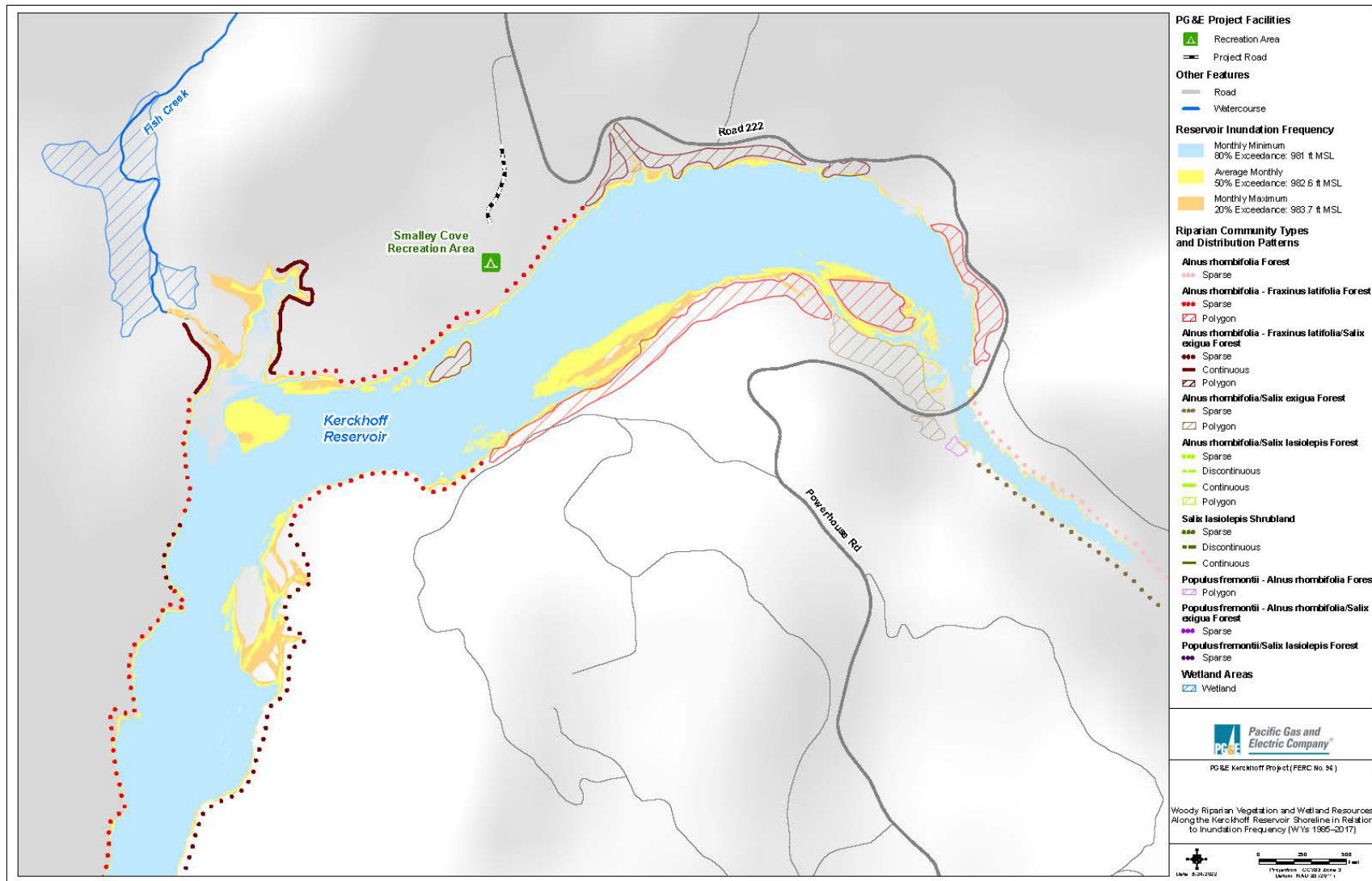


Figure E2-5: Woody Riparian Vegetation and Wetland Resources Along the Kerckhoff Reservoir Shoreline in Relation to Inundation Frequency (Water Years 1985–2017)

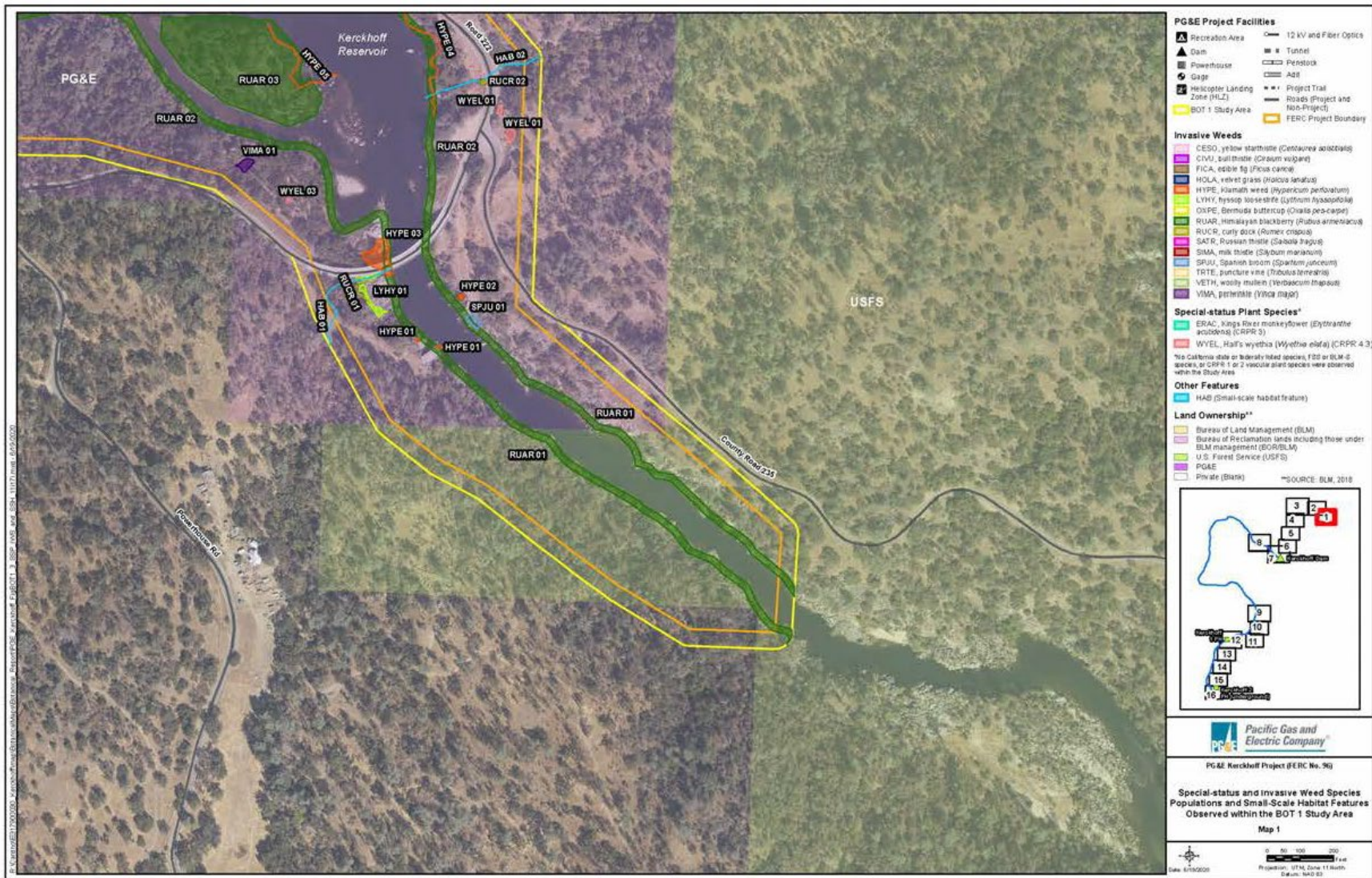


Figure E2-6: Invasive Species, Rare Plant, and Small-Scale Habitat Features Mapping (Map 1)



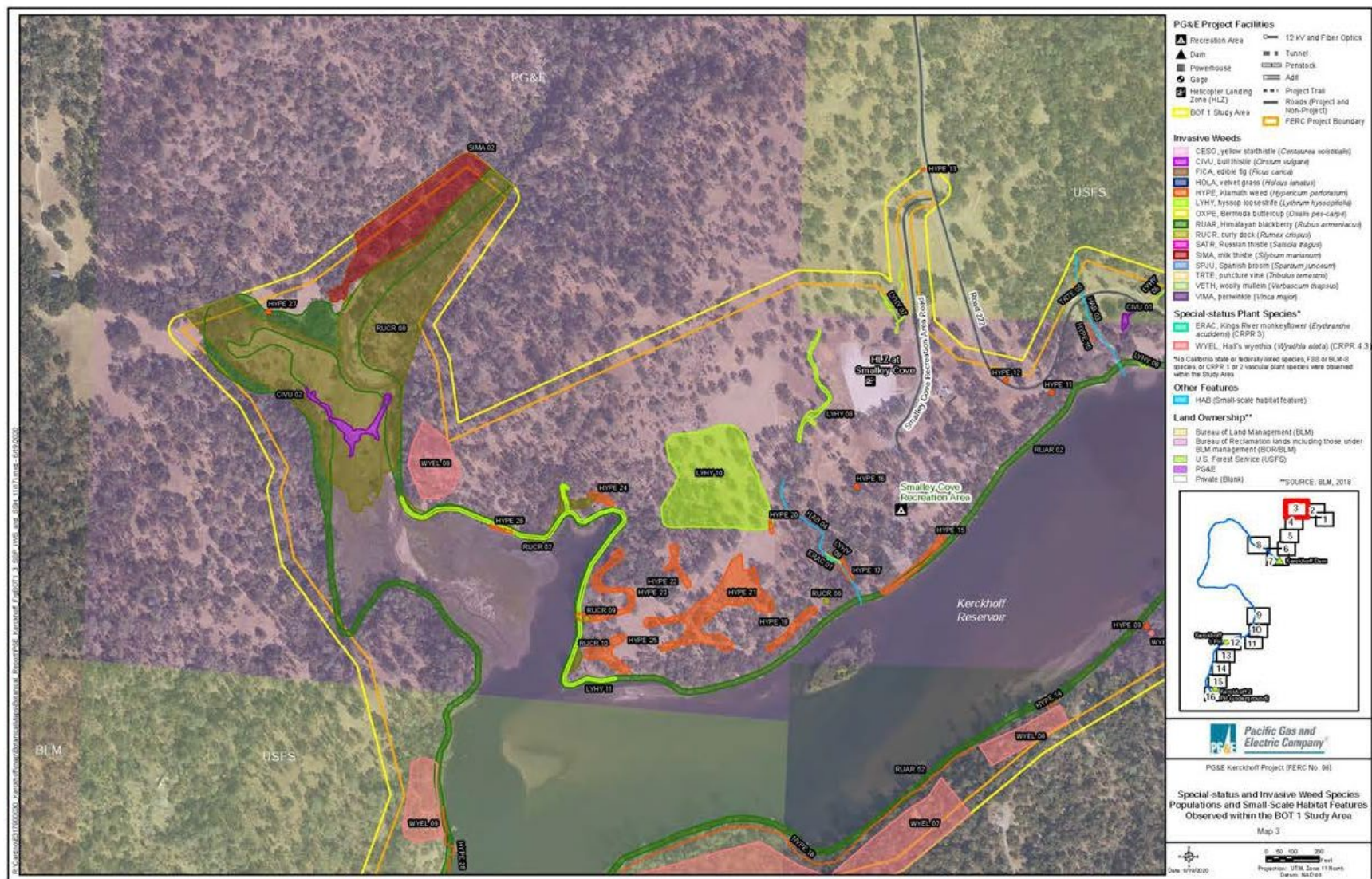


Figure E2-8: Invasive Species, Rare Plant, and Small-Scale Habitat Features Mapping (Map 3)

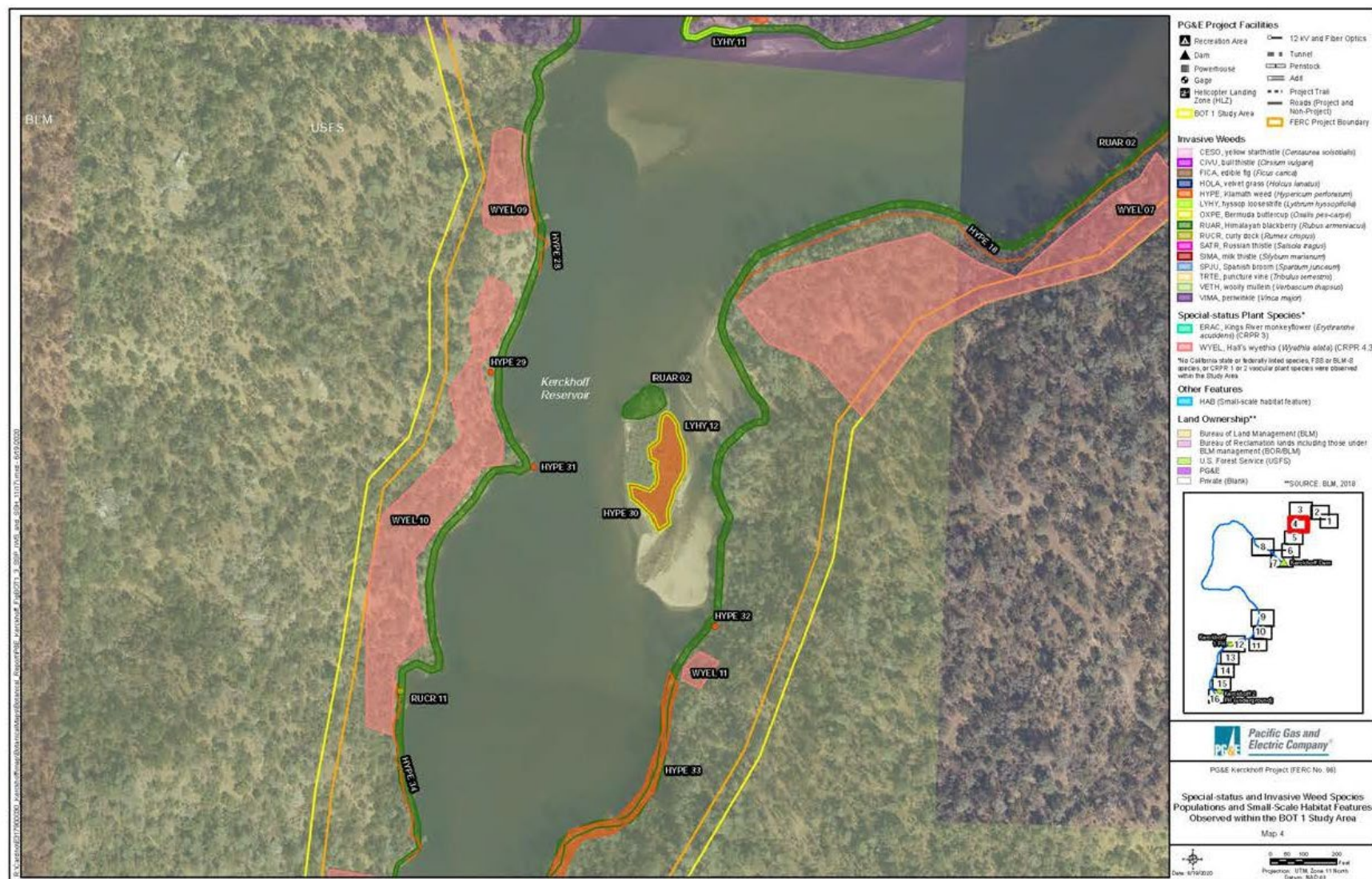


Figure E2-9: Invasive Species, Rare Plant, and Small-Scale Habitat Features Mapping (Map 4)

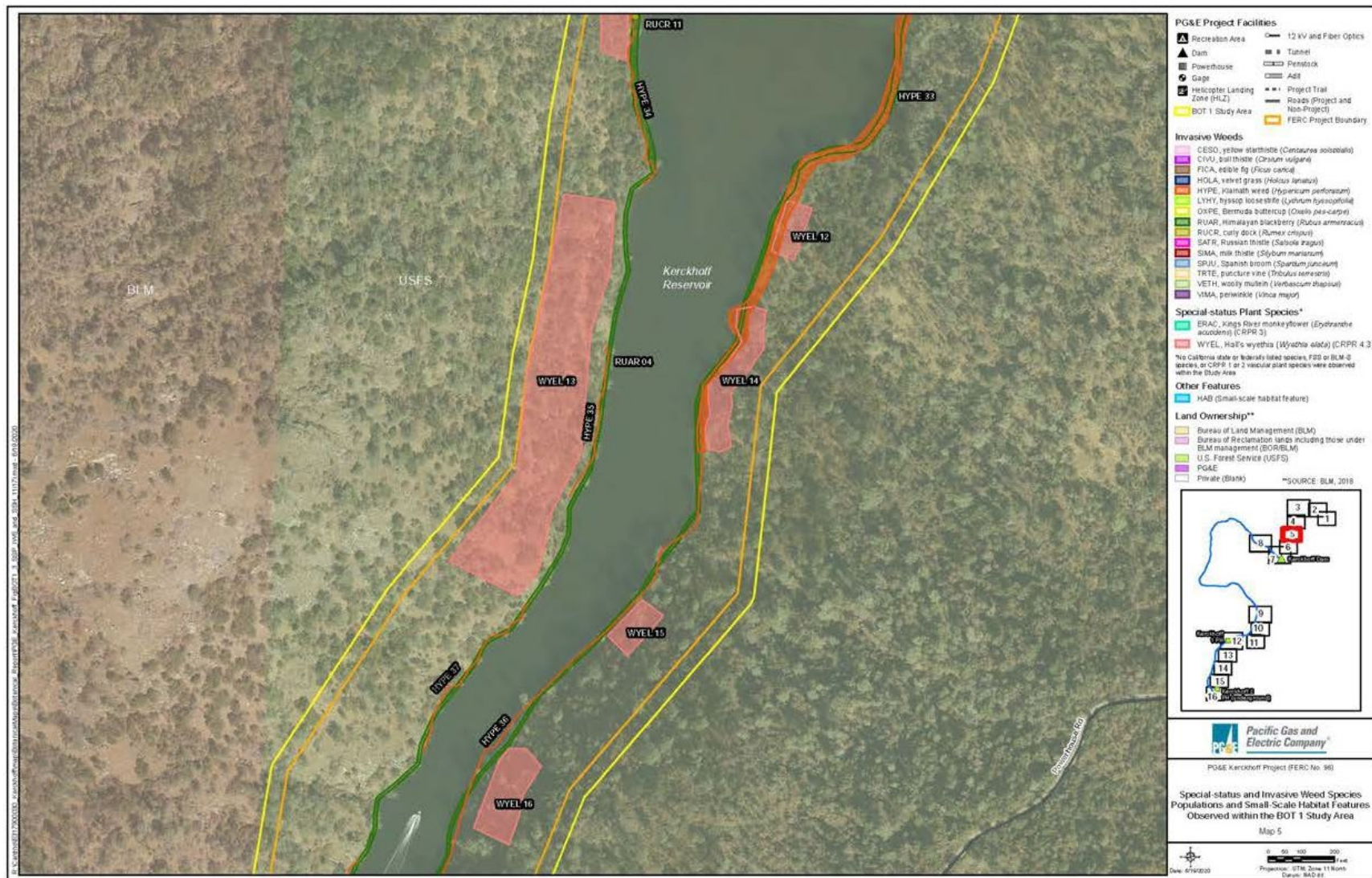


Figure E2-10: Invasive Species, Rare Plant, and Small-Scale Habitat Features Mapping (Map 5)

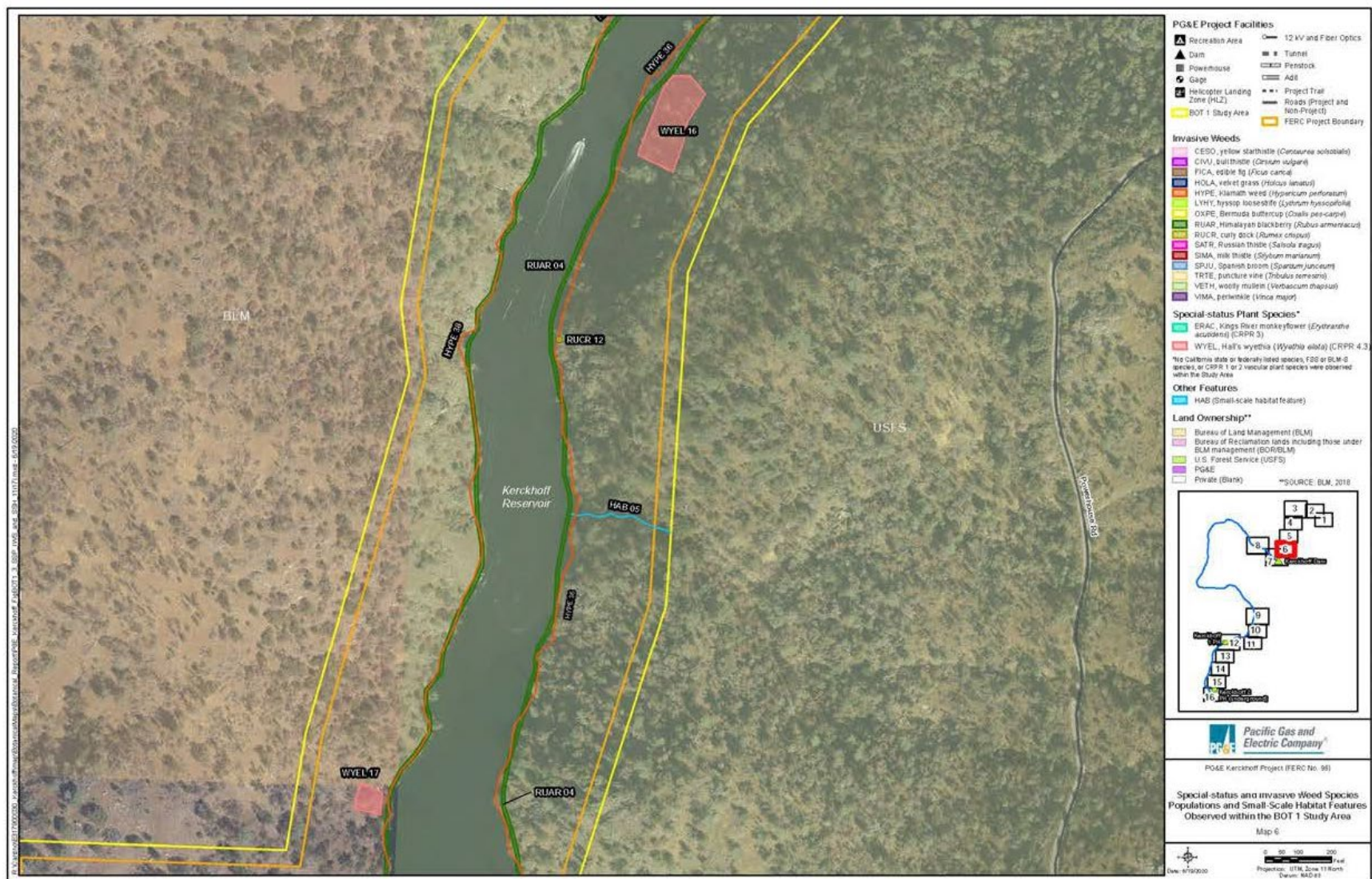


Figure E2-11: Invasive Species, Rare Plant, and Small-Scale Habitat Features Mapping (Map 6)

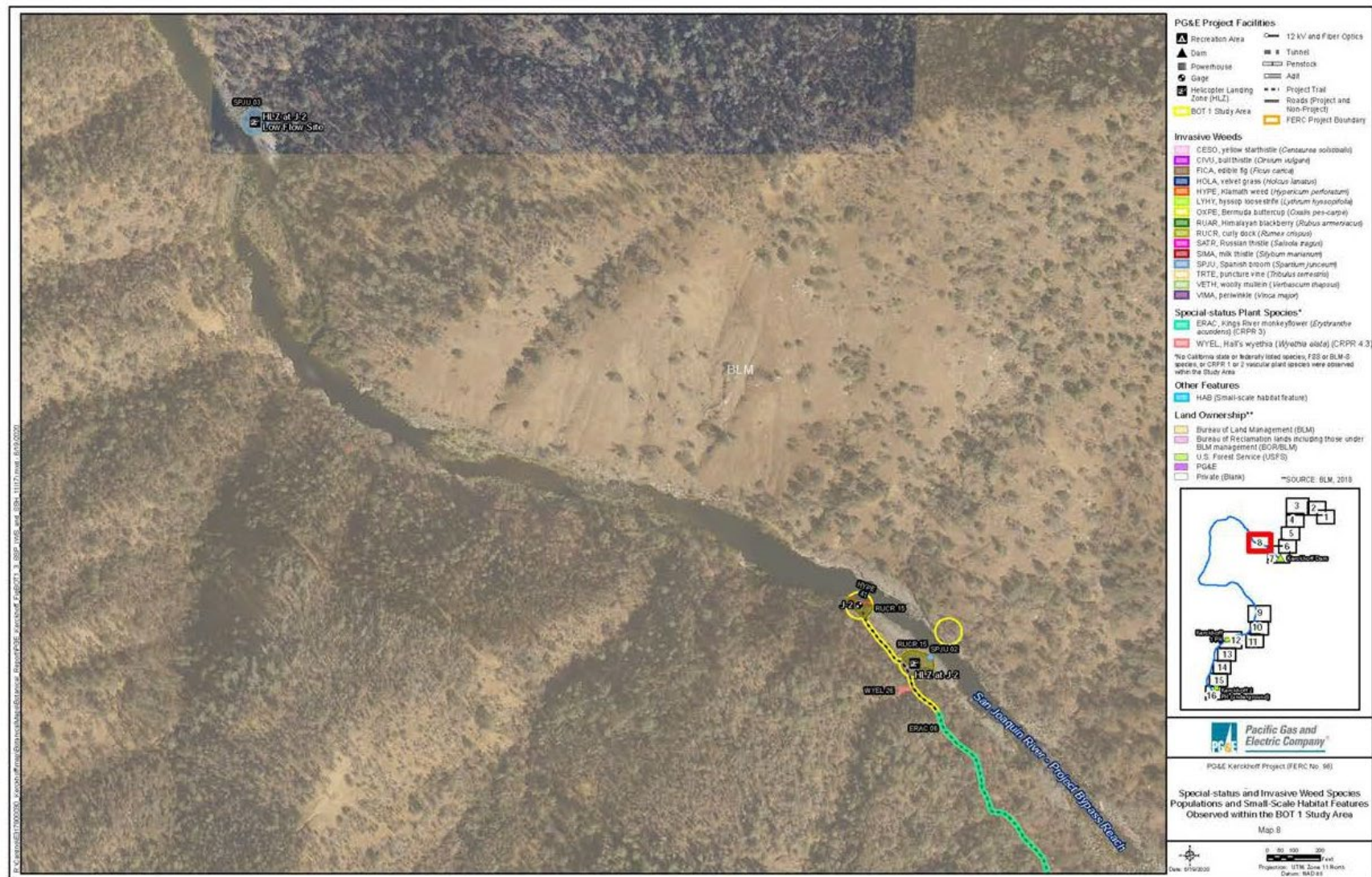


Figure E2-12: Invasive Species, Rare Plant, and Small-Scale Habitat Features Mapping (Map 7)



Figure E2-13: Invasive Species, Rare Plant, and Small-Scale Habitat Features Mapping (Map 8)



Figure E2-14: Invasive Species, Rare Plant, and Small-Scale Habitat Features Mapping (Map 9)



Figure E2-15: Invasive Species, Rare Plant, and Small-Scale Habitat Features Mapping (Map 10)

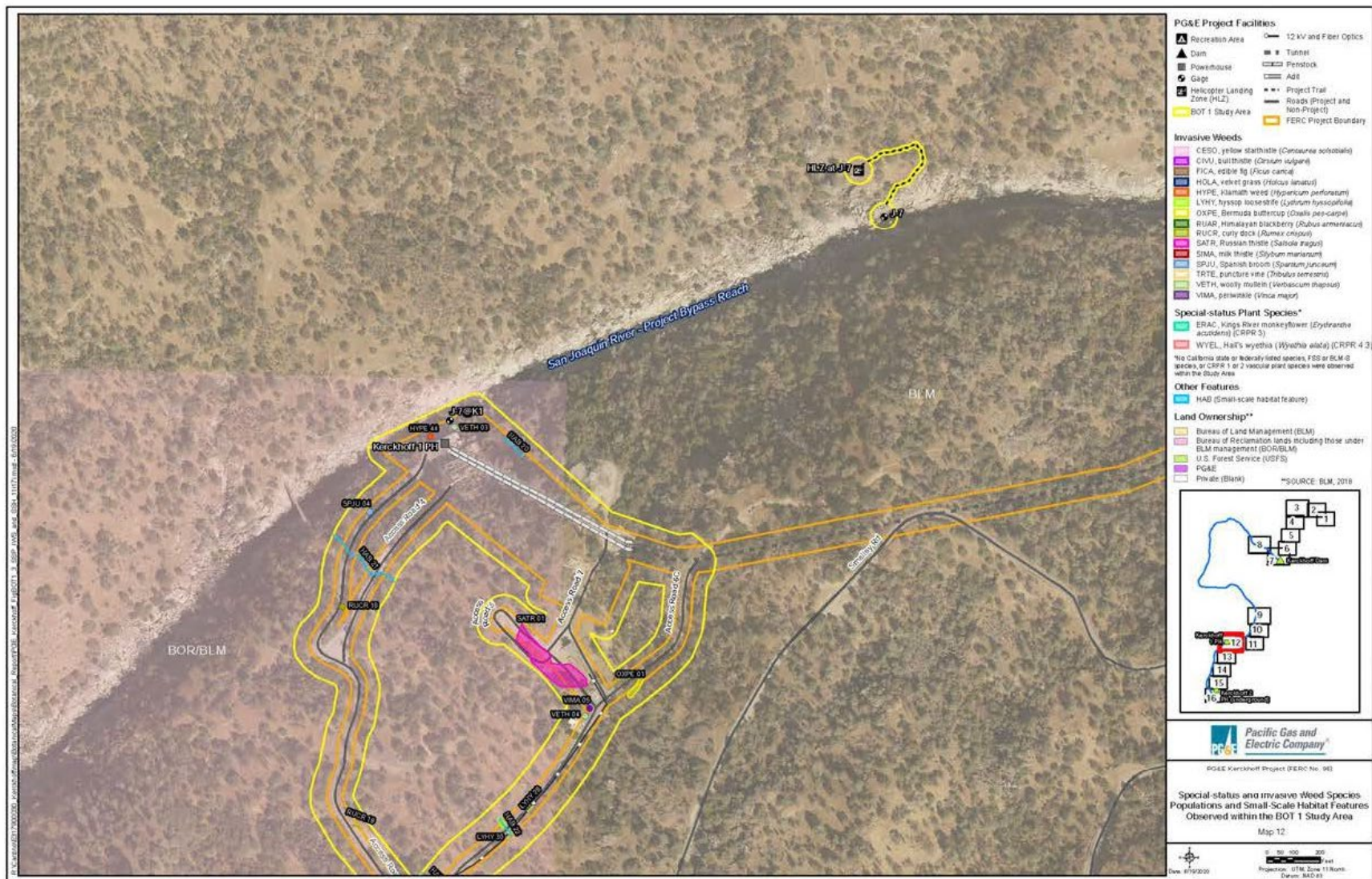


Figure E2-16: Invasive Species, Rare Plant, and Small-Scale Habitat Features Mapping (Map 11)



Figure E2-17: Invasive Species, Rare Plant, and Small-Scale Habitat Features Mapping (Map 12)



Figure E2-18: Invasive Species, Rare Plant, and Small-Scale Habitat Features Mapping (Map 13)

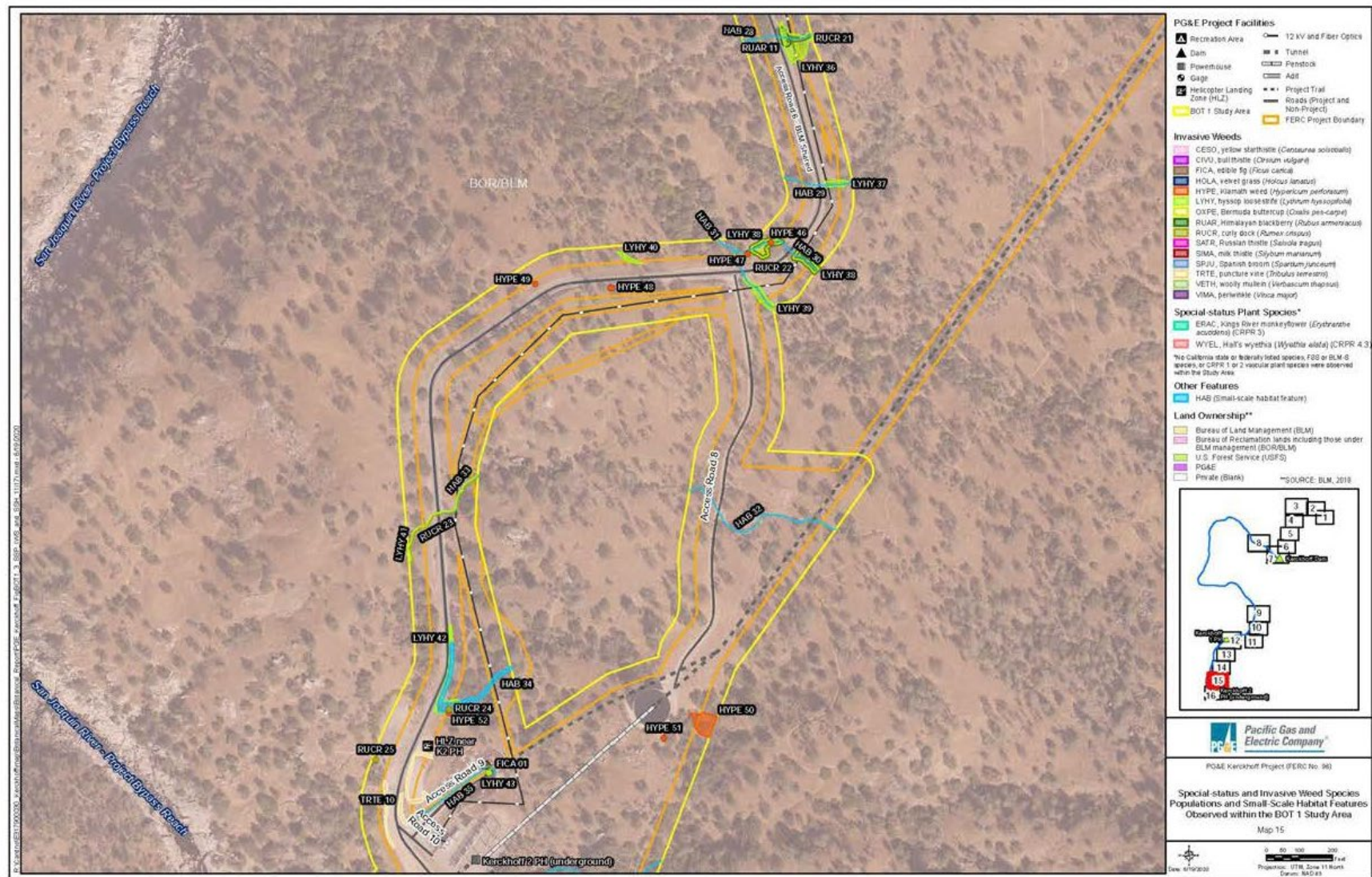


Figure E2-19: Invasive Species, Rare Plant, and Small-Scale Habitat Features Mapping (Map 14)

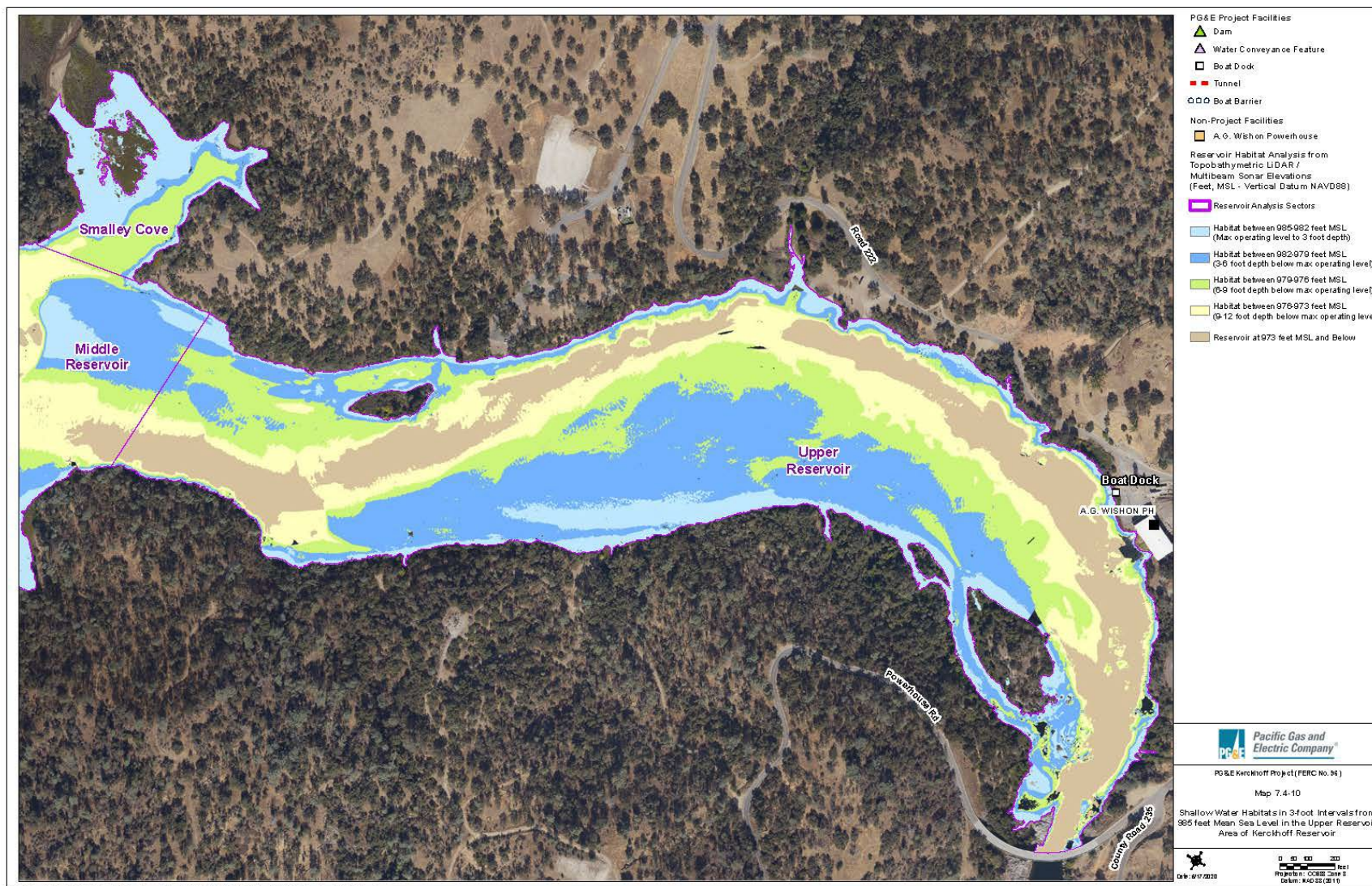


Figure E2-21: Shallow- Water Habitats in 3-Foot Intervals from 985 Feet Mean Sea Level in the Upper Reservoir Area of Kerckhoff Reservoir

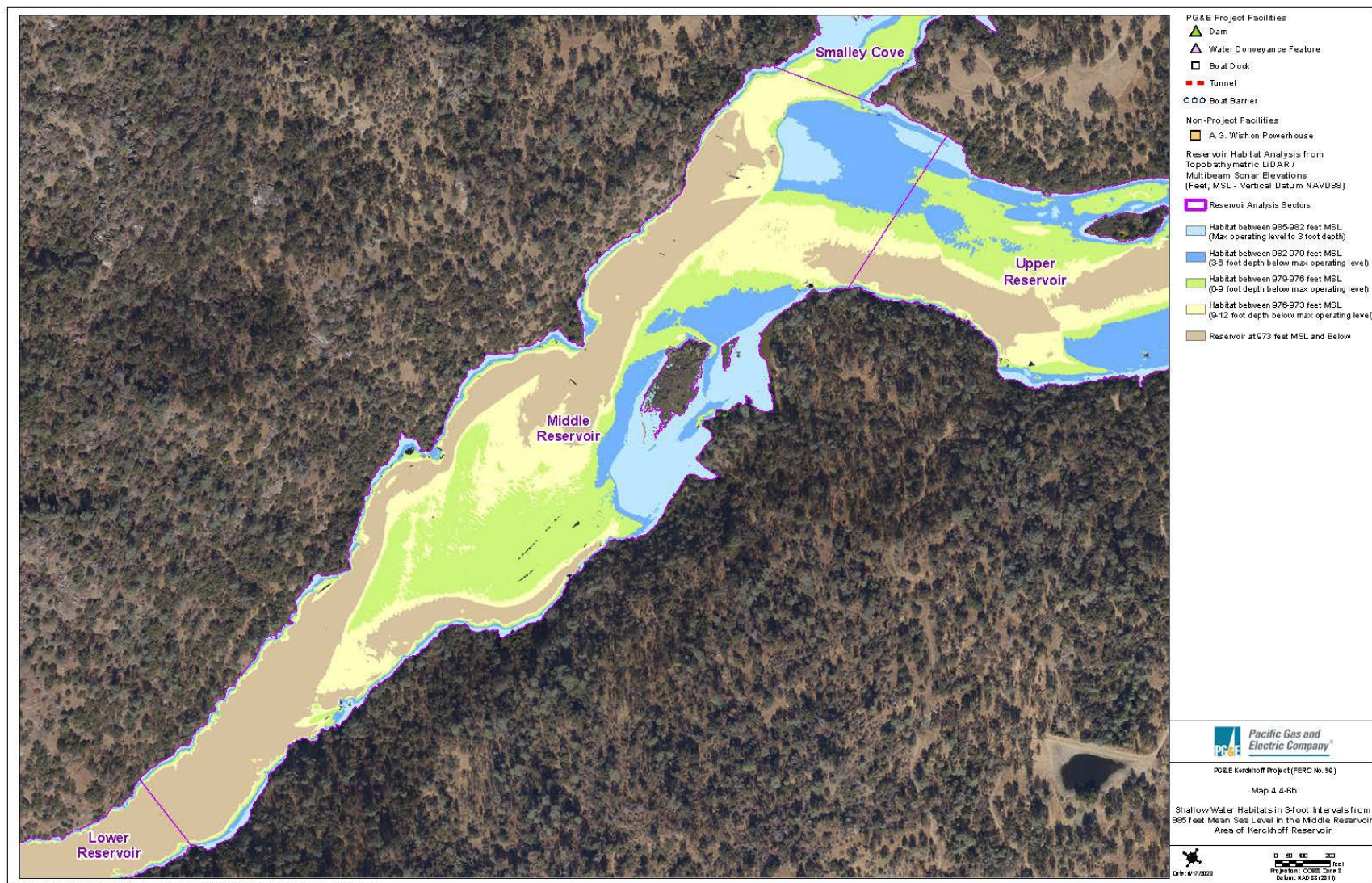


Figure E2-22: Shallow- Water Habitats in 3-Foot Intervals from 985 Feet Mean Sea Level in the Middle Reservoir Area of Kerckhoff Reservoir



Figure E2-23: Shallow- Water Habitats in 3-Foot Intervals from 985 Feet Mean Sea Level in the Lower Reservoir Area of Kerckhoff Reservoir

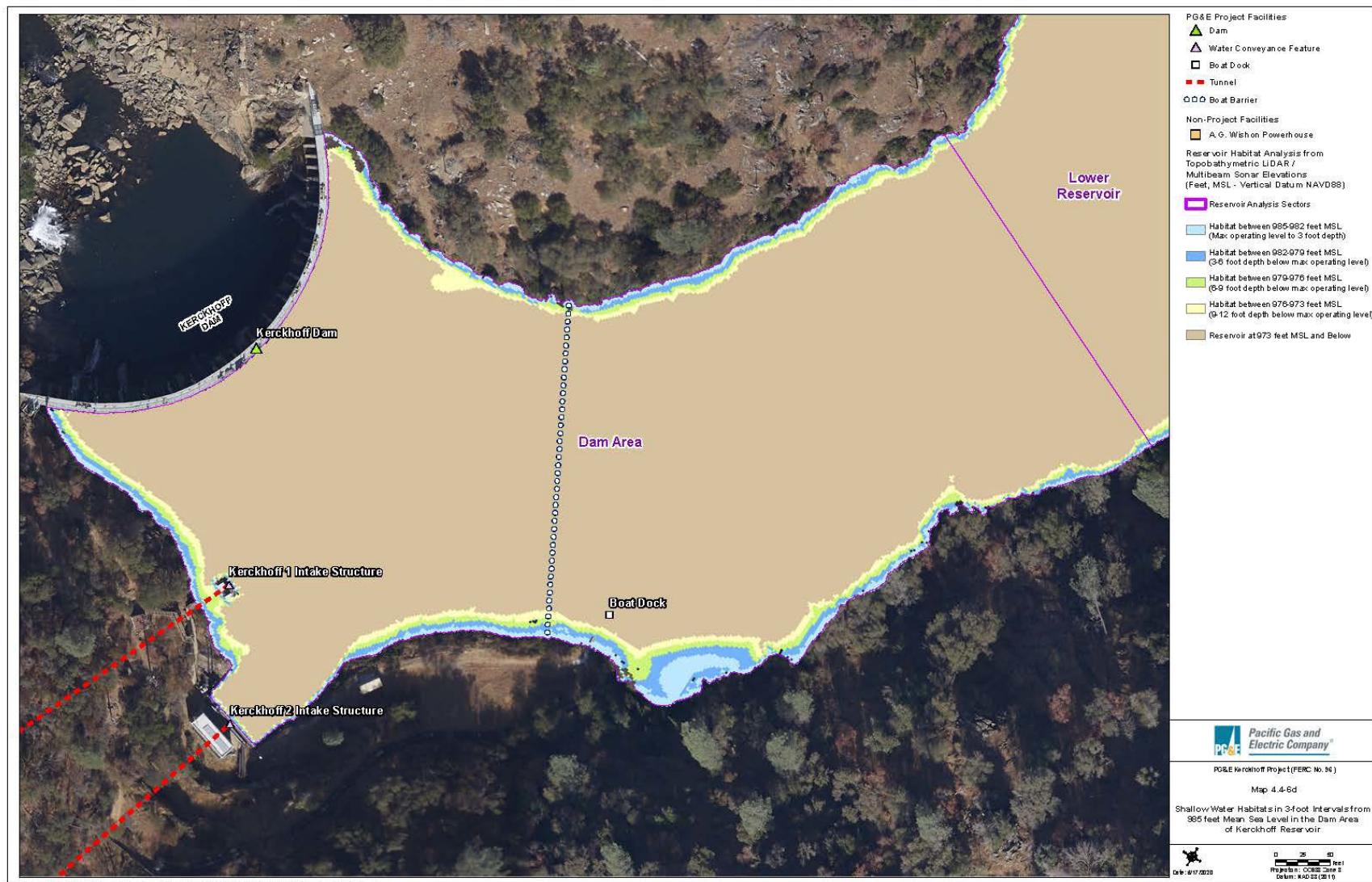


Figure E2-24: Shallow-Water Habitats in 3-Foot Intervals from 985 Feet Mean Sea Level in the Dam Area of Kerckhoff Reservoir

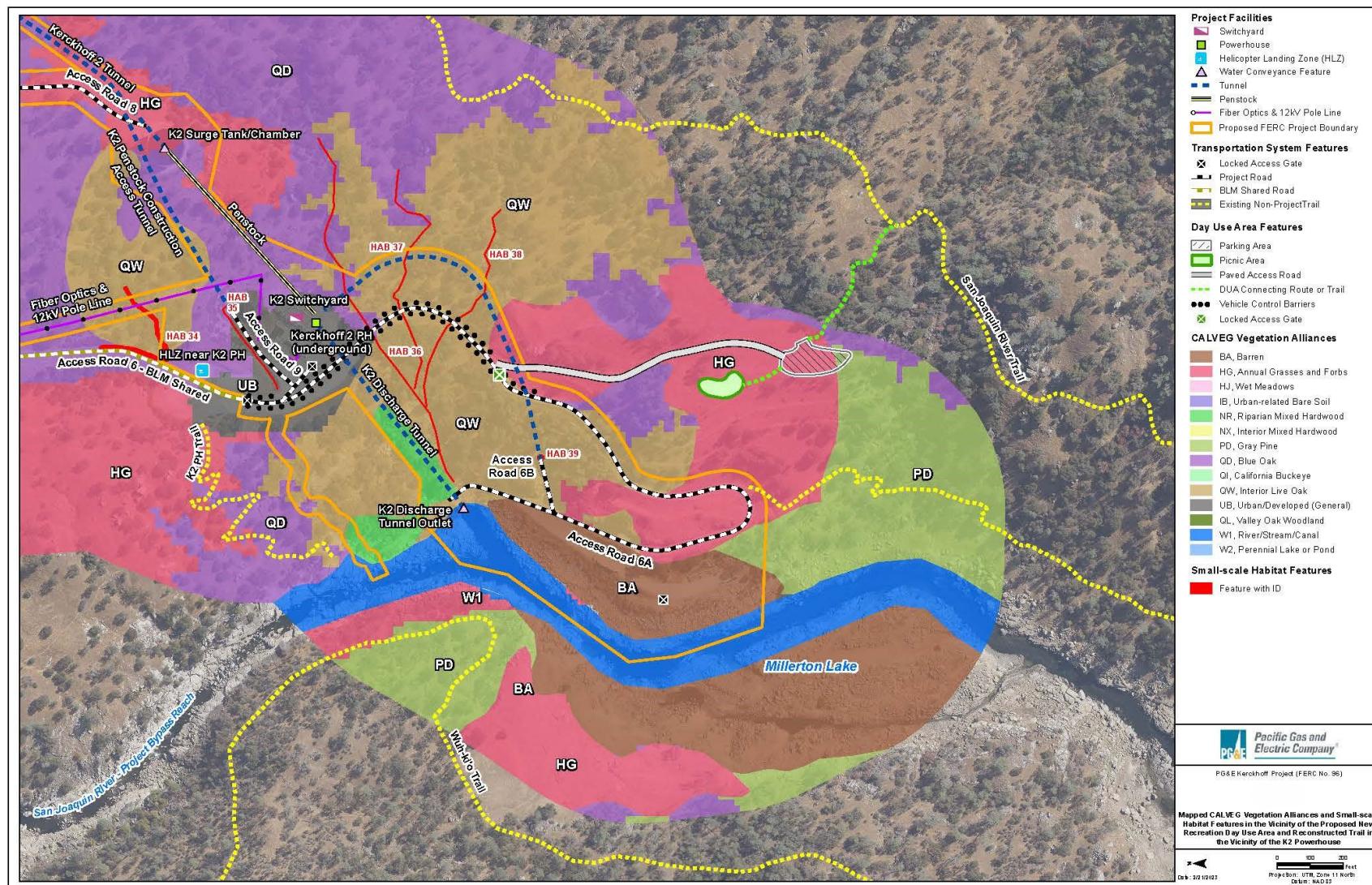
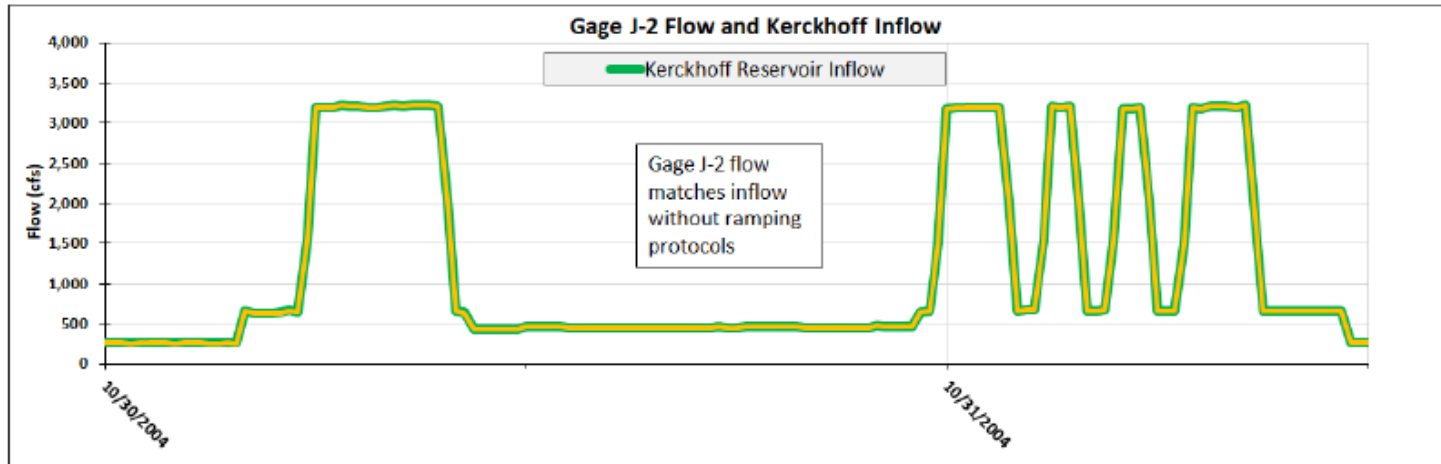


Figure E2-25: CALVEG Vegetation Alliances Mapped within the Botanical Study Area—Vista Day Use Area

No Action Alternative (Current Operations)



Proposed Project with LTOR

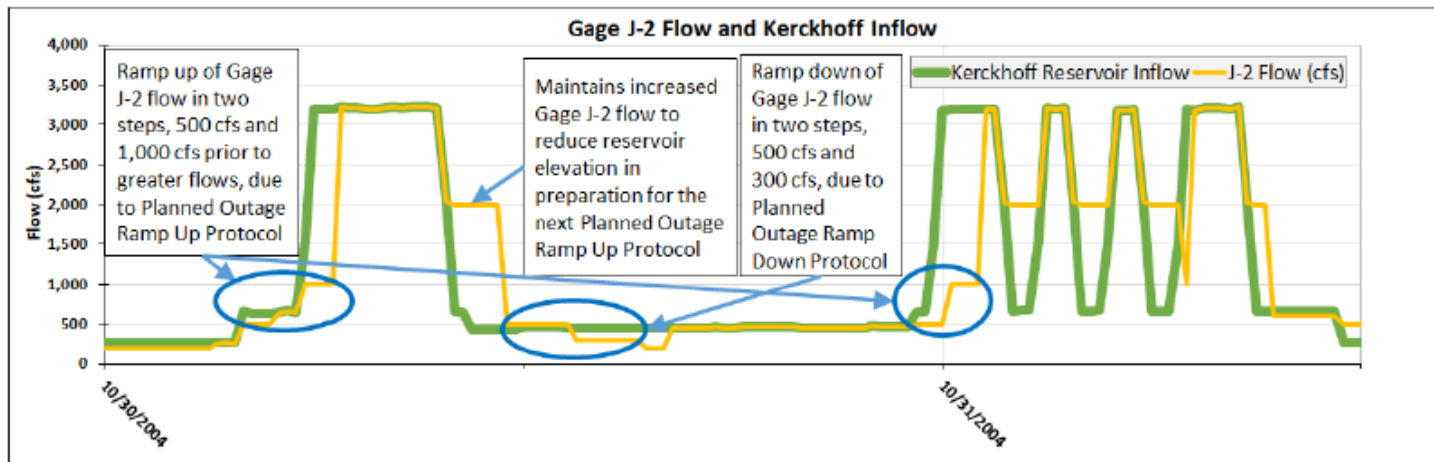


Figure E2-26: Flows Modeled in the Project Bypass Reach at Gage J-2 for Current Operations (Top) and Proposed Project (Bottom) during a Planned Outage of K2 Powerhouse (based on WY 2004)

Appendix E3

Tables

Kerckhoff Hydroelectric Project Special-Status Plant Species Evaluated.

Scientific Name	Common Name	Listing Status (Federal/State/ BLM/USFS/CRPR)	Elevation Range (feet)^a	Bloom Period	Habitat Associations	Potential to Occur in the Study Area
<i>Allium abramsii</i>	Abrams' onion	1B.2	2,900–10,000	May–Jul	Sandy, granitic areas in upper and lower montane coniferous forest	NONE. Study Area is outside the elevation range for the species; 2 recent occurrences (2009) nearby in Alder Springs, Jose Basin
<i>Calycadenia spicata</i>	spicate calycadenia	1B.3	128 – 4,480	May-Sep	Valley and foothill grassland, cismontane woodland. Dry, adobe, clay, gravelly, rocky, disturbed areas, openings, roadsides.	NONE. Study Area lacks suitable clay substrate
<i>Calyptridium pulchellum</i>	Mariposa pussypaws	FT / 1B.1	1,310–3,610	Apr–Jul (Aug)	Sandy or gravelly soils, decomposed granite or metamorphic rocks, chaparral, gray pine, oak woodland, cismontane woodland	LOW. No recent known occurrences; microhabitat (gravel openings or rock outcrops) not likely in the Study Area; Study Area is at the lower end of species' elevation range
<i>Camissonia sierrae</i> ssp. <i>alticola</i>	Mono Hot Springs evening-primrose	FSS / 1B.2	3,396–7,907	May–Aug	Shallow soil on granite outcrops, ponderosa-pine forest; gravel and sand pans and ledges associated with granitic outcrops in chaparral, ponderosa pine, mixed conifer and red fir/lodgepole pine forests	NONE. Study Area is outside the elevation range for the species; suitable habitat not present
<i>Camissonia sierrae</i> ssp. <i>sierrae</i>	Yosemite evening-primrose	FSS / 4.3	1,640–5,397	Apr–Jun	Cismontane woodland and lower montane coniferous forest	MOD. CNPS reports 2 recent occurrences in the vicinity of the Study Area; habitat present in the Study Area; Study Area is just outside of the species' elevation range
<i>Carex praticola</i>	northern meadow sedge	2B.2	0–3,200	May–Jul	Meadows and seeps (mesic)	LOW. No mapped CNDDDB occurrences in Fresno County; CNPS listed in Cascadel Point quadrangle; only marginal habitat present in the Study Area

Scientific Name	Common Name	Listing Status (Federal/State/ BLM/USFS/CRPR)	Elevation Range (feet) ^a	Bloom Period	Habitat Associations	Potential to Occur in the Study Area
<i>Carpenteria californica</i>	tree-anemone	ST / BLMS / FSS / 1B.2	1,115–4,395	(Apr) May–Jul	Chaparral, cismontane woodland, usually granitic. Foothill chaparral, foothill woodland, lower ponderosa pine forest. Prefers draws	<i>Carpenteria californica</i>
<i>Castilleja campestris</i> var. <i>succulenta</i>	fleshy owl's-clover	FT / SE / BLMS / 1B.2	160–2,460	Mar (Apr–May)	Vernal pools, often in acidic soils	LOW. Recent occurrences in the area; however, suitable vernal pool habitat is not known to occur in the Study Area
<i>Ceanothus fresnensis</i>	Fresno ceanothus	4.3	2,950–6,900	May–Jul	Openings in cismontane woodland and lower montane coniferous forest	NONE. Study Area is outside the elevation range for the species
<i>Claytonia palustris</i>	marsh claytonia; streambank spring beauty	4.3	3,281–8,202	May–Oct	Meadows, seeps, and other mesic habitats in coniferous forest habitat	NONE. Study Area is outside the elevation range for the species
<i>Claytonia parviflora</i> ssp. <i>grandiflora</i>	streambank spring beauty	4.2	820–3,935	Feb–May	Cismontane woodland; rocky (mesic)	MOD. No recent known occurrences; suitable habitat is present in the Study Area
<i>Collomia rawsoniana</i>	Rawson's flaming-trumpet	FSS / 1B.2	2,559–7,218	Jul–Aug	Lower montane coniferous forest, meadows and seeps, riparian forest, shaded areas near streams in cismontane woodland; mesic	NONE. Study Area is outside the elevation range for the species; no suitable habitat in the Study Area
<i>Cordylanthus rigidus</i> ssp. <i>brevibracteatus</i>	short-bracted bird's-beak	4.3	2,000–8,500	Jul–Aug (Oct)	Chaparral, lower montane coniferous forest, pinyon and juniper woodland, upper montane coniferous forest; openings, granitic	NONE. Study Area is outside the elevation range for the species; 3 historical occurrences (1940, 1955) near Auberry
<i>Cryptantha hooveri</i>	Hoover's cryptantha	1A	30–490	Apr–May	Inland dunes, sandy areas in valley and foothill grassland	NONE. This species is presumed extinct. No occurrences in Fresno County; no suitable habitat in the Study Area
<i>Delphinium hansenii</i> ssp. <i>ewanianum</i>	Ewan's larkspur	4.2	195–1,970	Mar–May	Cismontane woodland and valley and foothill grassland; rocky	HIGH. Known from the area; suitable habitat present in the Study Area
<i>Downingia pusilla</i>	dwarf downingia	2B.2	0–1,460	Mar–May	Mesic areas and vernal pools in valley and foothill grassland	LOW. Only one historical occurrence in Fresno County (1979); vernal pool habitat is not known to occur in the Study Area

Scientific Name	Common Name	Listing Status (Federal/State/ BLM/USFS/CRPR)	Elevation Range (feet) ^a	Bloom Period	Habitat Associations	Potential to Occur in the Study Area
<i>Eriastrum tracyi</i>	Tracy's eriastrum	SR / FSS / 3.2	1,030–5,840	May–Jul	Open areas on shale or alluvium in chaparral, cismontane woodland, and valley and foothill grassland	MOD. No mapped occurrences in the vicinity of the Study Area; suitable habitat is present in the Study Area
<i>Eryngium spinosepalum</i>	spiny- sepal button- celery	1B.2	260–3,200	Apr–Jun	Vernal pools in valley and foothill grassland	LOW. All occurrences in the vicinity of the Study Area are historical (latest is 1994); vernal pool habitat is not known to occur in the Study Area
<i>Erythranthe (=Mimulus) acutidens</i>	Kings River monkeyflo wer	3	1,000–4,005	Apr–Jul	Cismontane woodland and lower montane coniferous forest	HIGH. Suitable habitat present in the Study Area; CNPS mapped several historical (1995) occurrences in the immediate vicinity of the Study Area (near Smalley Road/New Auberry and near Tollhouse/Black Mountain)
<i>Erythranthe (=Mimulus) gracilipes</i>	slender- stalked monkeyflo wer	BLMS / FSS / 1B.2	1,640–4,265	Apr–May (Jun)	Chaparral, cismontane woodland, lower montane (ponderosa pine) coniferous forest; disturbed or burned areas, and/or decomposed granite, rock outcrops and associated gravelly and sandy areas	HIGH. Suitable habitat present within the Study Area; CNPS mapped several historical occurrences in Project Vicinity (Auberry, Prather, Tollhouse)
<i>Erythranthe inconspicua (=Mimulus</i>	small- flowered monkeyflo wer	4.3	895–2,495	May–Jun	Chaparral, cismontane woodland, and lower montane coniferous forest;	HIGH. Recent occurrences (2013) in the immediate vicinity of the Study Area (Squaw Leap)
<i>inconspicuus)</i>					mesic	and several other historical occurrences in Auberry/Tollhouse; suitable habitat present in the Study Area
<i>Erythranthe laciniata (=Mimulus laciniatus)</i>	cut-leaved monkeyflo wer	4.3	1,608–8,694	Apr–Jul	Chaparral and montane coniferous forest	MOD. Several historical occurrence at higher elevation near Shaver Lake; suitable habitat is not present in the Study Area

Scientific Name	Common Name	Listing Status (Federal/State/ BLM/USFS/CRPR)	Elevation Range (feet) ^a	Bloom Period	Habitat Associations	Potential to Occur in the Study Area
<i>Erythranthe sierrae</i>	Sierra Nevada monkeyflower	4.2	605–7,500	Mar–Jul	Cismontane woodlands and lower montane coniferous forest (openings); vernal wet depressions, swales, streambanks, meadows and seeps (dry); granitic, sandy, or gravelly soils	MOD. Species is included on several checklists in the vicinity of the Study Area, but no mapped occurrences in Fresno County; suitable habitat present in the Study Area
<i>Gratiola heterosepala</i>	Boggs Lake hedgehyssop	SE / BLMS / 1B.2	33–7,792	Apr–Aug	Edges of lakes, marshes, and vernal pools	LOW. Multiple occurrences in the vicinity of the Study Area (2001, 2005; from Table Mountain); however, vernal pool habitat is not known to occur in the Study Area
<i>Hulsea brevifolia</i>	short-leaved hulsea	FSS / 1B.2	4,921–10,499	May–Aug	Montane forest in openings and under canopy in mixed conifer and red fir forest; granitic or volcanic soils, gravelly soils	NONE. Study Area is outside the elevation range for the species; no suitable habitat present in the Study Area
<i>Ivesia unguiculata</i>	Yosemite ivesia	4.2	4,800–9,360	Jun–Sep	Meadows and seeps, subalpine coniferous forest, upper montane coniferous forest. Moist open slopes and meadows.	NONE. Study Area is outside the elevation range for the species; no suitable habitat present in the Study Area
<i>Jensia yosemitana</i>	Yosemite tarplant	3.2	3,937–7,546	(Apr) May–Jul	Meadows and seeps in lower montane coniferous forest	NONE. Study Area is outside the elevation range for the species; suitable habitat is not present in the Study Area
<i>Leptosiphon serrulatus</i>	Madera leptosiphon	FSS / 1B.2	984–4,265	Apr–May (Jun)	Openings in woodland, chaparral; dry slopes in cismontane oak woodland and lower montane coniferous forest. Usually in decomposed granite, one instance on serpentine.	HIGH. USFS considers this a likely species; included on several checklists in the vicinity of the Study Area (CNPS), but only mapped occurrences are outside the Project Vicinity in the Kings River watershed
<i>Lewisia congdonii</i>	Congdon's lewisia	SR / – / FSS / 1B.3	1,641–9,187	Apr–Jun	Chaparral, foothill woodland, red fir forest, yellow pine forest; metamorphic or granitic rock faces, cracks, and ledges; scree and talus, spoil piles of old barite mines	LOW. Most occurrences outside the vicinity of the Study Area in Mariposa County, a few occurrences in Fresno County; only marginal habitat present in the Study Area; USFS reports “unlikely, but include in list of plants to survey”

Scientific Name	Common Name	Listing Status (Federal/State/ BLM/USFS/CRPR)	Elevation Range (feet) ^a	Bloom Period	Habitat Associations	Potential to Occur in the Study Area
<i>Lupinus citrinus</i> var. <i>citrinus</i>	orange lupine	BLMS / FSS / 1B.2	1,247–5,577	Apr–Jun (Jul)	Chaparral, cismontane woodland, and lower montane coniferous forest; granitic soils	MOD. Occurrences in the vicinity of the Study Area, but outside the elevation range of the Study Area; USFS reports “remote possibility”
<i>Navarretia</i> <i>nigelliformis</i> ssp. <i>nigelliformis</i>	adobe navarretia	4.2	328–3,281	Apr–Jun	Vernal pools or other mesic habitats in valley and foothill grassland	LOW. Occurrences near Piedra on the Kings River; however, vernal pool habitat is not known to occur in the Study Area
<i>Orcuttia</i> <i>inaequalis</i>	San Joaquin Valley Orcutt grass	FT / SE /BLM S / 1B.1	33–2,477	Apr–Sep	Vernal pools	MOD. Occurrences in the vicinity of the Study Area (Millerton Lake); however, vernal pool habitat is not known to occur in the Study Area
<i>Piperia colemanii</i>	Coleman's rein orchid	4.3	3,840–7,360	June–Aug	Chaparral, lower montane coniferous forest. Often in sandy soils	NONE. Study Area is outside the elevation range for the species
<i>Piperia michaelii</i>	Michael's rein orchid	4.2	10–3,002	Apr–Aug	Chaparral, cismontane woodland, and lower montane coniferous forest	MOD. Occurrences in the vicinity of the Study Area (Black Mountain); suitable habitat
						(cismontane woodland) present in the Study Area
<i>Plagiobothrys</i> <i>torreyi</i> var. <i>perplexans</i>	chaparral popcorn flower	4.3	3,510–9,006	Apr–Sep	Meadows, seeps, and other mesic habitats on chaparral and coniferous forest	NONE. Study Area is outside the elevation range for the species
<i>Plagiobothrys</i> <i>torreyi</i> var. <i>torreyi</i>	Yosemite popcorn flower	1B.2	3,456–4,448	Apr–Jun	Meadows and seeps, subalpine coniferous forest, upper montane coniferous forest. Moist open slopes and meadows	NONE. Study Area is outside the elevation range for the species and lacks suitable habitat for the species
<i>Pseudobahia</i> <i>bahiifolia</i>	Hartweg's golden sunburst	FE / SE / 1B.1	49–492	Mar–Apr	Cismontane woodland and valley and foothill grassland; clay soils	MOD. Two historical (1986) occurrences in the vicinity of the Study Area (Friant and Friant- Kern Canal); suitable habitat present in the Study Area
<i>Sagittaria</i> <i>sanfordii</i>	Sanford's arrowhead	1B.2	<1,000	May–Oct (Nov)	Freshwater wetlands, marshes, swamps, riparian areas (assorted shallow freshwater); ponds and ditches	LOW. CNPS reports from the vicinity of the Study Area (Friant), but no mapped occurrences; only marginal habitat present in the Study Area

Scientific Name	Common Name	Listing Status (Federal/State/ BLM/USFS/CRPR)	Elevation Range (feet) ^a	Bloom Period	Habitat Associations	Potential to Occur in the Study Area
<i>Sidalcea keckii</i>	Keck's checkerblo om	FE / 1B.1	246–2,133	Apr–May (Jun)	Cismontane woodland and valley and foothill grassland; serpentine soils, and clay soils	LOW. No mapped occurrences in the vicinity of the Study Area; suitable habitat (serpentine/clay soils) not present in the Study Area
<i>Streptanthus farnsworthianus</i>	Farnswort h's jewel flower	4.3	1,312–4,593	May–Jun	Cismontane woodland	MOD. Historical occurrences in the vicinity of the Study Area; suitable habitat present in the Study Area
<i>Stylocline masonii</i>	Mason's nest straw	BLMS / 1B.1	330–4,000	Mar–May (Jun)	Shadscale scrub, pinyon- juniper woodland; open loose sand of washes and flats	NONE. Not known from Fresno County, all mapped occurrences are west and south of Kern County; suitable habitat not present within the Study Area
<i>Trifolium dedeckerae</i> (= <i>T. kingii</i> ssp. <i>dedeckerae</i>)	DeDecker' s clover	BLMS	6,800–11,500	May–Jun	Lodgepole, red fir, yellow pine forest, pinyon- juniper woodland; subalpine; rock crevices	NONE. Study Area is outside the elevation range for the species; suitable habitat not present in the Study Area
<i>Viburnum ellipticum</i>	oval- leaved viburnum	2B.3	705–4,593	May–Jun	Chaparral, cismontane woodland, and lower montane coniferous forest	HIGH. Known from the vicinity of the Study Area (John Stebbins, independent botanist, in phone conversation with K.A. Colgate, Cardno, in April 2019); suitable habitat (cismontane woodland) present in the Study Area
<i>Viola pinetorum</i> ssp. <i>grisea</i>	grey leaved violet	BLMS / 1B.2	6,500–12,000	Apr–Jul	Mountain peaks, alpine zones	NONE. Study Area is outside the elevation range for the species; suitable habitat not present in the Study Area
<i>Wyethia elata</i>	Hall's wyethia	4.3	1,640–4,590	May–Aug	Cismontane woodland and lower montane coniferous forest	MOD. Study Area is just outside of the elevation range for the species; several occurrences in the vicinity of the Study Area; suitable habitat (cismontane woodland) present in the Study Area
<i>Bruchia bolanderi</i>	Bolander's bruchia	FSS / 4.2	5,577–9,186	N/A	Often in meadows and seeps on damp soils in montane coniferous forest	NONE. Study Area is outside the elevation range for the species

Scientific Name	Common Name	Listing Status (Federal/State/ BLM/USFS/CRPR)	Elevation Range (feet) ^a	Bloom Period	Habitat Associations	Potential to Occur in the Study Area
<i>Bryum chryseum</i>	brassy bryum	4.3	160–1,970	N/A	Cismontane woodland, valley and foothill grassland, openings in chaparral habitats	HIGH. Possible mapped occurrence in Fresno/Madera foothills near the Study Area
<i>Didymodon californicus</i>	California beard- moss	4.2	4,511–5,397	N/A	Openings in lower montane coniferous forest	NONE. Study Area is outside the elevation range for the species; suitable habitat not present in the Study Area
<i>Fissidens aphelotaxifolius</i>	brook pocket moss	FSS / 2B.2	6,562–7,218	N/A	Lower montane coniferous forest	NONE. Study Area is outside the elevation range for the species; suitable habitat not present in the Study Area
<i>Meesia triquetra</i>	three- ranked hump moss	4.2	4,265–9,688	Jul	Bogs and fens	NONE. Study Area is outside the elevation range for the species; suitable habitat not present in the Study Area
<i>Mielichhoferia elongata</i>	elongate coper moss	– / – / FSS / 4.3	<3,550	N/A	Seasonally moist sites on metamorphic, sedimentary, limestone, and serpentine rock outcrops, often containing heavy metals	MOD. Collections from lower elevation habitats consistent with the Study Area
<i>Mielichhoferia shevockii</i>	Shevock's copper moss	– / – / FSS / 1B.2	>4,592	N/A	Metamorphic rocks, often along roads. Also in woodlands on gravelly soil among rocks containing heavy metals, often found with <i>Mielichhoferia elongata</i>	MOD. Collections from lower elevation habitats consistent with the Study Area
<i>Plagiobryoides vinosula</i>	wine- colored tufa moss	4.2	98–5,692	N/A	Cismontane woodland	HIGH. Possible mapped occurrence in Fresno/Madera foothills in the vicinity of the Study Area
<i>Peltigera gowardii</i>	Western waterfan lichen	FSS / 4.2	3,494–8,596	N/A	On rocks in cold water creeks with little or no sediment or disturbance in montane coniferous forest	NONE. Study Area is outside the elevation range for the species; suitable habitat not present in the Study Area

Sources: BLM 2014b; BoR 2014; CDFW 2019b, 2019c; GANDA 2015a, 2016b; USFS 2013; USFWS 2013, 2019

a Elevation range for the Kerckhoff Hydroelectric Project is approximately 300–1,000 ft. Notes:

BLM	Bureau of Land Management
CNDDDB	California Natural Diversity Database
CRPR	California Rare Plant Rank
HIGH	High potential to occur is based on recent mapped occurrences from the vicinity of the Project and/or Study Area, and elevation and habitat conditions are present in the Study Area.
KNOWN	Species is currently known from the Study Area based on past survey reports, agency consultation, and/or other literature sources, and elevation and habitat conditions are present in the Study Area.
LOW	Elevation and/or habitat requirements for this species are marginal in the Study Area and/or only few (historical) occurrences are present in the vicinity of the Project.
MOD	Moderate potential to occur is based on known occurrences in the vicinity of the Project, and elevation and habitat requirements being met in the Study Area.
NONE	Elevation and/or habitat requirements for this species are not present in the Project Area, and/or the species has a very specific and limited geographic distribution.
USFS	United States Forest Service.
BLM/USFS Listings:	Listing Status
BLMS	BLM Sensitive
Federal and State Listings:	Listing Status
FT	Federal Threatened
SE	State Endangered
SR	State Rare
ST	State Threatened
CRPR Ratings:	
CRPR 1A	Plants presumed extirpated in California and either rare or extinct elsewhere
CRPR 1B	Plants rare, threatened, or endangered in California and elsewhere
CRPR 2A	Plants presumed extirpated in California, but common elsewhere
CRPR 2B	Plants rare, threatened, or endangered in California, but common elsewhere
CRPR 3	Review List: Plants about which more information is needed
CRPR 4	Watch List: Plants or limited distribution
Threat Ranks:	
1	Seriously threatened in California (over 80% of occurrences threatened/high degree and immediacy of threat)
2	Moderately threatened in California (20–80% of occurrences threatened/moderate degree and immediacy of threat)
3	Not very threatened in California (<20% of occurrences threatened/low degree and immediacy of threat or no current threats known)

Table WILD 1-4.

Special-status wildlife species known to occur or potentially occurring in the Study Area.

Scientific Name	Common Name	Federal Status	Other Status	State Status	Habitat	Potential for Occurrence in Study Area ^a
Known to Occur						
Birds						
<i>Aquila chrysaetos</i>	golden eagle	Eagle Act	BLM-S	CFP	Forages in grasslands and early successional stages of forest and shrub habitats at elevations up to 11,500 ft. Nests on secluded cliffs with overhanging ledges or large trees in open areas with unobstructed view.	Known to occur. Suitable nesting and foraging habitat is present within the Study Area. Two individuals were observed incidentally in the Project Bypass Reach during bald eagle helicopter surveys conducted in June 2019. The species is also known to nest southwest of the Study Area on the cliffs above Millerton Lake (BoR 2014).
<i>Haliaeetus leucocephalus</i>	bald eagle	FD, Eagle Act	BLM-S, FSS	SE, CFP	Year-round resident in ice-free regions of California. Foraging areas include regulated and unregulated rivers, reservoirs, lakes, estuaries, and coastal marine ecosystems. Breeding bald eagles require relatively large bodies of water, including reservoirs containing a large standing population of suitable-sized fish. Nests are usually located within 1 mile of foraging habitat.	Known to occur. Suitable foraging and nesting habitat is present within the Study Area. This species was observed nesting on Kerckhoff Reservoir during bald eagle nesting surveys conducted in 2019. Wintering subadults were also observed in the Project Bypass Reach and south of the Kerckhoff 2 Powerhouse at the upper end of Millerton Lake. This species was also observed roosting on Kerckhoff Reservoir during wildlife reconnaissance surveys conducted in 2019, and incidentally at Kerckhoff Reservoir and near the Kerckhoff 2 Powerhouse during other technical studies.

Scientific Name	Common Name	Federal Status	Other Status	State Status	Habitat	Potential for Occurrence in Study Area ^a
<i>Setophaga petechia</i>	yellow warbler	—	—	CSC	Breeds in riparian woodlands from coastal and desert lowlands at elevations up to 8,000 ft. in the Sierra Nevada. Also breeds in montane chaparral, open ponderosa pine, and mixed conifer habitats with substantial amounts of brush.	Known to occur. Suitable habitat for this species is present within the Study Area. Singing males were observed during wildlife reconnaissance surveys conducted in May 2019 at three locations: • One individual was observed adjacent to the Fiber Optics & 12 kV Pole Line between Kerckhoff 1 Switchyard and Kerckhoff 2 Switchyard, near the Ya-Gub-Weh-Tuh Trailhead parking lot; • Five individuals were observed on the eastern shore of Smalley Cove, adjacent to Smalley Cove Campground; and • One individual was observed on the San Joaquin River, just above the inlet into Kerckhoff Reservoir. Other records of this species are also known from the Project vicinity (BoR 2014).
<i>Strix occidentalis occidentalis</i>	California spotted owl	—	BLM-S, FSS	CSC	In the Sierra Nevada, typically nests in old-growth or mature, multi-layered, dense, mixed-conifer forests. Forages in multi-layered mixed conifer, redwood, Douglas fir, and oak woodland habitats, from sea level to elevations of approximately 7,600 ft., with the majority (86 percent) occurring from 3,000 to 7,000 ft. Foraging habitat is similar to nesting habitat, but owls may also forage in more open canopy	Known to occur. A single individual responded to calls during two nocturnal surveys conducted near Kerckhoff Dam within the Study Area (BoR 2014). However, nesting habitat is marginal in the Study Area. This species was not observed during surveys conducted in support of relicensing.

Scientific Name	Common Name	Federal Status	Other Status	State Status	Habitat	Potential for Occurrence in Study Area ^a
Mammals						
<i>Antrozous pallidus</i>	pallid bat	—	BLM-S, FSS	CSC	Occurs in grasslands, shrublands, woodlands, and forests from sea level to 10,000 ft. in elevation. Typically roosts in caves, crevices, or mines. Requires open habitat for foraging.	Known to occur. Suitable roosting and foraging habitat is present within the Study Area. This species was observed during bat surveys conducted for relicensing studies in 2019. Refer to Table WILD 1-9 for specific facilities where this species was observed. Maternal roosts are present south of the Study Area on the cliffs above Millerton Lake (BoR 2014).
<i>Corynorhinus townsendii</i>	Townsend's big-eared bat	—	BLM-S, FSS	CSC	Found in all but alpine and subalpine habitats; most abundant in mesic habitats up to 6,000 ft. in elevation. Requires caves, mines, tunnels, buildings, or other human-made structures for roosting. Extremely sensitive to disturbance and may abandon a roost if disturbed.	Known to occur. Suitable foraging habitat is present within the Study Area, though recent surveys at several Kerckhoff facilities indicated that no potential roosting habitat appears to be present at those Project features (GANDA 2015a, 2016b). This species was detected during bat surveys conducted for relicensing studies in 2019. Refer to Table WILD 1-9 for specific facilities where this species was observed. This species was detected in the Millerton Lake Cave System in the vicinity of the Study Area approximately 0.8 mile north of Big Sandy Creek (BoR 2014).
<i>Myotis evotis</i>	long-eared myotis	—	BLM-S	—	Found predominantly in coniferous forests, typically only at higher elevations in southern areas (between 7,000 and 8,500 ft.). They roost in tree cavities and beneath exfoliating bark in both living trees and dead snags.	Known to occur. Suitable foraging and roosting habitat is present within the Study Area. This species was detected during bat surveys conducted for relicensing studies in 2019. Refer to Table WILD 1-9 for specific facilities where this species was observed.

Scientific Name	Common Name	Federal Status	Other Status	State Status	Habitat	Potential for Occurrence in Study Area ^a
<i>Myotis thysanodes</i>	fringed myotis	—	BLM-S, FSS	—	Optimal habitats are pinyon-juniper, valley foothill hardwood, and hardwood-conifer, generally at 4,000 to 7,000 ft. Roosts in caves, mines, buildings, and crevices. Separate day and night roosts may be used. Uses open habitats, early successional stages, streams, lakes, and ponds as foraging areas. This species is migratory, making relatively short, local movements to suitable hibernacula.	Known to occur. Suitable roosting and foraging habitat is present within the Study Area. This species was detected during bat surveys conducted for relicensing studies in 2019. Refer to Table WILD 1-9 for specific facilities where this species was observed.
<i>Myotis yumanensis</i>	Yuma myotis	—	BLM-S	—	Occasionally roosting in mines or caves, these bats are most often found in buildings or bridges. Bachelors also sometimes roost in abandoned cliff swallow nests, but tree cavities are probably the original sites for most nursery roosts. These bats typically forage over water in forested areas.	Known to occur. Suitable foraging and roosting habitat is present within the Study Area. This species was observed during bat surveys conducted for relicensing studies in 2019. Refer to Table WILD 1-9 for specific facilities where this species was observed.
<i>Eumops perotis californicus</i>	western mastiff bat	—	BLM-S	CSC	Found in variety of habitats including desert scrub, chaparral, oak woodland, ponderosa pine, meadows, and mixed conifer forests up to 4,600 ft. in elevation. Distribution is likely limited by availability of significant rock features offering suitable roosting habitat.	Known to occur. Suitable foraging and roosting habitat for this species is present within the Study Area. This species was heard foraging above Kerckhoff Reservoir in 2015 (GANDA 2015a, 2016b). This species is known to roost southwest of the Study Area on the cliffs above Millerton Lake (BoR 2014). This species was not observed during surveys conducted in support of relicensing.

Scientific Name	Common Name	Federal Status	Other Status	State Status	Habitat	Potential for Occurrence in Study Area ^a
May Potentially Occur						
Reptiles						
<i>Anniella pulchra</i>	northern California legless lizard	—	—	CSC	Occurs in moist warm loose soil with plant cover. Moisture is essential. Occurs in sparsely vegetated areas of beach dunes, chaparral, pine-oak woodlands, desert scrub, sandy washes, and stream terraces with sycamores, cottonwoods, or oaks. Often can be found under surface objects such as rocks, boards, driftwood, leaf litter, and logs. Elevation range is from sea level to 5,900 ft.	May potentially occur. Suitable habitat is present within the Study Area; however, this species was not observed during surveys conducted in support of relicensing.
<i>Phrynosoma blainvillii</i>	coast horned lizard	—	BLM-S	CSC	Occurs in valley foothill hardwood, conifer, and riparian habitats, as well as in pine-cypress, juniper, and annual grassland habitats. The elevational range extends up to 4,000 ft. in the Sierra Nevada foothills and up to 6,000 ft. in the mountains of southern California.	May potentially occur. Suitable habitat is present within the Study Area; however, this species was not observed during surveys conducted in support of relicensing.
<i>Lampropeltis zonata</i>	California mountain kingsnake	—	BLM-S	—	A habitat generalist, found in diverse habitats including coniferous forest, oak-pine woodlands, riparian woodland, chaparral, manzanita, and coastal sage scrub. Wooded areas near a stream with rock outcrops, talus, or rotting logs that are exposed to the sun are good places to find this snake. Elevation range is from 1,500 to 8,000 ft.	May potentially occur. Suitable habitat is present within the Study Area; however, this species was not observed during surveys conducted in support of relicensing.

Scientific Name	Common Name	Federal Status	Other Status	State Status	Habitat	Potential for Occurrence in Study Area ^a
Birds						
<i>Ammodramus savannarum</i>	grasshopper sparrow	—	—	CSC	Inhabits moderately open grasslands, grassland-shrub areas, and ruderal areas with patchy bare ground. An uncommon and local summer resident and breeder in the foothills and lowlands west of the Cascade-Sierra Nevada crest. Occurs in dry, dense grasslands, especially those with a variety of grasses and tall forbs and scattered shrubs for singing perches.	May potentially occur. Suitable habitat is present within the Study Area; however, this species was not observed during surveys conducted in support of relicensing.
<i>Asio flammeus</i>	short-eared owl	—	—	CSC	Prefers open areas with few trees, such as annual and perennial grasslands, prairies, dunes, meadows, irrigated lands, saline and fresh emergent wetlands. Needs elevated sites for perching and dense vegetation for roosting.	May potentially occur. Suitable habitat is present within the Study Area; however, this species was not observed during surveys conducted in support of relicensing.
<i>Circus hudsonicus</i>	northern harrier	—	—	CSC	Occurs in a variety of habitats at elevations up to 10,000 ft. Forages in open areas such as meadows, wetlands, and grasslands. Breeding habitat is up to 5,700 ft. in the Sierra Nevada, in areas with shrubby vegetation near foraging habitat.	May potentially occur. Suitable habitat is present within the Study Area; however, this species was not observed during surveys conducted in support of relicensing.
<i>Elanus leucurus</i>	white-tailed kite	—	BLM-S	CFP	Prefers coastal and lowland valleys; often associated with farmlands, meadows with emergent vegetation, and grasslands.	May potentially occur. Suitable habitat is present within the Study Area; however, this species was not observed during surveys conducted in support of relicensing.
<i>Falco peregrinus anatum</i>	American peregrine falcon	FD	—	SD, CFP	Very uncommon breeding resident and uncommon as a migrant. Breeds in woodlands, forests, coastal habitats, and riparian areas near wetlands, lakes, rivers, or other water on high cliffs, banks, dunes, or mounds. Active nesting sites are known along the coast, in the Sierra Nevada, and in the mountains of northern California. Migrants occur along the coast and the western Sierra Nevada in spring and fall.	May potentially occur. Suitable habitat is present within the Study Area; however, this species was not observed during surveys conducted in support of relicensing.

Scientific Name	Common Name	Federal Status	Other Status	State Status	Habitat	Potential for Occurrence in Study Area ^a
<i>Lanius ludovicianus</i>	loggerhead shrike	—	—	CSC	Usually found in open areas with few trees, such as annual and perennial grasslands, prairies, dunes, meadows, irrigated lands, and saline and freshwater emergent wetlands.	May potentially occur. Suitable habitat is present within the Study Area; however, this species was not observed during surveys conducted in support of relicensing.
<i>Progne subis</i>	purple martin	—	—	CSC	An uncommon, local summer resident in wooded, low-elevation habitats. Found in valley foothill, montane hardwood, montane hardwood-conifer, and riparian habitats. Nests in tall, old trees near an open body of water, and occasionally in residential areas.	May potentially occur. Suitable habitat is present within the Study Area; however, this species was not observed during surveys conducted in support of relicensing.
Mammals						
<i>Bassariscus astutus</i>	ringtail	—	—	CFP	Found in most forest and shrub habitats in close association with rocky and/or riparian areas, usually not more than 0.6 mile from water. Dens in hollow trees, snags, or other cavities.	May potentially occur. Suitable habitat is present within the Study Area; however, this species was not observed during surveys conducted in support of relicensing.
<i>Euderma maculatum</i>	spotted bat	—	BLM-S	CSC	Ranges from arid deserts and grasslands through mixed conifer forests up to elevations of 10,600 ft. in southern California. Prefers sites with adequate roosting habitat, such as cliffs. Often limited by the availability of cliff habitat. Feeds over water and along marshes.	May potentially occur. Suitable habitat is present within the Study Area; however, this species was not observed during surveys conducted in support of relicensing.
<i>Lasiurus blossevillii</i>	western red bat	—	—	CSC	Roosts in forests and woodlands from sea level up through mixed mesic conifer forests in coastal ranges and the Sierra Nevada. Forages in a variety of habitats including croplands, grasslands, shrublands, and open woodlands and forests. Prefers solitary roosts in trees and occasionally shrubs.	May potentially occur. Suitable habitat is present within the Study Area; however, this species was not observed during surveys conducted in support of relicensing.
<i>Myotis ciliolabrum</i>	western small-footed myotis	—	BLM-S	—	Found in a wide variety of habitats, primarily in relatively arid wooded and brushy uplands near water. Elevation range is from 0 to 8,900 ft.	May potentially occur. Suitable habitat is present within the Study Area; however, this species was not observed during surveys conducted in support of relicensing.

Scientific Name	Common Name	Federal Status	Other Status	State Status	Habitat	Potential for Occurrence in Study Area ^a
<i>Perognathus xanthonotus</i>	San Joaquin pocket mouse	—	BLM-S	—	Occurs in dry, open grasslands with fine-textured soils in the Central and Salinas Valleys from elevation 1,000 to 2,000 ft.	May potentially occur. Suitable habitat is present within the Study Area; however, this species was not observed during surveys conducted in support of relicensing.
<i>Taxidea taxus</i>	American badger	—	—	CSC	Occurs throughout most of the state in areas with dry, friable soils. It is most abundant in drier open stages of most shrub, forest, and herbaceous habitats up to 12,000 ft. in elevation.	May potentially occur. Suitable habitat is present within the Study Area; however, this species was not observed during surveys conducted in support of relicensing.
Unlikely to Occur						
Invertebrates						
<i>Branchinecta conservatio</i>	Conservancy fairy shrimp	FE	—	—	Found in large, turbid vernal and playa pools.	Unlikely to occur. There is no suitable habitat for this species within the Study Area. There are no documented CNDDDB occurrences within the Study Area.
<i>Branchinecta lynchi</i>	vernal pool fairy shrimp	FT	—	—	Inhabits primarily vernal pools, but also occurs in other seasonal wetlands such as alkaline rain pools, ephemeral drainages, rock outcrop pools, ditches, stream oxbows, stock ponds, and vernal swales.	Unlikely to occur. There is no suitable habitat for this species within the Study Area. There are no documented CNDDDB occurrences within the Study Area. Critical habitat for this species is approximately 0.9 mile west of the FERC Project Boundary.
<i>Desmocerus californicus dimorphus</i>	valley elderberry longhorn beetle	FT	—	—	Elderberry shrubs are host; generally, found in riparian areas and floodplains, and also open hillsides and rocky outcrops.	Unlikely to occur. Although elderberry shrubs are present within the Study Area, USFWS has revised the species' range and neither Madera nor Fresno County is within the current range for this species (personal communication, Timothy Ludwick, USFWS, 2017). There are no documented CNDDDB occurrences within the Study Area.

Scientific Name	Common Name	Federal Status	Other Status	State Status	Habitat	Potential for Occurrence in Study Area ^a
<i>Lepidurus packardii</i>	vernal pool tadpole shrimp	FE	—	—	Occurs in a variety of seasonal habitats: vernal pools, ponded clay flats, alkaline pools, ephemeral stock tanks, and roadside ditches.	Unlikely to occur. There is no suitable habitat for this species within the Study Area. There are no documented CNDDB occurrences within the Study Area. Critical habitat for this species is approximately 0.9 mile west of the FERC Project Boundary.
Amphibians						
<i>Batrachoseps regius</i>	Kings River slender salamander	—	FSS	—	Found along stream corridors and moist wooded canyons in valley foothill riparian, blue oak woodland, and Sierra mixed conifer woodlands. Found only on the southern and eastern sides of the North Fork of the Kings River, Summit Meadow in the South Fork Kings River drainage, and the middle fork of the Kaweah River. Found at elevations between 1,100 and 8,100 ft.	Unlikely to occur. The Study Area is outside the geographic range of this species.
Reptiles						
<i>Gambelia sila</i>	blunt-nosed leopard lizard	FE	—	SE, CFP	Found in sparsely vegetated alkali scrub and desert habitats below 2,400 ft. in the San Joaquin Valley and adjacent foothills. USFWS has not designated critical habitat for this species.	Unlikely to occur. The Study Area is outside the geographic range of this species.
Birds						
<i>Accipiter gentilis</i>	northern goshawk	—	BLM-S, FSS	CSC	Forages and nests in middle- to high-elevation, mature, dense conifer forests. Wintering habitat includes foothills, northern deserts in pinyon-juniper woodland, and low-elevation riparian habitats.	Unlikely to occur. There is no suitable habitat for this species within the Study Area. There are no documented CNDDB occurrences within the Study Area.
<i>Agelaius tricolor</i>	tricolored blackbird	—	BLM-S	ST, CSC	Nests near fresh water, emergent wetland with cattails or tules, and Himalayan blackberry; forages in grasslands, woodland, and agriculture in the Central Valley and Coast Ranges.	Unlikely to occur. Suitable nesting habitat for this species is very limited within the Study Area. Study Area is higher in elevation than preferred valley floor habitats.

Scientific Name	Common Name	Federal Status	Other Status	State Status	Habitat	Potential for Occurrence in Study Area ^a
<i>Asio otus</i>	long-eared owl	—	—	CSC	Uncommon resident throughout the state, except for the Central Valley and Southern California deserts. Requires riparian habitat, and uses oak thickets or other dense stands of trees. Forages in open areas in woodland and forested habitats.	Unlikely to occur. Suitable habitat is minimal within the Study Area. There are no documented CNDDDB occurrences of this species within the Study Area.
<i>Athene cunicularia</i>	burrowing owl	—	BLM-S	CSC	Suitable habitat throughout their breeding range typically includes open, treeless areas within grassland, steppe, and desert biomes. They generally inhabit gently sloping areas, characterized by low, sparse vegetation.	Unlikely to occur. Suitable habitat is minimal within the Study Area. There are no documented CNDDDB occurrences of this species within the Study Area.
<i>Buteo swainsonii</i>	Swainson's hawk	—	BLM-S	ST	Uncommon breeding resident and migrant in the Central Valley, Klamath Basin, Northeastern Plateau, Lassen County, and Mojave Desert. Nests in riparian woodlands, juniper-sage flats, and oak woodlands. Forages in grasslands and agricultural areas.	Unlikely to occur. This species prefers open grassland and agricultural land for foraging and nests in tall riparian trees, often sycamores or cottonwoods. Suitable nesting and foraging habitat for this species is minimal within the Study Area. This species does not venture far from California's Central Valley. There are no documented CNDDDB occurrences of this species within the Study Area.
<i>Charadrius montanus</i>	mountain plover	—	BLM-S	CSC	Breeds on open plains at moderate elevations in the intermountain West. Winters in short-grass plains and fields, plowed fields, and sandy deserts in the western United States. In California, found mostly in the Central Valley, foothills west of San Joaquin Valley, Imperial Valley, and along the central Colorado River valley.	Unlikely to occur. The Study Area is outside the geographic range of this species.
<i>Empidonax traillii</i>	willow flycatcher	—	FSS	SE	Found in wet meadow and montane riparian habitats from 2,000 to 8,000 ft. Most often occurs in broad, open river valleys or large mountain meadows with lush growth of shrubby willows.	Unlikely to occur. Wet meadow habitat within the Study Area does not support dense thickets of riparian vegetation (BoR 2014). There are no documented CNDDDB occurrences of this species within the Study Area.

Scientific Name	Common Name	Federal Status	Other Status	State Status	Habitat	Potential for Occurrence in Study Area ^a
<i>Gymnogyps californianus</i>	California condor	FE	—	SE, CFP	Endangered, permanent resident of the semi-arid, rugged mountain ranges surrounding the southern San Joaquin Valley, including the Coast Ranges from Santa Clara County south to Los Angeles County, the Transverse Ranges, Tehachapi Mountains, and southern Sierra Nevada. Forages over wide areas of open rangelands, roosts on cliffs and in large trees and snags.	Unlikely to occur. Potentially suitable foraging habitat is present within the Study Area; however, this species was not observed during surveys conducted in support of relicensing and the Study Area is outside of the current condor range. GPS tracking by USFWS detected a single condor south of Auberry in 2013 (USFWS 2013), outside the Study Area. No condor locations have been recorded within the Study Area or vicinity from current USFWS tracking data (2003 – 2016).
<i>Icteria virens</i>	yellow-breasted chat	—	—	CSC	Found in dense riparian thickets of willows, vine tangles, and dense brush associated with streams, swampy ground, and the borders of small ponds.	Unlikely to occur. Suitable habitat for this species is minimal within the Study Area. There are no documented CNDDB occurrences of this species within the Study Area.
<i>Riparia riparia</i>	bank swallow	—	BLM-S	ST	Found in lowland and riparian habitats during spring and fall. During the breeding season, restricted to riparian, lacustrine, and coastal areas that have vertical banks, bluffs, and cliffs in which to nest. Nests colonially and almost always near open water.	Unlikely to occur. Suitable nesting habitat is not present within the Study Area. There are no documented CNDDB occurrences of this species within the Study Area.
<i>Strix nebulosa</i>	great gray owl	—	FSS	SE	Nests in old-growth coniferous forests and forages in montane meadows and occasionally annual grasslands. Distribution includes the high elevations of the Sierra Nevada and Cascade ranges, from 4,500 to 7,500 ft. in elevation.	Unlikely to occur. The Study Area is outside the typical elevation range for this species. There are no documented CNDDB occurrences of this species within the Study Area.
<i>Vireo bellii pusillus</i>	least Bell's vireo	FE	—	SE	Summer resident below 2,000 ft. in Santa Barbara, Ventura, San Bernardino, Riverside, San Diego, Imperial, and Inyo counties. Prefers willows and other low, dense valley-foothill riparian habitat in the lower portion of canyons for breeding.	Unlikely to occur. Suitable riparian habitat for this species is limited in size, distribution, and structure. This species is not known to nest in the Study Area (BoR 2014). There are no documented CNDDB occurrences of this species within the Study Area.

Scientific Name	Common Name	Federal Status	Other Status	State Status	Habitat	Potential for Occurrence in Study Area ^a
Mammals						
<i>Dipodomys nitratooides exilis</i>	Fresno kangaroo rat	FE	—	SE	The range of this species encompasses arid grasslands (with friable, sandy soils) in the San Joaquin and adjacent valleys, from the valley floor in Merced County, south of the Merced and San Joaquin rivers, to the southern edge of the valley, and the Panoche Valley in eastern San Benito County), the Carrizo Plain (San Luis Obispo County), and the upper Cuyama Valley (San Luis Obispo and Santa Barbara counties), at elevations of 100 to 2,700 ft. USFWS has designated critical habitat for this species.	Unlikely to occur. The Project is not within the geographic range of this species. The closest critical habitat designated for this species is in western Fresno County. There are no documented CNDDB occurrences of this species in the Study Area.
<i>Martes caurina sierrae</i>	Sierra marten	--	FSS	--	Mixed evergreen forests with more than 40% crown closure along Sierra Nevada and Cascade mountains between 4,000 and 10,600 feet. Needs variety of different-aged stands, particularly old-growth conifers and snags which provide cavities for dens/nests.	Unlikely to occur. Study Area is below the typically elevation range for this species.
<i>Pekania pennanti</i>	fisher – Southern Sierra Nevada DPS	FE	BLM-S, FSS	ST (S. Sierra Nevada ESU), CSC	Found in large areas of mature, dense forest red fir, lodgepole pine, ponderosa pine, mixed conifer, and Jeffrey pine forests with snags and greater than 50% canopy closure. Also found in montane riparian corridors within the aforementioned habitats. Historically known from elevations of sea level to 8,000 ft.; in the Sierra Nevada, typically restricted to above 2,000 ft. in elevation.	Unlikely to occur. Study Area is below the typically elevation range for this species. Suitable habitat is limited within the Study Area. There are no documented CNDDB occurrences of this species in the Study Area.

^a Sources: BLM 2014b; BoR 2014; CDFW 2019b, 2019c; GANDA 2015a, 2016b; USFS 2013; USFWS 2013, 2019

Federal Status	
FC	Federal Candidate
FD	Federally Delisted
FC	Federal Candidate
FE	Federal Endangered
FPD	Federal Proposed for Delisting
FPE	Federally Proposed Endangered
FPT	Federally Proposed Threatened
FT	Federally Threatened
Eagle Act	Protected under Bald and Golden Eagle Protection Act
USDA-FS Status	
FSS	U.S. Forest Service Sensitive – Sierra National Forest
State Status	
CFP	California Fully Protected
CSC	California Species of Special Concern
SCE	California Candidate Endangered
SCT	California Candidate Threatened
SD	California Delisted
SE	California Endangered
ST	California Threatened
BLM Status	
BLM-S	Bureau of Land Management Sensitive (Bakersfield Office)

Appendix F

Biological Resources – Aquatics and Fisheries Data

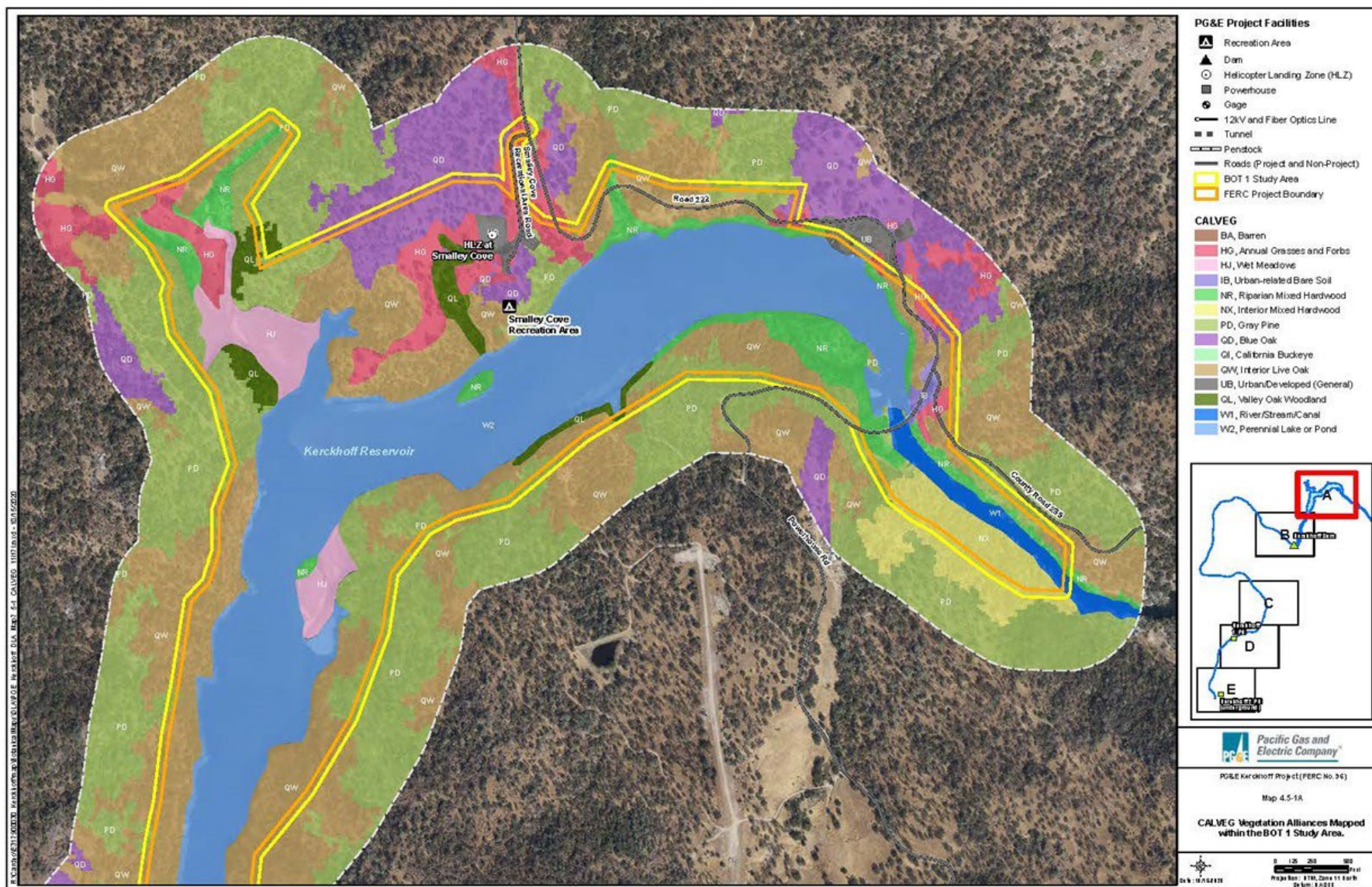


Figure F-1: CALVEG Vegetation Alliances Mapped within the Botanical Study Area—Section A

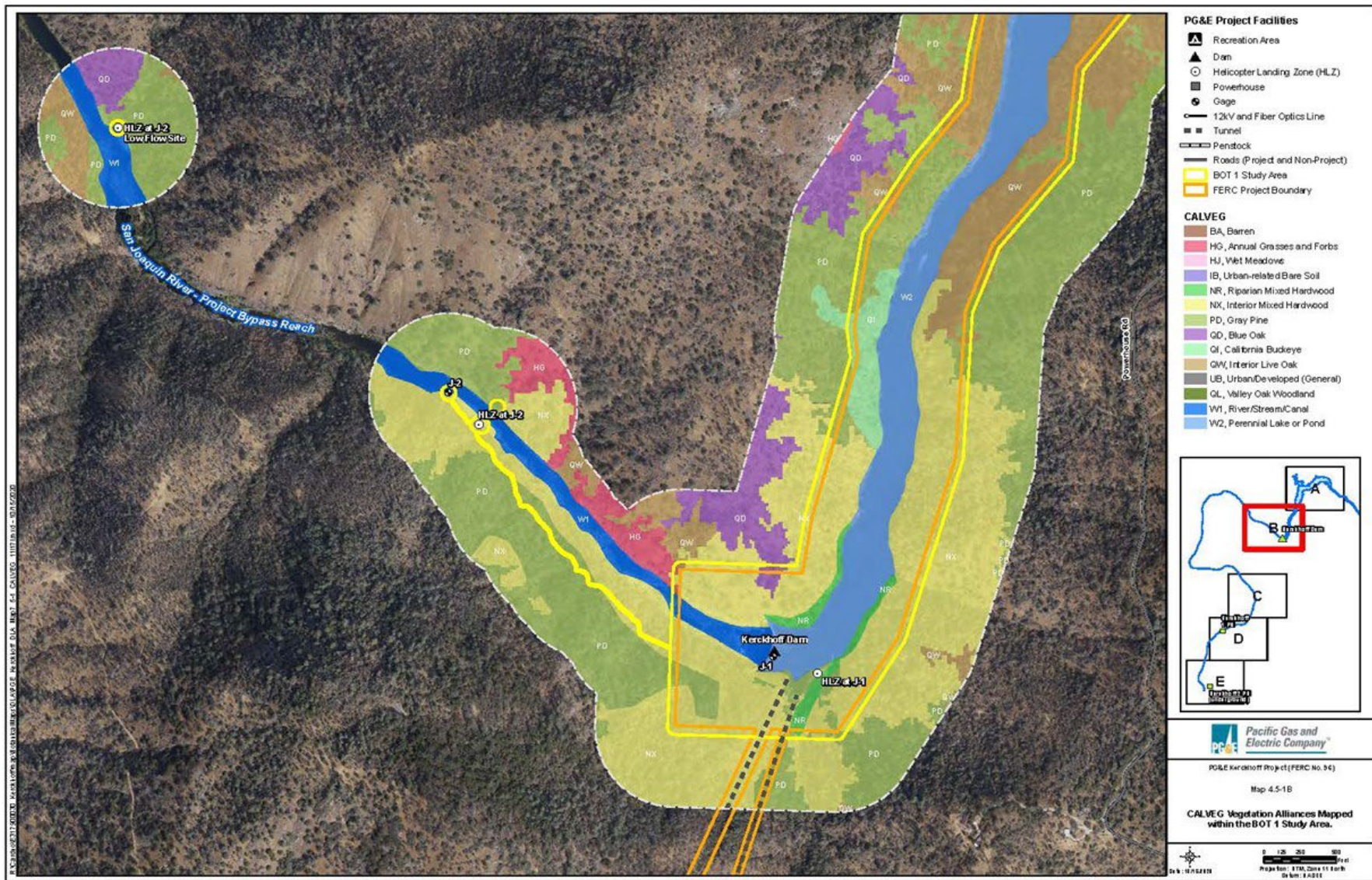


Figure F-2: CALVEG Vegetation Alliances Mapped within the Botanical Study Area—Section B

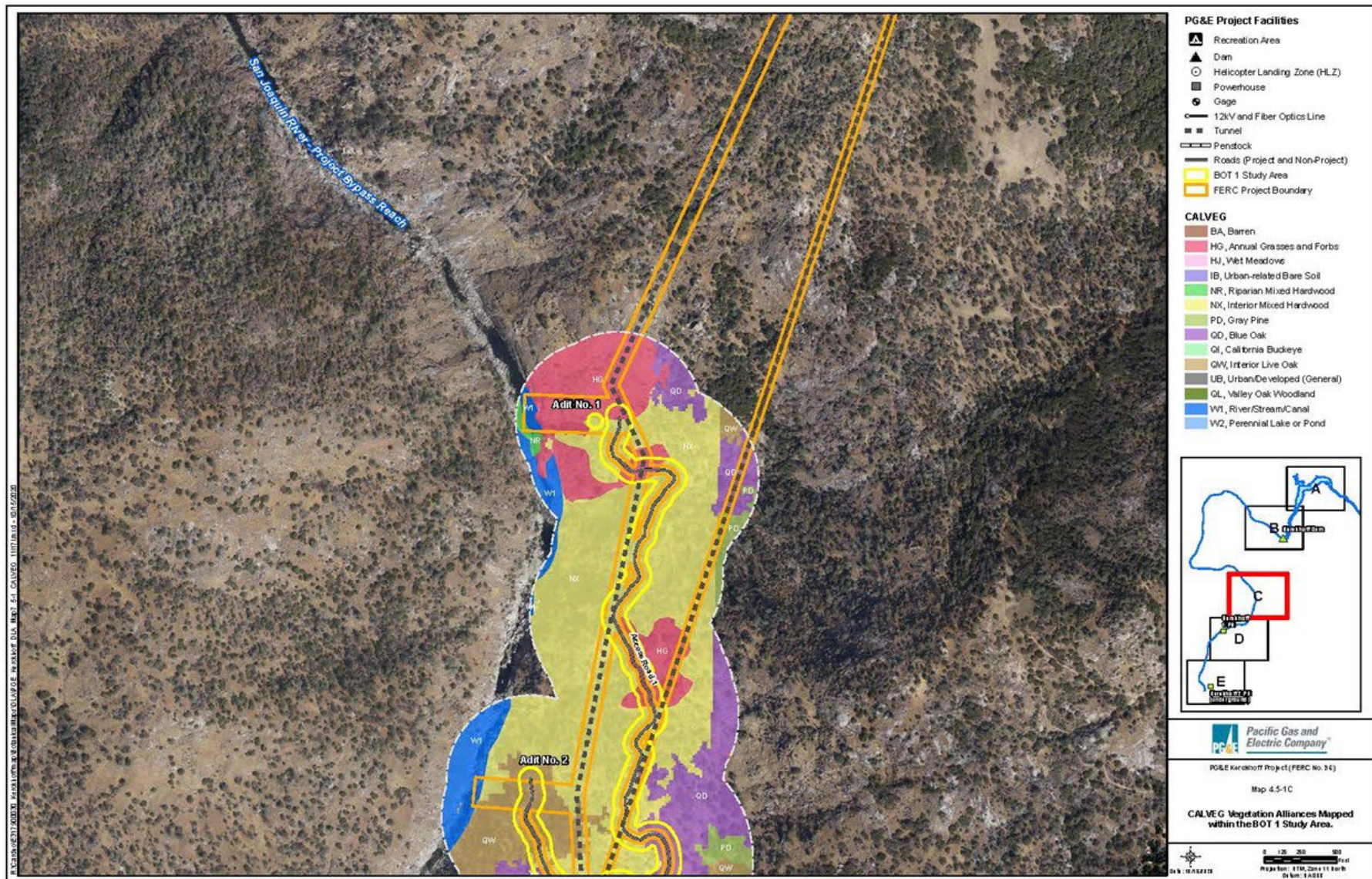


Figure F-3: CALVEG Vegetation Alliances Mapped within the Botanical Study Area—Section C

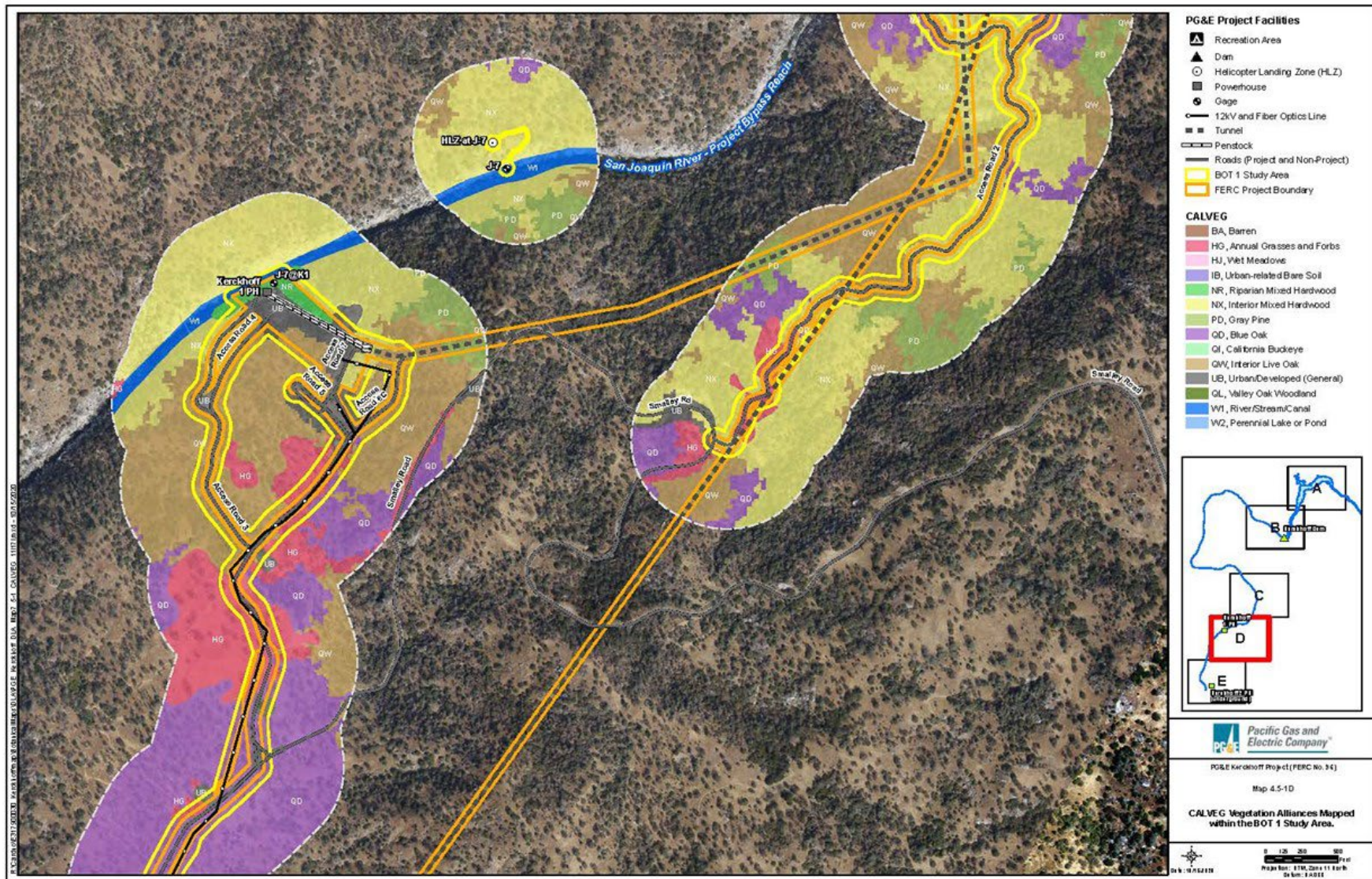


Figure F-4: CALVEG Vegetation Alliances Mapped within the Botanical Study Area—Section D

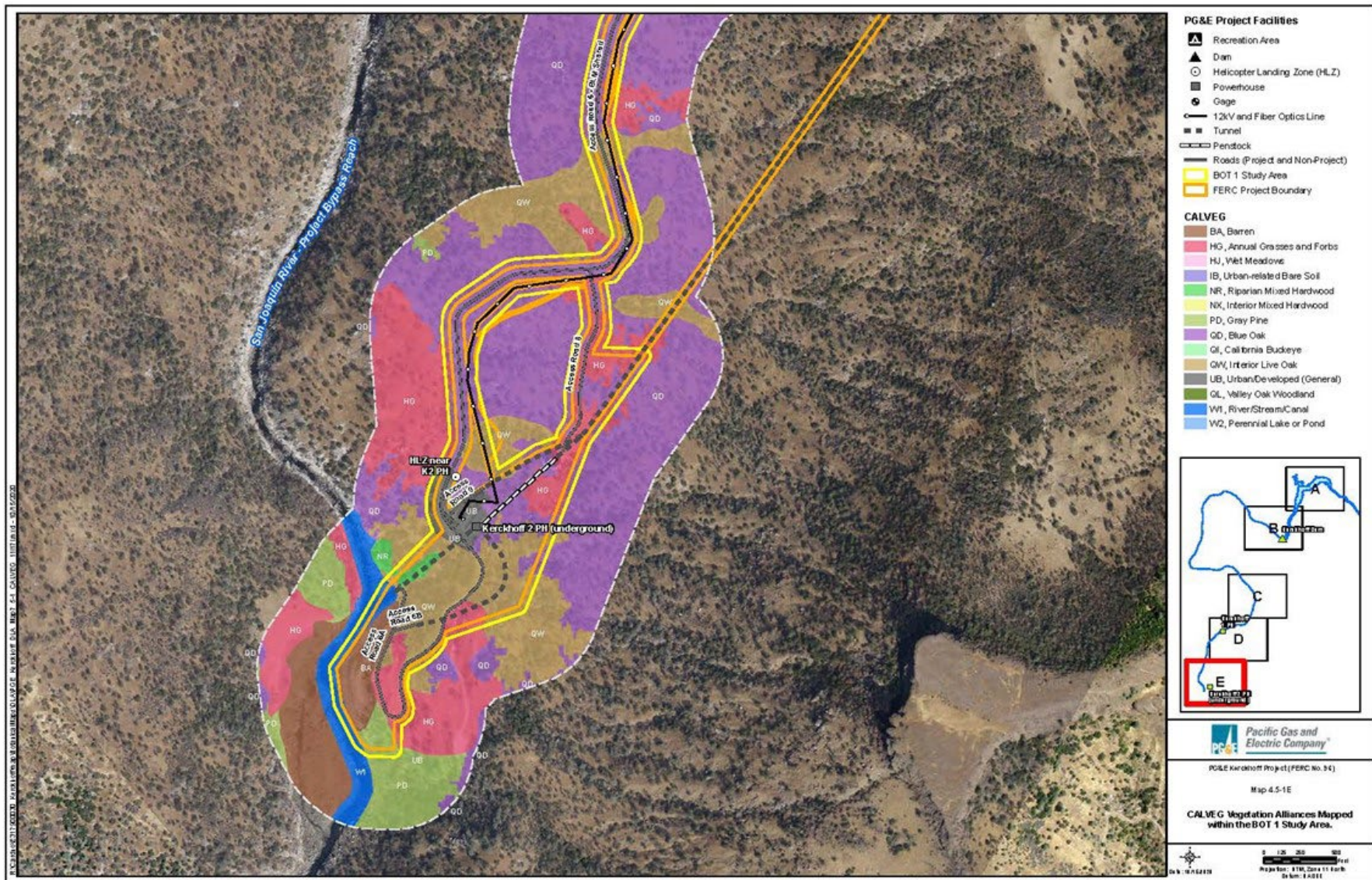


Figure F-5: CALVEG Vegetation Alliances Mapped within the Botanical Study Area—Section E

Appendix G

Project Operations Model – CEQA Alternatives 1 and 2

PROJECT OPERATIONS MODEL – CEQA ALTERNATIVES 1 & 2

KERCKHOFF HYDROELECTRIC PROJECT

FERC No. 96-048

Prepared for:

**California State Water Resources
Control Board**

Prepared by:

Kleinschmidt Associates

April 2026

Kleinschmidt

EXECUTIVE SUMMARY

In November 2020, Pacific Gas and Electric Company (PG&E, or the Applicant) submitted a new license application to the Federal Energy Regulatory Commission (FERC) for the Kerckhoff Hydroelectric Project (FERC No. 96-048). As part of the FERC Ready for Environmental Analysis process, the U.S. Department of the Interior (DOI) issued comments, recommendations, preliminary terms and conditions, and preliminary fishway prescriptions in 2024 (DOI 2024), with revisions issued in 2025 (DOI 2025) under Sections 4(e), 10(a), 10(j), and 18 of the Federal Power Act (FPA). Two of the DOI conditions directly affect how the Kerckhoff Hydroelectric Project would be operated:

1. United States Bureau of Land Management (BLM) FPA 4(e) Condition No 4
2. BLM FPA 4(e) Condition No. 5

Because these measures would change Kerckhoff Hydroelectric Project operations, California State Water Resources Control Board staff and Kleinschmidt Associates fully implemented and evaluated the 2024 BLM FPA 4(e) Condition No 4, a modified version of the 2024 BLM FPA 4(e) Condition No. 5 (Alternative 1 Ramp Up Measure), and the 2025 Revised BLM 4(e) Conditions Nos. 4 and 5 in PG&E's Hydrologic Engineering Center's Reservoir Simulation (HEC-ResSim) Operations Model (PG&E 2025a). This report evaluates the measures described above under two alternatives: California Environmental Quality Act (CEQA) Alternative 1, which reflects the 2024 BLM FPA 4(e) Condition No 4 and the Alternative 1 Ramp Up Measure; and CEQA Alternative 2, which reflects the revised 2025 DOI Revised BLM 4(e) Conditions Nos. 4 and 5. Both alternatives were simulated across the full hydrologic period of record from Water Year (WY) 2003 and WYs 2005–2017.

The Operations Model (ResSim Version 3.3, PG&E 2025a) simulates reservoir inflows, spillway and outlet hydraulics, powerhouse capacity and constraints, and required environmental releases. Several higher priority operational rules were already in place and remained active under both alternatives. These include minimum instream flow requirements, fish-related flow and temperature measures, Kerckhoff 2 (K2) Powerhouse deratings, powerhouse outages, and other operational constraints. These background rules affect how well new spill and ramping measures can be carried out while keeping the reservoir near its normal operating range. The normal operating range is defined in the model using a guide curve, which is a seasonal rule that shows the preferred target

water levels in a reservoir throughout the year to balance hydropower, environmental, and societal needs. The guide curve provides operators with a reference line for when to store water and when to release it during changing hydrologic conditions.

CEQA ALTERNATIVE 1

2024 BLM 4(E) CONDITION 4 – SPILL YEAR BOATING FLOWS AND DOWN RAMPING OF SPILL FLOWS RESULTS SUMMARY

Under Alternative 1, water-year-specific ramp down schedules (Schedules AB, BC, and D) were applied to all spill events. All schedules were completed successfully; however, the high starting flows and long step durations consistently caused the reservoir level to infringe on K2 Powerhouse operational constraints, built into the original PG&E Operations Model (PG&E 2025a). One such constraint is the minimum reservoir elevation for operating the K2 Powerhouse, which is 981.5 feet above mean sea level (msl) in the model, as described in Table 2.3 of Appendix B of the Second Supplemental Information Filing in Support of Final Application for New License (PG&E 2023). Other constraints also impose limitations on K2 operations as reservoir levels drop and depend on inflow rates, reservoir level, and other operational rules with higher priority. Furthermore, if the reservoir elevation drops to 981.5 feet msl or lower, the Kerckhoff Hydroelectric Project can no longer divert water into the K2 Powerhouse in the model. The K2 Powerhouse operational constraints relative to the minimum operating reservoir elevation are collectively referred to in this report as the encroachment toward the K2 Powerhouse's minimum operating reservoir elevation. This encroachment caused frequent over-cycling of the K2 Powerhouse as the model attempted to both maintain the required spill flows and keep the reservoir above the minimum operating elevation of the K2 Powerhouse.

Powerhouse over-cycling refers to repeated increases and decreases in powerhouse releases as the model responds to competing operational goals. In the model, this resulted in rapid oscillations in both powerhouse flow and reservoir elevation over brief periods (15 minutes to 2 hours, typically). This behavior is considered unrealistic and operationally undesirable. The encroachment toward the K2 Powerhouse's minimum operating reservoir elevation generally leads to powerhouse over-cycling, primarily around the large Rough Operating Zone (ROZ), especially when the prescribed spillway flows are large compared to inflows.

Non-spill-year whitewater boating flows were only possible when reservoir inflows were high enough to support two consecutive days of releases between 2,500 and 1,600 cubic feet per second (cfs), followed by the required ramp down. Across six non-spill years, only 28.6 percent of boating flow attempts were fully successful; WY 2014 was an exception, as inflows were sufficient to support most weekend boating events.

The Stranding Protection Down Ramping schedule, which uses lower flows and shorter durations, performed well. It resulted in far fewer reservoir-level conflicts and minimal powerhouse over-cycling. The September – October Ramp Down was also completed successfully in all applicable years, although it occasionally caused the encroachment toward the K2 Powerhouse’s minimum operating elevation due to typically low fall inflows, which led to a brief instance of powerhouse over-cycling in WY 2007.

MODIFIED BLM 4(E) CONDITION 5 – ALTERNATIVE 1 RAMP UP MEASURE RESULTS SUMMARY

The Alternative 1 Ramp Up Measure limits spill ramp up rates to no more than one foot per hour of stage increase at Gage J-2 (United States Geologic Survey Gage Number: 11246700) for spill initiations between minimum instream flow and 4,000 cfs. Using a stage-discharge rating curve developed from historical United States Geological Survey data at Gage J-2, the model applied stepped hourly increases equal to one foot of stage rise.

Out of 42 spill events requiring ramp up, the model successfully met this requirement 97.6 percent of the time. No encroachment toward the K2 Powerhouse’s minimum operating reservoir elevation or powerhouse over-cycling occurred. The main operational sensitivities were the need for advance notice of incoming inflows (typically one to five hours) and proper timing by operators. Starting ramp up earlier generally provided more flexibility and reduced the risk of exceeding the reservoir guide curve.

CEQA ALTERNATIVE 2 – REVISED DOI CONDITIONS

2025 REVISED BLM 4(E) CONDITION 4– MODIFIED END-OF-SPILL FLOW RECESSON AND WHITewater FLOW RELEASES AND SUBSEQUENT SPILL RAMP DOWN SCHEDULE RESULTS SUMMARY

Modified End-of-Spill Flow Recesson and Whitewater Flow Releases (Modified EOS Flow Recesson Measure) schedules were applied to the largest spill event in each WY between

May 1 and August 31. While all Modified EOS Flow Recession schedules were completed successfully, the higher initial flows and relatively long step durations resulted in the encroachment toward the K2 Powerhouse's minimum operating reservoir elevation and K2 Powerhouse over-cycling in all cases. In practice, operators would likely need to extend step durations to better match actual inflow recession rates, which is feasible as the measure's flow steps only require minimum amounts of time that a down ramp step must be implemented.

The Subsequent Spill Ramp Down schedule, which uses shorter steps and lower flows, performed efficiently with minimal reservoir drawdown and no meaningful powerhouse cycling.

2025 REVISED BLM 4(E) CONDITION 5 – MODIFIED SPILL SEASON FLOW MEASURE AND THE MODIFIED PLANNED OUTAGE MEASURE INITIAL RELEASE PROTOCOL RESULTS SUMMARY

The Modified Spill Season Flow Measure was triggered 30 times during the period of record and was implemented successfully in all cases. Its lower flow ranges and short step durations prevented the encroachment toward the K2 Powerhouse's minimum operating reservoir elevation and avoided powerhouse over-cycling. The Planned Outage Measure (POM) Ramp Down performed similarly, although it often caused substantial reservoir drawdown.

In contrast, the POM Initial Release Protocol created significant operational challenges. Attempting to release spill at 3:30 a.m. in anticipation of forecast inflows consistently caused the reservoir to drop toward the K2 Powerhouse's minimum operating reservoir elevation before inflows arrived. Without consistent inflows the goal of the protocol, which was to have initial spill associated with an outage begin the previous night or early morning so that spill arrives downstream near the K1 Powerhouse by 8:30 a.m. could not be completed. This led to secondary spill increases later in the day once the reservoir was at full capacity to match reservoir inflows. These secondary increases produced stage rise rates ranging from approximately 1.2 feet to as much as 11.7 feet at downstream monitoring locations.

Stage-discharge rating curves used to evaluate these changes were developed by PG&E as part of a prior study and are valid up to flows of 3,500 cfs (Cardno 2021). Stage changes at higher flows were not evaluated but could be larger.

RESERVOIR PERFORMANCE, STAGE BEHAVIOR, AND OPERATIONAL FEASIBILITY (UNDER ALTERNATIVES 1 AND 2)

Across all simulations, Kerckhoff Reservoir remained well above the inactive pool elevation of 960 feet msl. Most ramp down measures caused reservoir drawdown because required spill releases exceeded inflow during execution. Measures with high flows and long durations—such as Schedules AB, BC, D, and Modified EOS Flow Recession—consistently led to the encroachment toward the K2 Powerhouse’s minimum operating reservoir elevation and K2 Powerhouse over-cycling. In actual operations, operators would likely reduce powerhouse generation to avoid repeated cycling.

Short-term drops in inflow occurred frequently in the inflow dataset. When matched by spill gate adjustments, these drops caused rapid stage decreases followed by sharp increases in the Project Bypass Reach (PBR). Modeled stage changes exceeded 11 feet at some study sites. Travel time from the dam to these sites was not analyzed, and these effects appear to reflect inflow data characteristics rather than failures of the evaluated measures.

OVERALL FINDINGS

- **Alternative 1 Ramp Up Measure** (stage-limited ramp up) is highly effective, operationally feasible, and does not create reservoir or powerhouse conflicts. However, operators at Kerckhoff Dam would need advanced notification from upstream projects of the timing and amount of incoming flows (typically one to five hours) in order to effectively implement ramp up by beginning ramp up prior inflows arriving.
- **Alternatives 1 and 2 high-flow, long-duration ramp downs** (Schedules AB, BC, D, Modified EOS Flow Recession) are technically achievable but consistently force the system into the encroachment toward the K2 Powerhouse's minimum operating reservoir elevation and K2 Powerhouse over-cycling. However Alternative 2's encroachment toward the K2 Powerhouse's minimum operating reservoir elevation and powerhouse over-cycling were less in occurrence and magnitude compared to Alternative 1.
- **Moderate, short-duration schedules** (Stranding Protection Down Ramping, Subsequent Spill Ramp Down, Modified Spill Season Flow Measure, Modified POM Ramp Down) perform well with minimal operational conflicts.
- **Non-spill year boating flows** remain highly constrained by limited inflows and rarely achieved their intended purpose of providing consistent boating flows for recreationists.
- **POM Initial Release Protocol** could not be properly implemented without sustained inflows to the reservoir and consistently lowered to reservoir without adequate inflows. Once inflows picked up later in the day, Kerckhoff Dam would be forced into spill once Kerckhoff Reservoir reached capacity and without the Project being able to divert through the K2 Powerhouse. This caused secondary flow spikes that created large stage increases in the PBR. The stage increase amount was dependent on the amount of inflow from upstream hydroelectric projects

Overall, the evaluated measures could be implemented within the existing operational framework. However, several measures create operational side effects—primarily the encroachment toward the K2 Powerhouse's minimum operating reservoir elevation and powerhouse over-cycling—that would require real-time operator judgment to manage safely and effectively.

The following table presents a qualitative assessment of the success of CEQA Alternatives 1 and 2 measures from the period of record simulations. The success rate provides a percentage of time the measure was successfully completed. The percentage of time the application of the measure caused K2 Powerhouse over-cycling is also presented.

CEQA Alternatives 1 and 2 performance.

Measure	Count	Success Rate (%)	K2 Powerhouse Over-Cycling (%)
Alternative 1 Ramping Conditions			
Spill Year Schedule Boating Flows and Down Ramping of Spill Flows	12	100	91.7
Non-Spill Year Boating Flows and Down Ramping	28	28.6	4.6
Stranding Protection Down Ramping	8	100	12.5
September – October Down Ramp	4	100	0**
Alternative 1 Ramp Up	42	97.6	0
Alternative 2 Ramping Conditions			
Modified EOS Flow Recession	10	100	100
Subsequent Spill Ramp Down	5	100	0
Modified Spill Season Flow Measure	30	100	0
POM Initial Release Protocol	12	0	0
Modified POM Ramp Down	12	100	0

*Success would depend on the operator's ability to accurately predict the optimal initiation time of the ramp up.

**K2 Powerhouse Over-Cycling in WY 2007 is not included here because it was very brief.

MODEL ASSUMPTIONS AND LIMITATIONS

The HEC-ResSim model provided by PG&E (PG&E 2025a), and augmented to include the CEQA 1 and 2 Alternatives, simulates reservoir operations using fixed, rule-based logic applied at set time intervals. Reservoir inflows are provided as input and assumed to be accurate. Storage and flow release behavior is based on predefined rating curves. The model does not account for real-time operator judgment, hydrologic feedback, or processes that occur within a single time step. Model results are intended to compare operational scenarios and are not meant to predict exact real-world operations. Key assumptions and limitations are as follows:

- **Inflows are prescribed.** Reservoir inflows are provided as external time series and are assumed accurate. The model does not generate runoff or adjust inflows based on operations.
- **Physical relationships are fixed.** Stage–storage, stage–discharge, and outlet capacity relationships are assumed constant over time and do not reflect sedimentation, debris, or structural changes.
- **Operations are rule based.** All operational decisions are controlled by predefined rules and priorities using built-in rules-based logic or scripted rules. Operator discretion and real-time adjustments are not represented.
- **Discrete time steps.** Operational changes occur only at the model time step (15 minutes). Changes within a time step are not simulated.
- **Simplified hydraulics.** Each reservoir is modeled as a single, well-mixed pool with level pool flow routing (meaning the reservoir raises and lowers as a level pool). Backwater, tailwater, and downstream flow routing effects are omitted (i.e., “null” routing).
- **Facilities are assumed available.** Spillways, outlet works, and powerhouses are assumed fully operational unless outages are specifically modeled (e.g., POM).
- **Results are comparative.** Model results are intended to compare alternatives and operating strategies, not to reproduce or forecast exact observed operations.
- **Adaptation from original PG&E Operations Model.** Aside from the newly implemented Alternatives 1 and 2, operational rules and physical properties of the dam and reservoir were adopted from the original model.

MODEL DATA SOURCES

The model data sources all appear on the references listed in Section 6.0 and are listed here for convenience:

- Cardno. 2021. Kerckhoff Hydroelectric Project Stage-Discharge Investigation. September 13, 2021.
- Pacific Gas and Electric Company (PG&E). 2023. Second Supplemental Information Filing in Support of Final Application for New License, FERC Project No. 96-048. March 31. [includes Appendix B, Operations Simulation Model]
- Pacific Gas and Electric Company (PG&E). 2025a. Kerckhoff Project ResSim Model – No Action 15-minute LTOR inflow. HEC-ResSim Model Files.

- Pacific Gas and Electric Company (PG&E). 2025b. PGE_Supplemental_FLA_15Min_Model. HEC-ResSim Model Files.
- United States Department of the Interior (DOI). 2024. Comments, Recommendations, Preliminary Terms and Conditions, and Preliminary Fishway Prescriptions on the Federal Energy Regulatory Commission Ready for Environmental Analysis Notice for the Kerckhoff Hydroelectric Project, Federal Energy Regulatory Commission Project No. P-96-048, San Joaquin River, Fresno and Madera Counties, California. United States Department of the Interior, September 24, 2024.
- United States Department of the Interior (DOI). 2025. Revised Conditions and Recommendations for the Kerckhoff Hydroelectric Project, Federal Energy Regulatory Commission Project No. P-96-048, San Joaquin River, Fresno and Madera Counties, California. United States Department of the Interior, May 11, 2025.

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Appendix A Storage Presented in Monthly Minima, Averages, and Maxima

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Operations Modeling Report-Final_Rev4.docx

ACRONYMS AND ABBREVIATIONS

A

AA	Above Average
Applicant	Pacific Gas and Electric Company

B

BA	Below Average
BLM	United States Bureau of Land Management

C

CEQA	California Environmental Quality Act
cfs	cubic feet per second

D

DLA	Draft License Application
DOI	United States Department of the Interior

F

FERC	Federal Energy Regulatory Commission
FLA	Final License Application
FPA	Federal Power Act

G

guide curve	A seasonal rule that shows the preferred target water levels in a reservoir throughout the year to balance hydropower, environmental, and societal needs. It provides operators with a reference line for when to store water and when to release it during changing hydrologic conditions
-------------	--

H

HEC	Hydrologic Engineering Center
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K

K1	Kerckhoff 1 (Powerhouse)
K2	Kerckhoff 2 (Powerhouse)

L

LTOR	Long-term Operating Rules
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M

MIF	minimum instream flow
Modified EOS Flow Recession	Modified End-of-Spill Flow Recession and Whitewater Releases
msl	above mean sea level

P

PBR	Project Bypass Reach
PG&E	Pacific Gas and Electric Company
POM	Planned Outage Measure

R

rating curve	A relationship between a hydraulic structure's capacity to pass flow and water surface elevation
REA	Notice of Application Accepted for Filing, Soliciting Motions to Intervene and Protests, Ready for Environmental Analysis and Soliciting Comments, Recommendations, Preliminary Terms and Conditions, and Preliminary Fishway Prescriptions
ResSim	Reservoir Simulation Software
ROZ	rough operating zone

S

SCE	Southern California Edison
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U

USGS	United States Geological Survey
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W

WY	Water Year
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1.0 INTRODUCTION

In November 2020, Pacific Gas and Electric Company (PG&E or Applicant) filed a new license application for the Kerckhoff Hydroelectric Project (Federal Energy Regulatory Commission [FERC] No. 96-048). In response, FERC published “Notice of Application Accepted for Filing, Soliciting Motions to Intervene and Protests, Ready for Environmental Analysis and Soliciting Comments, Recommendations, Preliminary Terms and Conditions, and Preliminary Fishway Prescriptions” (REA) in June 2024. This led to a review by the United States Department of the Interior (DOI), which included participation from the United States Fish and Wildlife Service, United States Bureau of Land Management (BLM), United States National Park Service, and United States Bureau of Reclamation. The review and the subsequent comments, recommendations, preliminary terms and conditions, and preliminary fishway prescription for operation of the Kerckhoff Hydroelectric Project based on Section 4(e), 10(j), 10(a), and 18 Authorities are included in a document provided by the DOI on September 24, 2024 (DOI 2024). A follow-up document provides revisions to Section 4(e) and 10(a) recommendations (DOI 2025).

This report discusses the development and evaluation of two new operations alternatives in PG&E’s existing United States Army Corps of Engineers Hydrologic Engineering Center’s (HEC) Reservoir Simulation Software (ResSim) Operations Model. While there are several recommendations provided in the original and revised documents, two recommendations are applicable to the Operations Model and would be implemented:

- BLM Federal Power Act (FPA) Section 4(e) Condition No. 4 – Passage of Southern California Edison’s (SCE) Long-term Operating Rules (LTOR) flows through the Kerckhoff Bypass Reach of the San Joaquin River (Project Bypass Reach, or PBR) (Condition 4)
- Modified BLM FPA Section 4(e) Condition No. 5 –Alternative 1 Ramp Up Measure

These two conditions make up Alternative 1, implemented into the ResSim Operations Model for the Kerckhoff Hydroelectric Project for comparison to existing conditions.

The revisions to these two conditions, as presented in DOI (2025), make up Alternative 2, also implemented into the ResSim Operations Model for the Kerckhoff Hydroelectric Project for comparison to existing conditions and Alternative 1. The following operational

rules that satisfy both California Environmental Quality Act (CEQA) Alternative 1 and CEQA Alternative 2 are discussed in detail in the succeeding sections.

- **CEQA Alternative 1**

- *BLM FPA Section 4(e) Condition No. 4 – Passage of Southern California Edison’s (SCE) Long-term Operating Rules (LTOR) flows through the Kerckhoff Bypass Reach of the San Joaquin River (Condition 4)*
 - Spill Year Schedule Boating Flows and Down Ramping of Spill Flows – Spill Year Schedules A or B Low Storage (AB), B High Storage or C (BC), and D.
 - Non-Spill Year Boating Flows and Down Ramping
 - Stranding Protection Down Ramping
 - September – October Down Ramp
- *Modified BLM FPA Section 4(e) Condition No. 5 – Alternative 1 Ramp Up Measure*
 - Alternative 1 Ramp Up

- **CEQA Alternative 2**

- *BLM FPA Section 4(e) Condition No. 4 (Condition 4 – Revised)*
 - Modified End-of-Spill Flow Recession and Whitewater Flow Releases Measure (Modified EOS Flow Recession)
 - Subsequent Spill Ramp Down Measure
- *BLM FPA Section 4(e) Revised Condition No. 5 – Deterrence Flows for Protection of Public Safety and Aquatic Life (Condition 5 – Revised)*
 - Modified Spill Season Flow Measure
 - Modified Planned Outage Measure (POM)

2.0 EXISTING CONDITIONS OPERATIONS MODEL

PG&E's Operations Model for the existing Kerckhoff Hydroelectric Project (FERC No. 96-048) (Kerckhoff Hydroelectric Project) was developed with ResSim. The modeling domain spans from the upper end of Kerckhoff Reservoir to the Kerckhoff 2 (K2) Powerhouse discharge into the San Joaquin River.

The ResSim model is composed of several elements to describe the system connectivity as well as inflow and outflow points, routing reaches, and the reservoir. The reservoir contains both physical and operational data for the Kerckhoff Hydroelectric Project. This model is optimized for ResSim Version 3.3 and will not work with more recent versions of ResSim under its current configuration.

2.1 Model Schematic

The model is composed of several elements to describe the system connectivity as shown in Figure 2-1.

Inflows to the system are added at the San Joaquin River Inflow to Kerckhoff Reservoir Junction. Kerckhoff Reservoir is included as a reservoir element in the model. The reservoir element includes a capacity curve that describes the relationship between water surface elevation and storage/area. Evaporation is assigned to the reservoir element and is based on monthly averages in units of inches. Two diversions are included with the reservoir that divert controlled releases via tunnels to the Kerckhoff 1 (K1) and K2 powerhouses. The reservoir element also includes a dam, which consists of two outlets: a low-level outlet and a gated spillway. Rating curves are entered into the model to define the hydraulic capacity of each outlet.

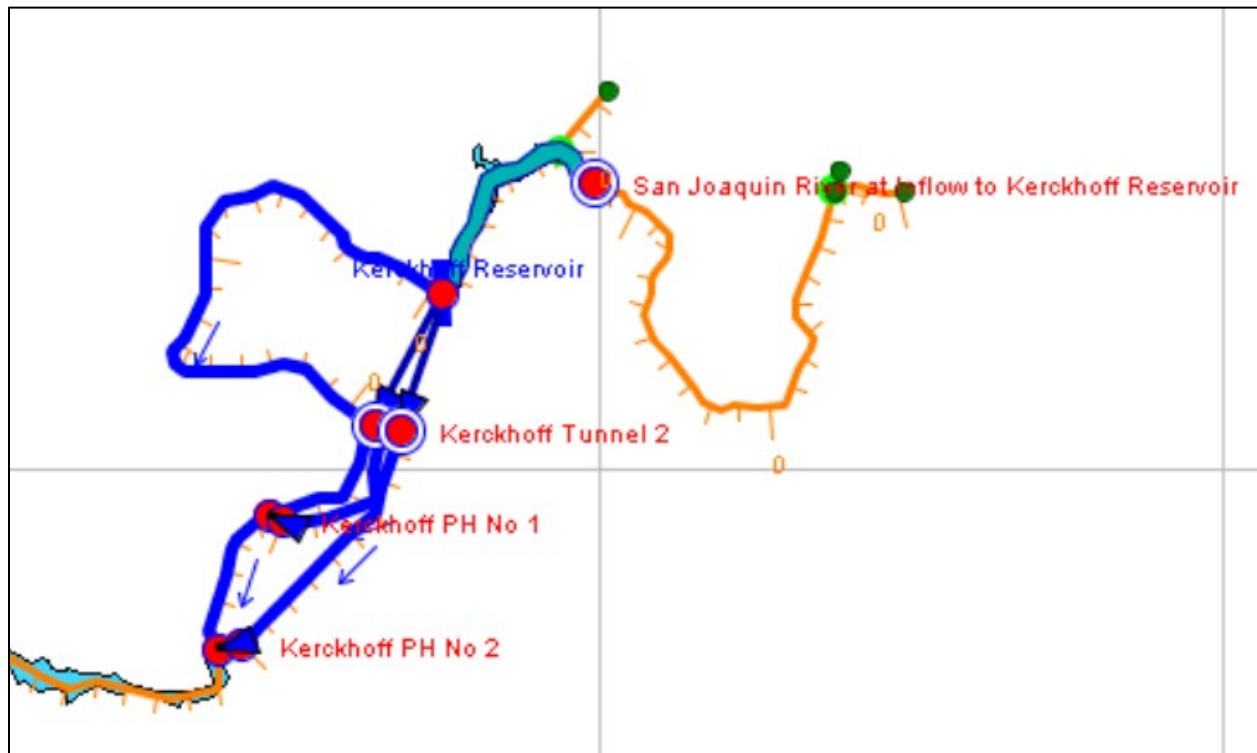


Figure 2-1 Model schematic.

The model includes the K1 Powerhouse, but that powerhouse is kept offline for all simulations to reflect the current offline status of K1 and K1's retirement for the purposes of power generation or diversion under the Proposed Project and Alternatives. The PBR from Kerckhoff Dam to the K2 Powerhouse discharge is also included as a routing reach but with Null Routing, meaning it is a pass-through reach assuming no travel time (i.e., inflow equals outflow for a given computational time step).

2.2 Hydrologic Data

The current configuration of the model includes 15-minute inflow data spanning Water Years (WYs) 2003 and 2005 through 2017. This inflow dataset is based on historical observed flows from the following sources. The following data were provided by PG&E in their Operations Model:

- SCE's Big Creek No. 4 Project (FERC No. 2017) at Dam 7 (Redinger Lake), United States Geological Survey (USGS) San Joaquin River above Willow Creek, near Auberry, California (USGS Gage No. 11242000), approximately seven miles upstream of Kerckhoff Reservoir

- Big Creek Powerhouse No. 4 near Auberry, California, USGS Gage No. 11246530, approximately one mile upstream of Kerckhoff Reservoir
- Willow Creek Mouth, USGS Gage No. 11246500, approximately six and a half miles upstream of Kerckhoff Reservoir
- San Joaquin A.G. Wishon Powerhouse near Auberry, California, USGS Gage No. 11246610, located at the headwaters of Kerckhoff Reservoir

The inflow data were adjusted to estimate what flow releases would have been under the LTOR prescription. These LTOR estimates were developed by PG&E for the existing Operations Model (PG&E 2023). The original 15-minute LTOR data included flows for WYs 2003 and 2005-2017 (PG&E 2023). For WY 2004, 15-minute data were not available. However, the existing conditions Operations Model provided by PG&E (PG&E 2025a) did have a complete 15-minute inflow record from WYs 2003-2017, but WY 2004 is contained in the modeling simulation only for continuity in the modeling simulation and was omitted from analysis.

The inflow data indicate many instances of sudden and significant drops in flow over a single time step (flow dips). An example of this is shown in Figure 2-2 over a three-day period in July 2005. However, these flow dips occurred frequently throughout the LTOR dataset. They are characterized by drops in flow data, sometimes as much as 2,000 cfs or more over a 15-minute time step. It is highly unlikely that upstream projects release flows in this way. Fortunately for the modeling effort discussed in this report, their effect on reservoir levels and spill at Kerckhoff Dam is minimal, most notably because the duration of these flow dips is so short (15 minutes).

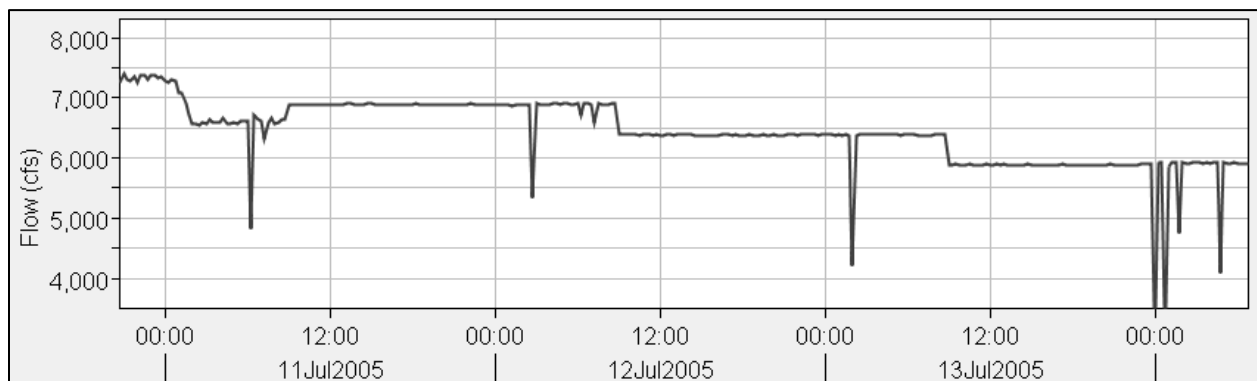


Figure 2-2 Example of flow dips in the LTOR inflow dataset.

2.3 Reservoir Operations Data

The primary function of a ResSim model is the ability to simulate operations at a reservoir through period of record flows. There are several operational rules implemented into the Kerckhoff Reservoir element in the current model configuration that simulate the existing conditions that Kerckhoff Reservoir operates within. This is referred to as the “No Project Alternative,” and in the ResSim model it is named “Generic PH Outages,” which represents existing conditions.

2.3.1 Zones

Three zones are defined for Kerckhoff Reservoir in the model: Inactive, Conservation, and Flood Control. These zones allow the specification of different rules for different operational pool level ranges. Inactive typically refers to the pool elevation below which any kind of operation is not possible (i.e., below the lowest operable discharge outlet). Conservation represents the pool elevation range where normal operations apply. Flood control represents the pool elevation range where operations specific to common flood events apply. The Operations Model uses a duplicate set of operational rules for both the Conservation zone and the Flood Control zone. The model is built to attempt to maintain the Kerckhoff Reservoir within the Conservation zone, which is between 980 feet and 984.5 feet above mean sea level (msl). Physical constraints can interrupt operational rules when near the boundaries of the Conservation zone. Examples include if an operation directs a certain amount of spill discharge but the pool elevation is so low it physically cannot discharge that amount of spill, or if an operation directs a small amount of spill but the inflow to the reservoir is so large that a project must spill more to prevent exceeding the Flood Control zone. These are both common reasons prescriptive operations can be overridden during the simulation and happens for both the No Project Alternative and the two CEQA Alternatives.

2.3.2 Operational Rules

The following operation rules are implemented for the No Project Alternative in the current ResSim model based on conditions implemented through current FERC licenses and other standard operational procedures. The rules are listed here in order of priority, meaning if during the simulation there is a conflict between actions taken by two or more rules, the highest priority rule would take precedence over the others. The rules and priority order below were implemented by PG&E into their existing Operations Model utilized for this modeling effort and were not changed.

1. Minimum Instream Flow (MIF) Requirements Below Kerckhoff Dam
2. American Shad (*Alosa sapidissima*) Spawning Flow Releases
3. 1980 Fishery Agreement for Smallmouth Bass (*Micropterus dolomieu*) Water Temperature Releases
4. K2 Powerhouse Derating
5. Powerhouse Maintenance Outages
6. K2 Powerhouse Constraints

Implementation of these conditions as rules in the ResSim model is described in the following sections. Detailed descriptions of these conditions have been provided in Appendix B (“Operations Simulation Model”) of the March 2023 Final License Application (FLA) (PG&E 2023).

2.3.2.1 Minimum Instream Flow Requirements Below Kerckhoff Dam

This condition follows the MIF requirements regulated under the Kerckhoff Hydroelectric Project’s current FERC license. This rule separates a given WY into two categories: Normal and Dry. A Dry WY is defined as a year with a forecasted April through July inflow to Millerton Lake that is less than or equal to 45 percent of the average April to July inflow to Millerton Lake. For a Normal WY, Kerckhoff Reservoir would release a minimum of 25 cubic feet per second (cfs) to the San Joaquin River at all times for that WY. For a Dry WY, Kerckhoff Reservoir would release a minimum of 15 cfs to the San Joaquin River at all times for that WY. The model is set to “over-release” 4.5 cfs in Dry WYs and 7.5 cfs in Normal WYs to match releases that are needed from the Kerckhoff Hydroelectric Project in actual operations. Consequently, the model releases 32.5 cfs for Normal WYs and 19.5 cfs for Dry WYs.

This rule is implemented in the ResSim model using a time series (Location Name: **MIFR_TS**) of releases that was constructed to follow the historically designated WY Type. The time series implemented in the model indicates Normal conditions with an MIF release of 32.5 cfs throughout the 2003–2017 simulation except for the following periods, which were set to the Dry WY MIF release of 19.5 cfs:

- April 1, 2007 – January 31, 2008
- May 1, 2013 – January 31, 2016

This rule is titled “Minimum Flow below Kerckhoff Dam” in the model and is described in detail in Section 2.2.4.5 of Appendix B in the FLA (PG&E 2023).

- Notes:

The condition specifies the minimum release for an entire WY. It is unclear why the date ranges set for Dry releases do not follow WY dates.

2.3.2.2 American Shad Spawning Flow Releases

This condition requires a minimum flow release through either the K1 or K2 powerhouse from May 15 to June 30 as a function of the Millerton Lake elevation. Because the K1 Powerhouse is retired in the model, the releases are only implemented for the K2 Powerhouse. The following rule is applied:

- When the Millerton Lake elevation is at or above 545 feet msl, releases shall include:
 - 1,200 cfs from the K2 Powerhouse from 10 p.m. to 2 a.m.
 - 775 cfs from the K2 Powerhouse all other hours
- When the Millerton Lake elevation is below 545 feet msl, releases shall include:
 - 775 from the K2 Powerhouse from 10 p.m. to 2 a.m.
 - 400 cfs from the K2 Powerhouse all other hours

A 2015 American Shad spawning flow release variance was granted and is included in the model, so for WY 2015, no attempt is made by the model to meet these flow requirements.

This rule is implemented in the ResSim model using a time series of flow releases at the K2 Powerhouse based on historical required releases for American Shad (Location Name: **SHAD_Req_Flow**).

This rule is titled “1993 Shad Order” in the model and is described in detail in Section 2.2.4.6 of Appendix B in the FLA (PG&E 2023).

- Notes:

When the Millerton Lake elevation is less than 545 feet msl, the condition requires a minimum of 400 cfs be released from 2 a.m. to 10 p.m. However, the model is set to a minimum release of 580 cfs under this scenario. This is because the K2 Powerhouse has a minimum flow requirement of 580 cfs to operate. If the minimum American Shad requirement is less than 580, then this operation rule step-increases to 580 cfs to meet the minimum K2 operational requirement.

2.3.2.3 1980 Fishery Agreement for Smallmouth Bass Water Temperature Releases

This condition requires stream temperatures in the San Joaquin River upstream of the K1 Powerhouse to be at or below 27 degrees Celsius (81 degrees Fahrenheit). Instead of implementing temperature modeling measures, PG&E developed a “rule of thumb” that relates temperature to a minimum flow release from Kerckhoff Dam. Through an analysis of historic water temperature and stream flow data, PG&E estimated that a minimum of 50 cfs is required throughout the month of July in Dry WYs to meet this requirement. From WYs 2003 to 2012, there was only one designated Dry WY (2007) when the minimum 50 cfs was required. From WYs 2013 to 2016, summer stream gage data were used for water temperature releases to meet the Fishery Agreement for those years in place of the rule-of-thumb 50 cfs minimum flow. Minimum flow releases ranged from 18 cfs to 50 cfs for the months of June, July, and August for those years (PG&E 2023).

This rule is implemented in the ResSim model using a time series of flow releases at Kerckhoff Dam based on water temperature minimum flow requirements (Location Name: **Water_Temp_Reqs**).

This rule is titled “Dry Year Release for Water Temp” in the model and is described in detail in Section 2.2.4.7 of Appendix B in the FLA (PG&E 2023).

- Notes:

While Appendix B (PG&E 2023) indicates that summer stream gage data for water temperature releases were used in place of the 50 cfs rule of thumb for WYs 2013 to 2016, the model appears to use this method for WY 2012 also.

2.3.2.4 K2 Powerhouse Derating

This condition represents a constraint on powerhouse operations for the K2 Powerhouse based on the Millerton Reservoir elevation. Millerton Reservoir high pool elevations create a high tailwater condition at the K2 Powerhouse, which interferes with operation of the powerhouse at high throughput levels. A relationship between the Millerton Reservoir elevation and the maximum flow release from the K2 Powerhouse was developed by PG&E and is implemented in the model.

This rule is implemented in the ResSim model using a time series of maximum flow releases at the K2 Powerhouse based on the Millerton Reservoir elevation (Location Name: **Millerton Elevation**).

This rule is titled “Millerton WSE Derating” in the model and is described in detail in Section 2.2.4.4 of Appendix B in the FLA (PG&E 2023).

2.3.2.5 Powerhouse Maintenance Outages

Each fall, the K2 Powerhouse goes down for maintenance. The start date, length, and frequency of maintenance outage is shown in Table 2-1.

Table 2-1 K2 Powerhouse outage schedule.

Maintenance Outage	Start Date	Outage Length (days)	Occurrence
Regular Annual Maintenance Outage	October 23	20	Every year
Extended Outage	October 23	75	Every 4 years
Turbine Work Outage	October 23	150	Every 15 years

This rule is implemented in the ResSim model using a time series of maximum flow releases at the K2 Powerhouse based on maintenance outage flows (Location Name: **K2_Generic_Maintenance_Outage**). In summary, the maximum flow in the time series is set to 5,100 cfs but brought to 0 cfs during the outage periods shown in Table 2-1.

This rule is titled “K2 Generic Outage” in the model and is described in detail in Section 2.2.4.3 of Appendix B in the FLA (PG&E 2023).

2.3.2.6 K2 Powerhouse Constraints

This condition represents constraints on powerhouse operations for the K2 Powerhouse as follows:

- K2 Minimum Operation Flow. A minimum flow of 580 cfs is required to operate the K2 Powerhouse. When inflow to the reservoir is not sufficient to meet higher priority demands with at least 580 cfs left for the K2 Powerhouse, then it will shut down
- K2 Rough Operating Zone. The K2 Powerhouse has a flow range of 1,744 cfs to 3,117 cfs that causes excessive wear to equipment. The model is set up to avoid operating the K2 Powerhouse with between 1,744 cfs and 3,117 cfs

- K2 Start and Stop Limitation. The K2 Powerhouse is limited to two stops and restarts per day
- K2 Powerhouse Derating. This is discussed in Section 2.3.2.4 and implemented as its own rule set

This rule is implemented in the ResSim model using a time series of flow releases to Tunnel No. 2 using a series of If-Else-Then conditionals following the prescription in Table 2-2. Implementing the powerhouse operations into the model is complicated and broken up into two separate rules called "K2 Generation Limits 2" and "K2 Generation Limits," ordered in that priority. This is discussed in greater detail in Section 2.2.4.4 of Appendix B in the FLA (PG&E 2023).

Table 2-2 Modeled K2 Powerhouse constraints.

Rule Priority	Modified Inflow ¹	Reservoir Elevation	K2 Powerhouse Flow
1	<580	>=984	580 cfs
2	<580	<981.5	0 cfs
3	<580	>981 and <984	Equal to the K2 Powerhouse flow in the last time-step
4	>=1,744 and <3,117	>=984	3,117 cfs
5	>=1,744 and <3,117	<984	1,744 cfs
6	Otherwise		Equal to Modified Inflow ²

^{1.} Modified Inflow is equal to the reservoir inflow minus minimum flows (*including 1980 Fishery Agreement for Smallmouth Bass Water Temperature Release*) below Kerckhoff Dam.

^{2.} Up to the maximum flow or derated flow depending upon Millerton Lake elevation.

2.3.2.7 Meteorological Data

The only meteorological data included in the model are evaporation data at Kerckhoff Reservoir. Evaporation is included as monthly totals (in inches), applied to each WY for the length of the simulation. The evaporation totals are shown in Table 2-3.

Table 2-3 Evaporation totals.

Month	Evaporation (inches)
January	1.30
February	1.30
March	2.70
April	4.30
May	6.10
June	8.90

Month	Evaporation (inches)
July	10.90
August	10.00
September	8.30
October	5.70
November	2.80
December	1.70

3.0 PROPOSED CEQA ADDITIONS TO PG&E'S OPERATIONS MODEL FOR EXISTING CONDITIONS

3.1 CEQA Alternative 1 Implementation

Alternative 1 consists of the original BLM 4(e) Conditions 4 (DOI 2024) and Alternative 1 Ramp Up Measure.

3.1.1 2024 BLM 4(e) Condition 4 – Spill Year Schedule Boating Flows and Down Ramping of Spill Flows

Condition 4 fully replaces PG&E's proposed EOS Flow Recession Measure and the Subsequent Spill Ramp Down Measure. It also replaces the down ramping components of PG&E's proposed Spill Season Flow Measure. Neither of these proposed operations are included in the existing conditions operations model. Condition 4 also uses LTOR flows and incorporates the following features:

- Varied length of down ramping from spill based on WY Type
 - Wetter years have a longer down ramping schedule than drier years
 - Variation allows down ramping of spills to better mimic the natural hydrograph while also providing whitewater boating opportunities
 - Variation reduces potential of fish stranding occurrences
- "Spill Year" Type as identified by SCE; notification given no later than May 1 each year
- WY Type schedules

The WY Type schedules are defined in Table 3-1.

Table 3-1 WY Type schedules.

Schedule	Criteria
A	April Forecast of Friant Natural Runoff during April-July not more than 650,000 acre-feet
B (Low Storage)	April Forecast of Friant Natural Runoff during April-July more than 650,000 acre-feet and WY Forecast Runoff not more than 1,200,000 acre-feet, with a September aggregate storage requirement less than 325,000 acre-feet
B (High Storage)	April Forecast of Friant Natural Runoff during April-July more than 650,000 acre-feet and WY Forecast Runoff not more than 1,200,000 acre-feet, with a

Schedule	Criteria
	September aggregate storage requirement greater than or equal to 325,000 acre-feet
C	April Forecast of Friant Natural Runoff during WY more than 1,200,000 acre-feet but not more than 1,600,000 acre-feet
D	April Forecast of Friant Natural Runoff during WY more than 1,600,000 acre-feet

3.1.1.1 Water Year Type

Implementation of this alternative first requires the definition of the WY Type, which is based on the April Forecast of Friant Runoff, WY Forecast Runoff, and SCE's September aggregate storage requirement. The WY type designation under this schedule would be provided to PG&E by SCE no later than May 1 each year. For the purpose of model implementation, the WY Type is based on historic runoff over the period of record flows. Once the WY Type is established for a given WY, that WY is assigned to one of three ramp down schedules:

- Schedule A or B Low Storage (AB)
- Schedule B (High Storage) or C (BC)
- Schedule D

WY Types for the period of record (2003–2017) were provided by SCE in a presentation slide deck from April 25, 2018, and are shown in Table 3-2.

Table 3-2 WY Types by year, A-D classification.

WY	WY Type		WY	WY Type
2003	C		2011	D
2005	D		2012	No Spill
2006	D		2013	No Spill
2007	No Spill		2014	No Spill
2008	B-Low		2015	No Spill
2009	C		2016	C
2010	D		2017	D

3.1.1.2 Spill Year Schedule Boating Flows and Down Ramping of Spill Flows

From May 1 to August 31 of each WY, the following down ramping schedule is implemented for the declining limb of spill(s) after SCE has identified when they will start

down ramping of spill flows and while there is still sufficient water available¹ to meet the respective schedule's requirements. Implementation of the down ramping schedules is accomplished in the model using operational conditionals and rules scripting. Scripting allows for the complexity required by the down ramping schedules. Table 3-3, Table 3-4, and Table 3-5 provide examples of Schedule D, Schedule C or B (High Storage), and Schedule B (Low Storage) or A, respectively.

Table 3-3 Schedule D.

Day 1	Maintain the flow within a range of 3,500–3,000 cfs
Day 2	Reduce the flow within a range of 3,000–2,500 cfs
Day 3	Reduce the flow within a range of 2,500–2,000 cfs
Day 8	Reduce the flow within a range of 2,000–1,600 cfs
Day 10	Reduce the flow within a range of 1,600–1,300 cfs
Day 12	Reduce the flow within a range of 1,300–1,000 cfs
Day 14	Reduce the flow within a range of 1,000–750 cfs
Day 16	Reduce the flow within a range of 750–500 cfs
Day 18	Reduce the flow within a range of 500–250 cfs
Day 20	Reduce the flow within a range of 250–100 cfs
Day 21	Reduce the flow within a range of 100 cfs – MIF

Table 3-4 Schedule B (High Storage) or C (BC).

Day 1	Maintain the flow within a range of 3,500–3,000 cfs
Day 2	Reduce the flow within a range of 3,000–2,500 cfs
Day 3	Reduce the flow within a range of 2,500–2,000 cfs
Day 5	Reduce the flow within a range of 2,000–1,600 cfs
Day 6	At 6 p.m., reduce the flow within a range of 1,600–1,200 cfs
Day 7	At 2 a.m., reduce the flow within a range of 1,200–800 cfs
Day 7	At 12 p.m., reduce the flow within a range of 800–600 cfs
Day 7	At 5 p.m., reduce the flow within a range of 600–400 cfs
Day 7	At 10 p.m., reduce the flow within a range of 400–200 cfs
Day 8	At 3 a.m., reduce the flow within a range of 200 cfs – MIF

Table 3-5 Schedule A or B (Low Storage) (AB).

Day 1	Maintain the flow within a range of 2,500–2,000 cfs
Day 3	At 6 p.m., reduce the flow within a range of 2,000–1,600 cfs
Day 4	At 2 a.m., reduce the flow within a range of 1,600–1,200 cfs
Day 4	At 12 p.m., reduce the flow within a range of 1,200–800 cfs

¹ Sufficient water availability is dependent on combined accessible volume of water from inflow and storage within Kerckhoff Reservoir.

Day 4	At 5 p.m., reduce the flow within a range of 800–600 cfs
Day 4	At 10 p.m., reduce the flow within a range of 600–400 cfs
Day 5	At 3 a.m., reduce the flow within a range of 400–200 cfs
Day 5	At 8 a.m., reduce the flow within a range of 200 cfs – MIF

3.1.1.3 Non-Spill Year Boating Flows and Down Ramping

Between May 15 and June 15 of a non-spill year that begins on a Saturday, the Applicant must provide scheduled boating flows and a gradual ramp down. These flows are based on the Applicant’s forecast of water availability. The Applicant must give 10 days’ advance notice per the Whitewater Notification and Access Measure. Water is released from Kerckhoff Dam for two days of whitewater boating, from 9 a.m. to 6 p.m. each day. On the first day, target flows range from 2,500 to 2,000 cfs, and on the second day from 2,000 to 1,600 cfs. After the second day, flows ramp down to the minimum instream flow. The boating flow and ramp down schedule will follow the Non-Spill Year Boating Flows and Down Ramping schedule in Table 3-6:

Table 3-6 Non-Spill Year Boating Flows and Down Ramping schedule.

Day 0	Flows ramped up to the Day 1 release level during the night, before 9 a.m.
Day 1	At 9 a.m., maintain the flow within an hourly avg. range of 2,500-2,000 cfs
Day 1	After min. 9 hours, reduce flow within an hourly avg. range of 2,000-1,600 cfs
Day 2	After min. 24 hours, reduce flow within an hourly avg. range of 1,600-1,200 cfs
Day 3	After min. 10 hours, reduce flow within an hourly avg. range of 1,200-800 cfs
Day 3	After min. 5 hours, reduce flow within an hourly avg. range of 800-600 cfs
Day 3	After min. 5 hours, reduce flow within an hourly avg. range of 600-400 cfs
Day 3	After min. 5 hours, reduce flow within an hourly avg. range of 400-200 cfs

3.1.1.4 Stranding Protection Down Ramping

From May 1 to August 31, the Applicant must begin reducing spill flows from Kerckhoff Dam once the average daily flow drops below 1,600 cfs, following the Stranding Protection Down Ramping schedule (Table 3-7). The Applicant should make a good faith effort to start this reduction before average hourly flows fall below 1,200 cfs.

Table 3-7 Stranding Protection Down Ramping schedule.

Step 1	Maintain flow within a range of 1,600–1,200 cfs for 10 hours
Step 2	Reduce the flow within a range of 1,200–800 cfs for 10 hours
Step 3	Reduce the flow within a range of 800–600 cfs for 5 hours
Step 4	Reduce the flow within a range of 600–400 cfs for 5 hours
Step 5	Reduce the flow within a range of 400–200 cfs for 5 hours

Step 6	Reduce the flow within a range of 200 cfs – MIF
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3.1.1.5 September – October Down Ramp

From September 1 to October 31 in all WY Types, once average daily flow declines below 1,600 cfs, the down ramping schedule in Table 3-8 is implemented:

Table 3-8 September 1 to October 31 down ramping schedule.

Step 1	Maintain flow within a range of 1,600–1,200 cfs for 2 hours
Step 2	Reduce the flow within a range of 1,200–800 cfs for 2 hours
Step 3	Reduce the flow within a range of 800–600 cfs for 2 hours
Step 4	Reduce the flow within a range of 600–400 cfs for 2 hours
Step 5	Reduce the flow within a range of 400–200 cfs for 2 hours
Step 6	Reduce the flow within a range of 200 cfs – MIF

3.1.2 Modified BLM 4(e) Condition 5 – Alternative 1 Ramp Up Measure

The Modified 2024 BLM 4(e) Condition 5 (Alternative 1 Ramp Up Measure) replaces the ramp up components of PG&E’s proposed Spill Season Flow Measure and POM. It puts limits on the rate increase of stage as measured at Gage J-2:

- Gage J-2:² A maximum stage change of 1 foot or less per hour for inflows between MIF and 4,000 cfs, provided there is sufficient³ storage and powerhouse capacity to meet this requirement

Gage J-2 is located within the PBR. This reach is implemented as a null routing reach, meaning the flow at Gage J-2 is assumed equal to the flows leaving Kerckhoff Dam (combined spill flow and low-level outflow flow). However, the model tracks flow through routing reaches, not stage. To fulfill the stage limit component of Alternative 1 Ramp Up Measure, a rating curve is required to establish a relationship between stage and flow. A rating curve was developed using historic gage data provided at Gage J-2 (USGS Gage No. 11246700) and is presented in Figure 3-1. The best fit curve follows this equation:

$$Q(H) = 49.3297(H-4.1169)^{2.2921}$$

²Gage J-2 is owned and operated by PG&E, with its location being approximately a half mile downstream of Kerckhoff Dam (USGS Gage No. 11246700).

³ Sufficient storage and powerhouse capacity is dependent on combined volume of water from inflow and storage within Kerckhoff Reservoir and flow through the K2 Powerhouse.

Where $Q(H)$ is discharge and H is stage. This allows the script written for Alternative 1 Ramp Up Measure to limit the increase in spill discharge to maintain no more than one foot of rise at Gage J-2.

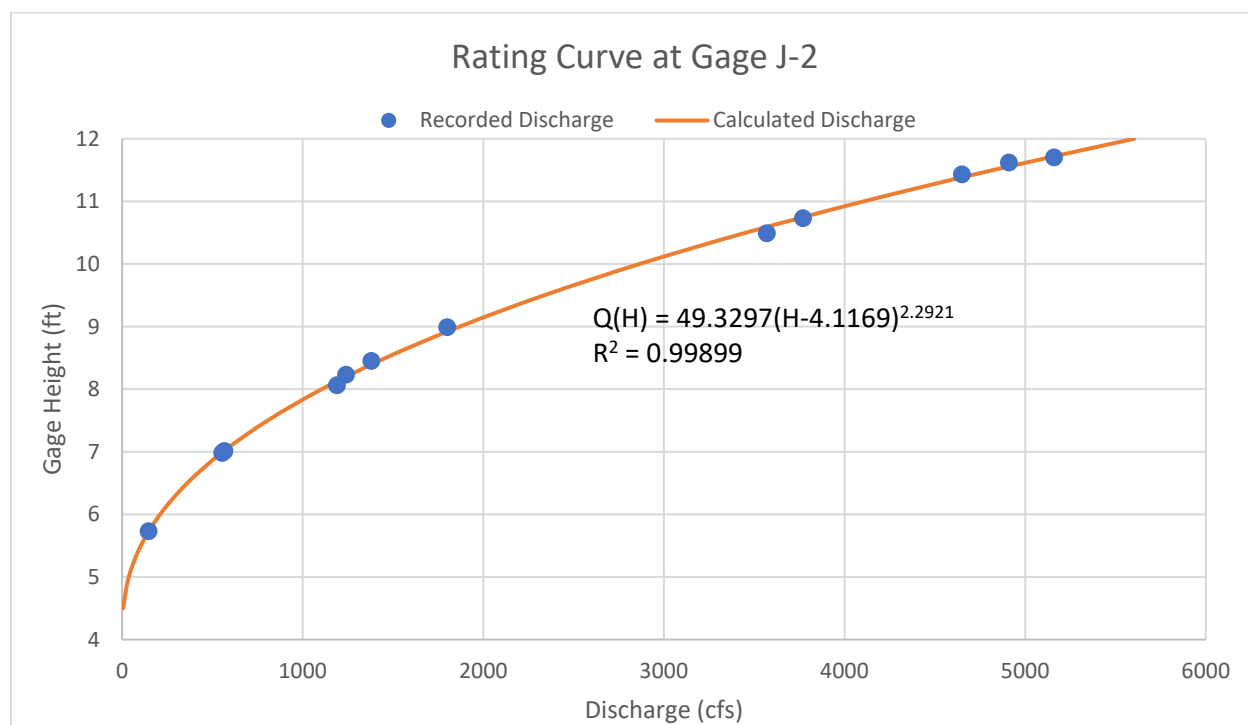


Figure 3-1 Gage J-2 rating curve.

3.2 CEQA Alternative 2 Implementation

Alternative 2 includes revisions to the implementation of Conditions 4 and 5 as described in DOI (2025) and presented in the following sections.

3.2.1 2025 Revised BLM 4(e) Condition 4 - Modified EOS Flow Recession

The 2025 revised BLM 4(e) Condition 4 replaces the original 2024 BLM 4(e) Condition 4 by implementing the Modified EOS Flow Recession Measure and the original PG&E Subsequent Spill Ramp Down Measure as presented in Appendices 3 and 4 of DOI (2025).

For Alternative 2, WYs are categorized into Above Average (AA) and Below Average (BA) based on the following criteria presented in Table 3-9:

Table 3-9 WY description for implementation of Condition 4 (Revised).

Schedule	Criteria
Above Average (AA)	April 1 forecast of San Joaquin River below Friant Unimpaired Runoff during April-July is predicted to be equal to or more than 1,200,000 acre-feet based on publication in Department of Water Resources Bulletin B120 or future equivalent. If the May 1 forecast alters the below Friant Unimpaired Runoff during April-July to a different WY classification, that WY classification would be used as soon as feasible following its publication.
Below Average (BA)	April 1 forecast of San Joaquin River below Friant Unimpaired Runoff during April-July is predicted to be less than 1,200,000 acre-feet based on publication in Department of Water Resources Bulletin B120 or future equivalent. If the May 1 forecast alters the below Friant Unimpaired Runoff during April-July to a different WY classification, that WY classification would be used as soon as feasible following its publication.

WY Types for the period of record (2003–2017) were provided by PG&E and are presented in Table 3-10:

Table 3-10 WY Types by year, AA-BA classification.

WY	WY Type	WY	WY Type
2003	BA	2011	AA
2005	AA	2012	BA
2006	AA	2013	BA
2007	BA	2014	BA
2008	BA	2015	BA
2009	BA	2016	BA
2010	AA	2017	AA

In the implementation of Modified EOS Flow Recession, the model will increase optimal whitewater boating opportunities and functional flows in AA years with the ramp down operational releases in Table 3-11:

Table 3-11 AA years down ramping schedule

Day 1 (9 a.m.)	2,500–2,000 cfs for minimum 9 hours, boating flow
Day 1 (6 p.m.)	2,000–1,600 cfs for minimum 48 hours, boating flow
Day 3 (6 p.m.)	1,600–1,200 cfs for minimum 10 hours, ramp down
Day 4 (4 a.m.)	1,200–800 cfs for minimum 5 hours
Day 4 (9 a.m.)	800–600 cfs for minimum 5 hours
Day 4 (2 p.m.)	600–400 cfs for minimum 5 hours
Day 4 (7 p.m.)	400–200 cfs for minimum 5 hours
Day 5 (12 a.m.)	200 cfs – MIF

For BA years, the ramp down operational releases in Table 3-12 will be followed:

Table 3-12 BA years down ramping schedule

Day 1 (9 a.m.)	2,500–2,000 cfs for minimum 9 hours, boating flow
Day 1 (6 p.m.)	2,000–1,600 cfs for minimum 24 hours, boating flow
Day 2 (6 p.m.)	1,600–1,200 cfs for minimum 10 hours, ramp down
Day 3 (4 a.m.)	1,200–800 cfs for minimum 5 hours
Day 3 (9 a.m.)	800–600 cfs for minimum 5 hours
Day 3 (2 p.m.)	600–400 cfs for minimum 5 hours
Day 3 (7 p.m.)	400–200 cfs for minimum 5 hours
Day 4 (12 a.m.)	200 cfs – MIF

The Subsequent Spill Ramp Down schedule appears in Table 3-13:

Table 3-13 Subsequent Spill Ramp Down Measure releases.

Step 1	Maintain flow within a range of 1,600–1,200 cfs for 2 hours
Step 2	Reduce the flow within a range of 1,200–800 cfs for 2 hours
Step 3	Reduce the flow within a range of 800–600 cfs for 2 hours
Step 4	Reduce the flow within a range of 600–400 cfs for 2 hours
Step 5	Reduce the flow within a range of 400–200 cfs for 2 hours
Step 6	Reduce the flow within a range of 200 cfs – MIF

3.2.2 2025 Revised BLM 4(e) Condition 5

The 2025 revised BLM 4(e) Condition 5 replaces the modified BLM (4(e) Condition 5 (Alternative 1 Ramp Up Measure) by implementing the Modified Spill Season Flow Measure and the POM as presented in Appendices 1 and 2 of DOI (2025). Condition 5 (Revised) uses the same WY designation as Condition 4 (Revised) as presented in Table 3-9 The 2025 revised BLM 4(e) Condition 5 Down Ramping schedule includes its own set of conditions to maintain compliance during down ramping. These conditions are described in detail in Appendices 1 and 2 of DOI (2025). The conditions will be implemented using a combination of rules conditionals and Jython scripting as needed.

3.2.2.1 Modified Spill Season Flow Measure

Schedule AA:

When sustained spills measured at Gage J-2 are 1,000 cfs⁴ or more for at least 5 hours of continuous duration and neither the Modified EOS Flow Recession Measure nor the

⁴ Flows are expressed as hourly average flows unless otherwise specified.

Subsequent Spill Ramp Down Measure is being implemented, subject to sufficient water availability,⁵ the model will initiate the protocol prior to average hourly flow declining below 800 cfs. Flows (Appendix 1 of DOI 2025) will be released as shown in Table 3-14:

Table 3-14 AA years down ramping schedule – Modified Spill Season Flow Measure.

Step 1	Maintain hourly average flow within a range of 1,200–800 cfs for a minimum of 4 hours
Step 2	Reduce the flow within a range of 600–400 cfs for 4 hours
Step 3	Reduce the flow within a range of 400–200 cfs for 4 hours
Step 4	Reduce the flow within a range of 200 cfs – MIF

Schedule BA:

When sustained spills measured at Gage J-2 are 500 cfs or more for at least 5 hours of continuous duration and neither the Modified EOS Flow Recession Measure nor the Subsequent Spill Ramp Down Measure is being implemented, the model will initiate the protocol prior to average hourly flow declining below 400 cfs. Flows will be released as shown in Table 3-15:

Table 3-15 BA years down ramping schedule – Modified Spill Season Flow Measure.

Step 1	Maintain hourly average flow within a range of 600–400 cfs for a minimum of 4 hours
Step 2	Reduce the flow within a range of 400–200 cfs for 4 hours
Step 3	Reduce the flow within a range of 200 cfs – MIF

Both Schedules AA and BA are predicated on sufficient water availability.

3.2.2.2 Modified Planned Outage Measure

3.2.2.2.1 Planned Outage Measure Initial Release Protocol

At the initiation of a spill event that falls within a planned K2 Powerhouse outage, the initial spill would be released ahead of the inflow starting at 3:30 a.m., subject to sufficient water availability. The model mimics the ramp up rate to the spill flow exactly as it would

⁵ Sufficient water availability is dependent on combined accessible volume of water from inflow, storage within the normal operating range of Kerckhoff Reservoir, or current powerhouse diversions to complete the specified ramp down to minimum flow without decreasing below 980 feet msl water surface elevation in Kerckhoff Reservoir.

enter Kerckhoff Reservoir, only it shifts the initiation time to earlier in the day. To accomplish this in reality, an operator would have to base the 3:30 a.m. spill initiation on a forecast of incoming flows. This applies for spills expected to exceed a daily average flow of 1,000 cfs for AA WYs and 500 cfs for BA WYs.

3.2.2.2.2 Modified Planned Outage Measure Ramp Down

AA WYs:

When sustained spills measured at Gage J-2 are 1,000 cfs or more for at least 4 hours of continuous duration subject to sufficient water availability, PG&E shall release flows below Kerckhoff Dam as shown in Table 3-16:

Table 3-16 AA years down ramping schedule – POM.

Step 1	Maintain hourly average flow within a range of 1,200–800 cfs for as long as sufficient water is available
Step 2	Reduce the flow within a range of 600–400 cfs for minimum 4 hours
Step 3	Reduce the flow within a range of 400–200 cfs for minimum 4 hours
Step 4	Reduce the flow within a range of 200 cfs – MIF

BA WYs:

When sustained spills measured at Gage J-2 are 500 cfs or more for at least 4 hours of continuous duration subject to sufficient water availability, PG&E shall release flows below Kerckhoff Dam as shown in Table 3-17:

Table 3-17 BA years down ramping schedule – POM.

Step 1	Maintain hourly average flow within a range of 600–400 cfs for as long as sufficient water is available
Step 2	Reduce the flow within a range of 400–200 cfs for minimum 4 hours
Step 3	Reduce the flow within a range of 200 cfs – MIF

4.0 RESULTS

Operations modeling results from the period of record simulations are presented herein for the CEQA Alternatives 1 and 2.

4.1 CEQA Alternative 1 Results

4.1.1 2024 BLM 4(e) Condition 4

4.1.1.1 Spill Year Schedule Boating Flows and Down Ramping of Spill Flows

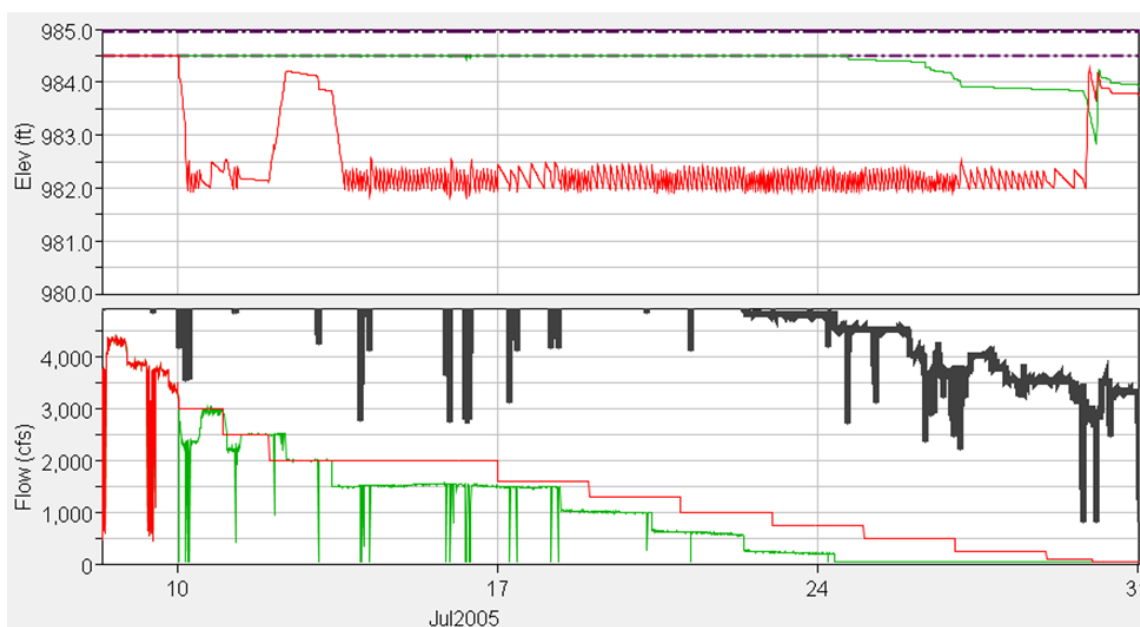
Standard down ramping for end of spills in WYs A, B (low storage), B (high storage), C, and D was implemented in the model for the period of record. The model demonstrated that for all WYs, the hydroelectric project is able to accommodate the prescribed Spill Year Schedule Boating Flows and Down Ramping of Spill Flows, including the extended boating flows. All schedules were completed successfully; however, the high starting flows and long step durations consistently caused the reservoir level to infringe on K2 Powerhouse operational constraints, built into the original PG&E Operations Model (PG&E 2025a). One such constraint is the minimum reservoir elevation for operating the K2 Powerhouse, which is 981.5 feet msl as described in Table 2.3 of Appendix B of the Second Supplemental Information Filing in Support of Final Application for New License (PG&E 2023). Other constraints also impose limitations on K2 operations as reservoir levels drop and depend on inflow rates, reservoir level, and other operational rules with higher priority. Furthermore, if the reservoir elevation drops to 981.5 feet msl or lower, the Kerckhoff Hydroelectric Project does not divert water into the K2 Powerhouse. The K2 Powerhouse operational constraints relative to the minimum operating reservoir elevation are collectively referred to in this report as the encroachment toward the K2 Powerhouse's minimum operating reservoir elevation. This encroachment caused frequent over-cycling of the K2 Powerhouse as the model attempted to both maintain the required spill flows and keep the reservoir above the minimum operating elevation of the K2 Powerhouse.

Figure 4-1 shows the major spill event in the summer of WY 2005, which begins around May 31 and terminates around June 16. The WY Type for WY 2005 is "D." The green lines represent existing conditions, the red lines represent Alternative 1 conditions (Spill Year Schedule Boating Flows and Down Ramping of Spill Flows), and the black line represents inflows to Kerckhoff Reservoir. This presents a common consequence of many of the down ramping schedules presented in this report, which is K2 Powerhouse cycling around the rough operating zone (ROZ). The ROZ is a range of flows (1,744 cfs to 3,117 cfs) for which

the turbine units would experience excessive wear, so the hydroelectric project avoids this range, as discussed in Section 2.3.2.6.

The Schedule D ramp down begins on July 10 and is able to follow Schedule D perfectly. However, notice once Schedule D begins that because the combination of spill flows and K2 Powerhouse flows exceed inflows to Kerckhoff Reservoir, the reservoir elevation drops very close to the K2 Powerhouse's minimum operating reservoir elevation of 980.0 feet msl. As the reservoir approaches the K2 Powerhouse's minimum operating reservoir elevation, in order to be able to maintain the Schedule D spill flows, the K2 Powerhouse cycles above and below the ROZ, while also trying to meet other K2 operational constraints, in an attempt to keep the reservoir high enough to stay above the minimum operating elevation for the K2 Powerhouse. The K2 Powerhouse cycling frequency is anywhere from half an hour to two hours, which likely represents an unrealistic operating scenario. Based on the documented operational constraints, any operation that requires K2 to dwell in the ROZ is considered infeasible due to excessive cavitation and vibration impacts and the associated maintenance and outage consequences. That means operating strategies that would require repeated short interval oscillations across the ROZ are not considered feasible, because they can increase cycling wear and raise reliability/maintenance risk even if each individual crossing is brief (personal email communication, J. Hartman and C. McCormick, March 5, 2026).

Therefore, while the spill is able to successfully complete Schedule D here, it is only able to do so under an unfeasible powerhouse operation. Therefore, while the spill is able to successfully complete Schedule D here, it is only able to do so under an unfeasible powerhouse operation.



Note: Green represents Existing Conditions. Red represents Alternative 1 Conditions. Black represents inflows to Kerckhoff Reservoir.

Figure 4-1 WY 2005 spill year schedule boating flows and down ramping of spill flows.

Throughout the period of record, Schedules AB and BC performed similarly to Schedule D. They were all implemented and completed successfully, in that they were able to follow the prescribed spill amounts and durations. However, like Schedule D, both Schedules AB and BC led to powerhouse over-cycling in almost every application, meaning the extended down ramp schedules described under Alternative 1 are unfeasible due to facility constraints.

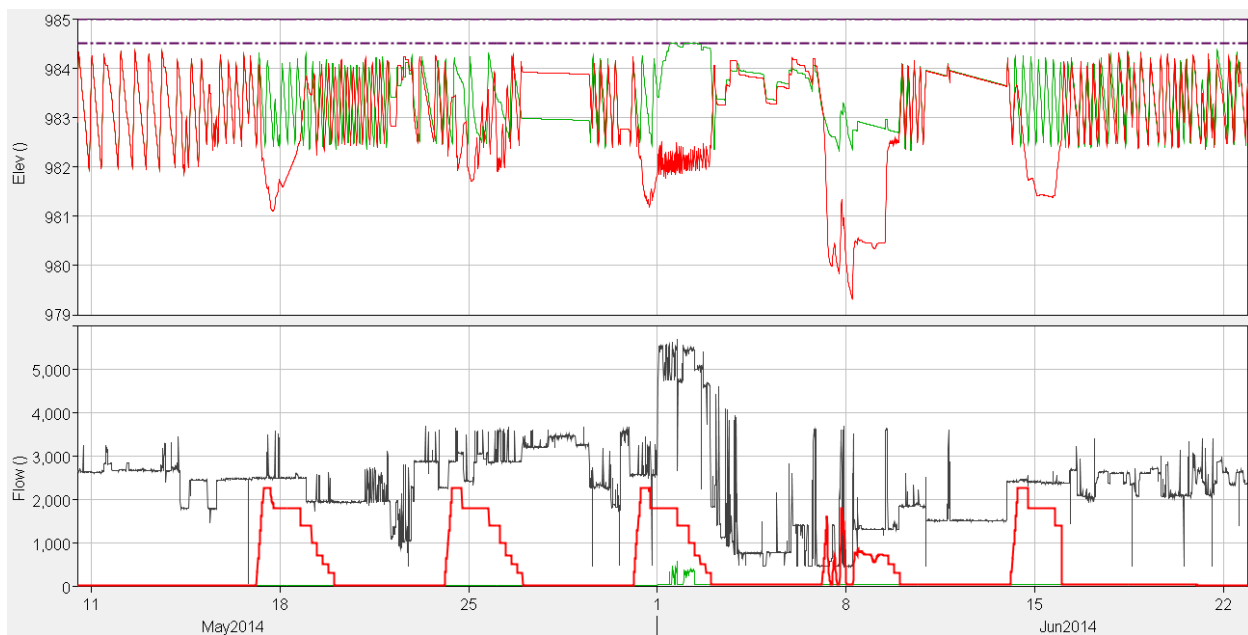
4.1.1.1.1 Assumptions

The following assumptions were incorporated into the Alternative 1 Condition 4 Spill Year Schedule Boating Flows and Down Ramping of Spill Flows Measure implementation to the model:

- To keep the model robust and repeatable for multiple WYs, a single discharge was selected for each step; in this case, the lowest discharge in the range presented in each step. For example, for Schedule D ramp down, the first step (Day 1) requires flows in the range of 3,500 cfs to 3,000 cfs. The model uses 3,000 cfs for this step. In reality, the operator would have flexibility to spill any amount between 3,000 cfs and 3,500 cfs
- The ramp down schedule is hard-wired into the rule script to better represent the decision an operator would make to initiate ramp down

4.1.1.2 Non-Spill Year Boating Flows and Down Ramping

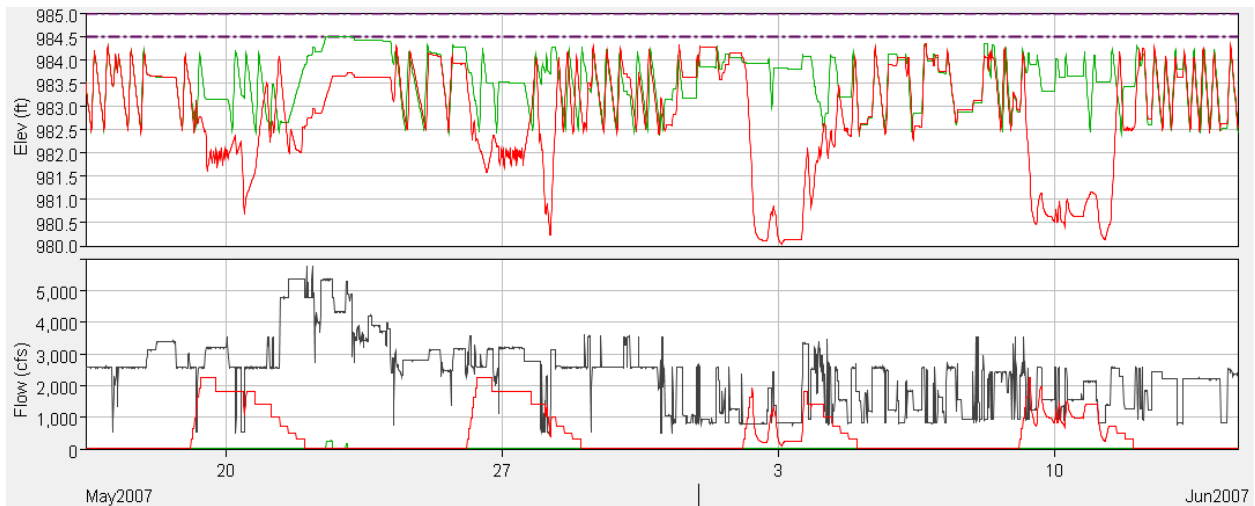
Within the period of record, non-spill years include WYs 2007, 2012, 2013, 2014, and 2015. The Non-Spill Year Boating Flows and Down Ramping schedule is attempted every weekend from May 15 to June 15 of non-spill years as shown in Table 3-6. Success of completing the Non-Spill Year Boating Flows and Down Ramping schedule varies and is primarily dependent on the volume of inflows coming into Kerckhoff Reservoir during the weekends. Figure 4-2 presents WY 2014, which is a non-spill year. In the upper plot, the green line represents existing conditions reservoir elevations. The red line represents Alternative 1 reservoir elevations. In the lower plot, the green line represents existing conditions spill to the PBR, the red line represents Alternative 1 spill, and the black line represents the inflow to Kerckhoff Reservoir. While WY 2014 is designated as a No Spill WY, there is sufficient inflow to support the full schedule for the first three weekends. Inflows to Kerckhoff Reservoir drop significantly by the fourth weekend, which results in lower pool elevation and poor and sporadic boating flows, and for the last weekend, boating flows are supported, but the ramp down schedule is cut short due to lack of available water.



Note: Green represents Existing Conditions. Red represents Alternative 1 Conditions. Black represents inflows to Kerckhoff Reservoir.

Figure 4-2 WY 2014 non-spill year boating flows and down ramping.

Observationally, WY 2014 had the most success in producing boating flows and a successful down ramping, and WY 2015 was the least successful. Boating flows and corresponding down ramping for the rest of the non-spill years are presented in Figure 4-3 through Figure 4-6 and summarized in Table 4-1.



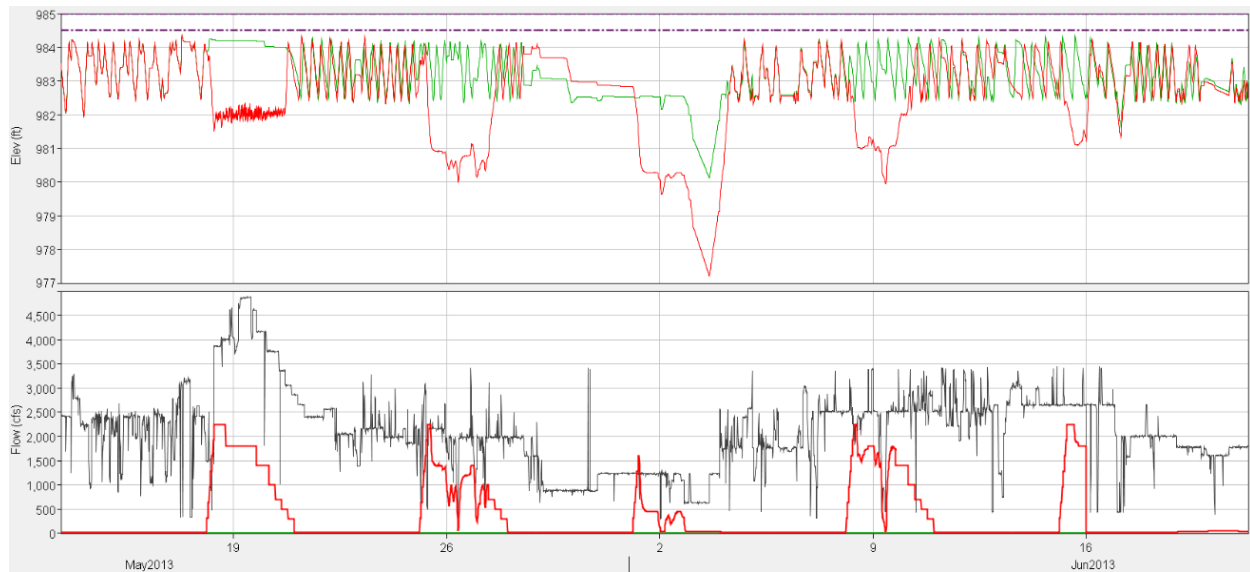
Note: Green represents Existing Conditions. Red represents Alternative 1 Conditions. Black represents inflows to Kerckhoff Reservoir.

Figure 4-3 WY 2007 non-spill year boating flows and down ramping.



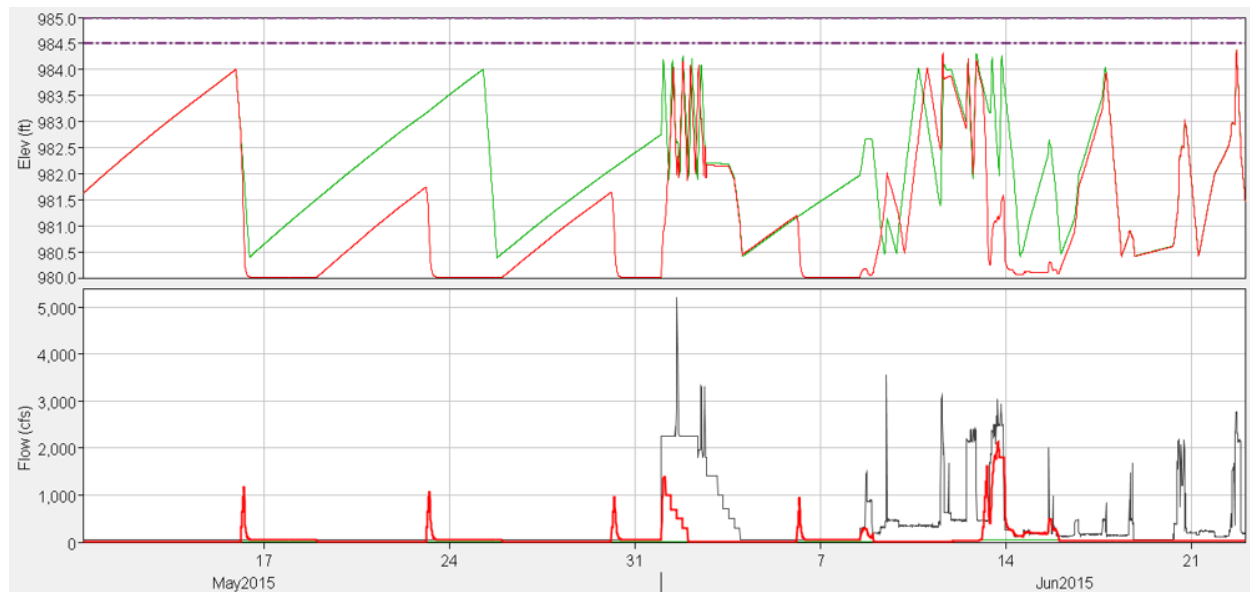
Note: Green represents Existing Conditions. Red represents Alternative 1 Conditions. Black represents inflows to Kerckhoff Reservoir.

Figure 4-4 WY 2012 non-spill year boating flows and down ramping.



Note: Green represents Existing Conditions. Red represents Alternative 1 Conditions. Black represents inflows to Kerckhoff Reservoir.

Figure 4-5 WY 2013 non-spill year boating flows and down ramping.



Note: Green represents Existing Conditions. Red represents Alternative 1 Conditions. Black represents inflows to Kerckhoff Reservoir.

Figure 4-6 WY 2015 non-spill year boating flows and down ramping.

Table 4-1 presents a summary of success or failure of the Non-Spill Years Boating Flows and Down Ramping schedules. In the table, "S" with the green shade represents a successful completion of the Boating Flow and Down Ramp schedule. "PS" with the orange shade represents a partial successful completion; this means it was able to achieve

boating flows for some duration but not for the full scheduled duration. “F” with the red shade represents failure to reach boating flows for any substantial duration. In years 2013, 2014, and 2015, there were five weekends that fell within the May 15 – June 15 period for boating flows. In years 2007 and 2012, there were only four weekends that met the criteria for boating flows.

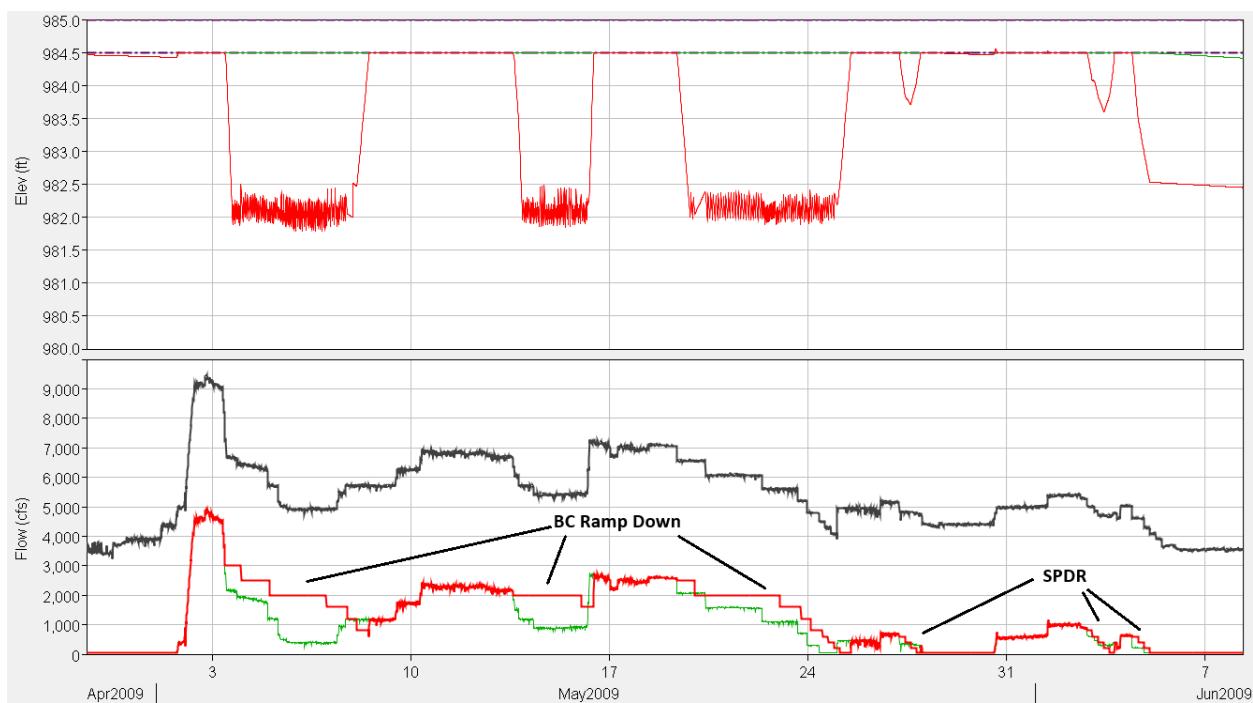
Table 4-1 Non-spill years boating flows success or failure.

WY	Weekend				
	1	2	3	4	5
2007	S	S	F	F	
2012	PS	F	PS	PS	
2013	S	PS	F	PS	PS
2014	S	S	S	F	PS
2015	F	F	F	F	F

S=Success, PS=Partial Success, F=Failure

4.1.1.3 Stranding Protection Down Ramping

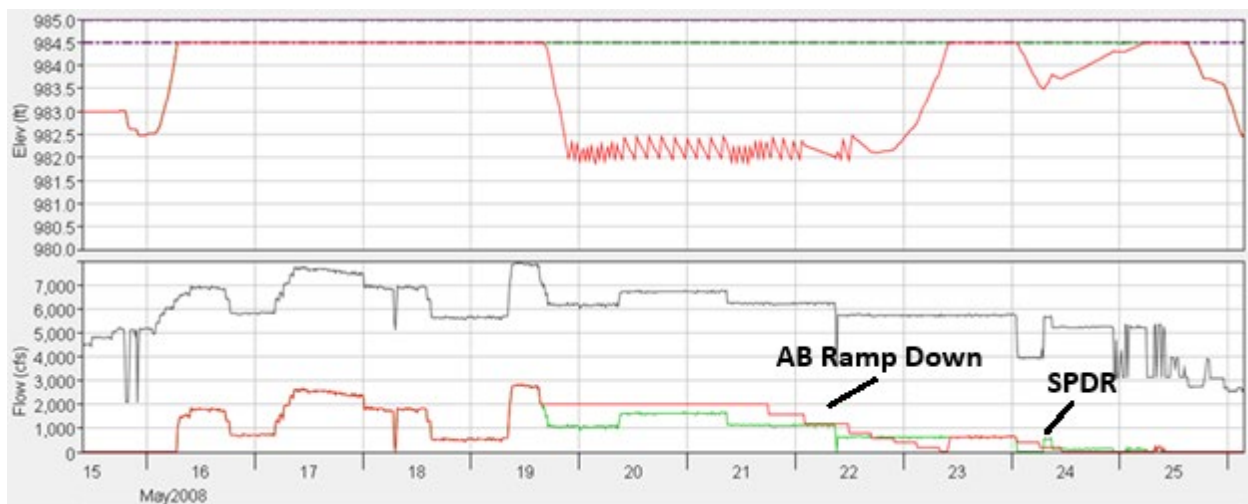
The Stranding Protection Down Ramping Measure covers initial and subsequent spills between May 1 and August 31. In other words, the ramp down schedules (AB, BC, D) are reserved for the large spill events in each spill season, while all others are handled by the Stranding Protection Down Ramping Measure. The Stranding Protection Down Ramping Measure was activated at least once in each of WYs 2008, 2009, 2010, 2011, and 2016. All other years are either non-spill years or did not exhibit initial or subsequent spills, which would have triggered the Stranding Protection Down Ramping Measure. Figure 4-7 shows the Stranding Protection Down Ramping Measure applied to WY 2009. Note during the large spill event, the Schedule BC ramp down is interrupted and restated two times during its recession. During the Schedule BC ramp down, spill is elevated over the demand, which results in the reservoir dropping toward K2 Powerhouse’s minimum operating reservoir elevation. To maintain capacity to meet the Schedule BC ramp down, the K2 Powerhouse must over-cycle, which is manifested in this plot with the oscillations in the pool elevation that correspond with the ramp down times. The smaller subsequent spill events are covered by Stranding Protection Down Ramping. Because the Stranding Protection Down Ramping ramp down better matches the inflow reductions over the same period, the pool elevation drops are minimal and avoid the K2 Powerhouse over-cycling.



Note: Green represents Existing Conditions. Red represents Alternative 1 Conditions. Black represents inflows to Kerckhoff Reservoir.

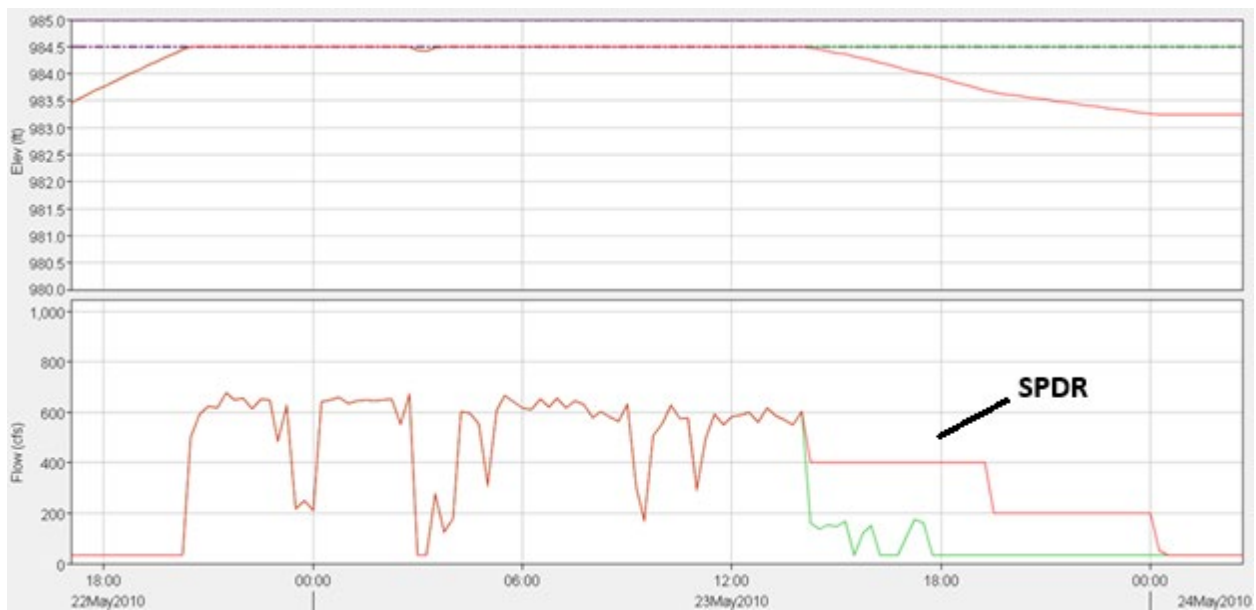
Figure 4-7 Stranding Protection Down Ramping Measure used in WY 2009.

In all the WYs where Stranding Protection Down Ramping was triggered, K2 Powerhouse over-cycling was avoided due to the shorter duration characteristic of Stranding Protection Down Ramping, compared to the Schedule AB, BC, and D ramp down schedules. An exception is a very brief period of K2 Powerhouse over-cycling during the Stranding Protection Down Ramping schedule in WY 2016. The other WYs in which Stranding Protection Down Ramping was called are presented in Figure 4-8 through Figure 4-10.



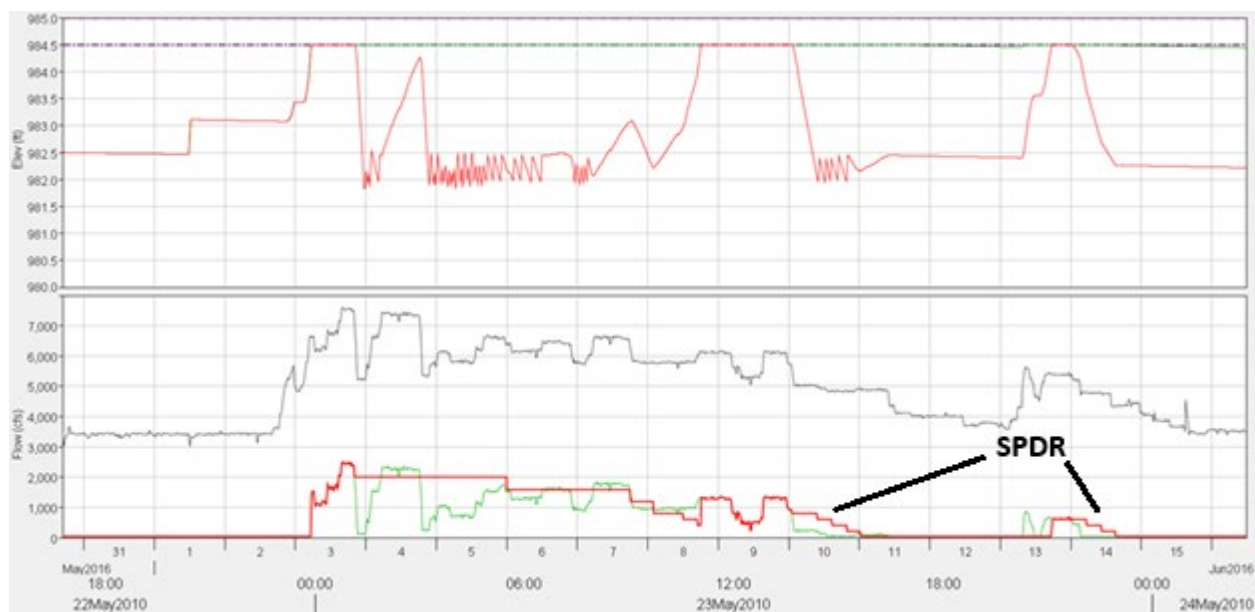
Note: Green represents Existing Conditions. Red represents Alternative 1 Conditions. Black represents inflows to Kerckhoff Reservoir.

Figure 4-8 WY 2008 Stranding Protection Down Ramping schedule.



Note: Green represents Existing Conditions. Red represents Alternative 1 Conditions.

Figure 4-9 WY 2010 zoomed-in view of small initial event with Stranding Protection Down Ramping.



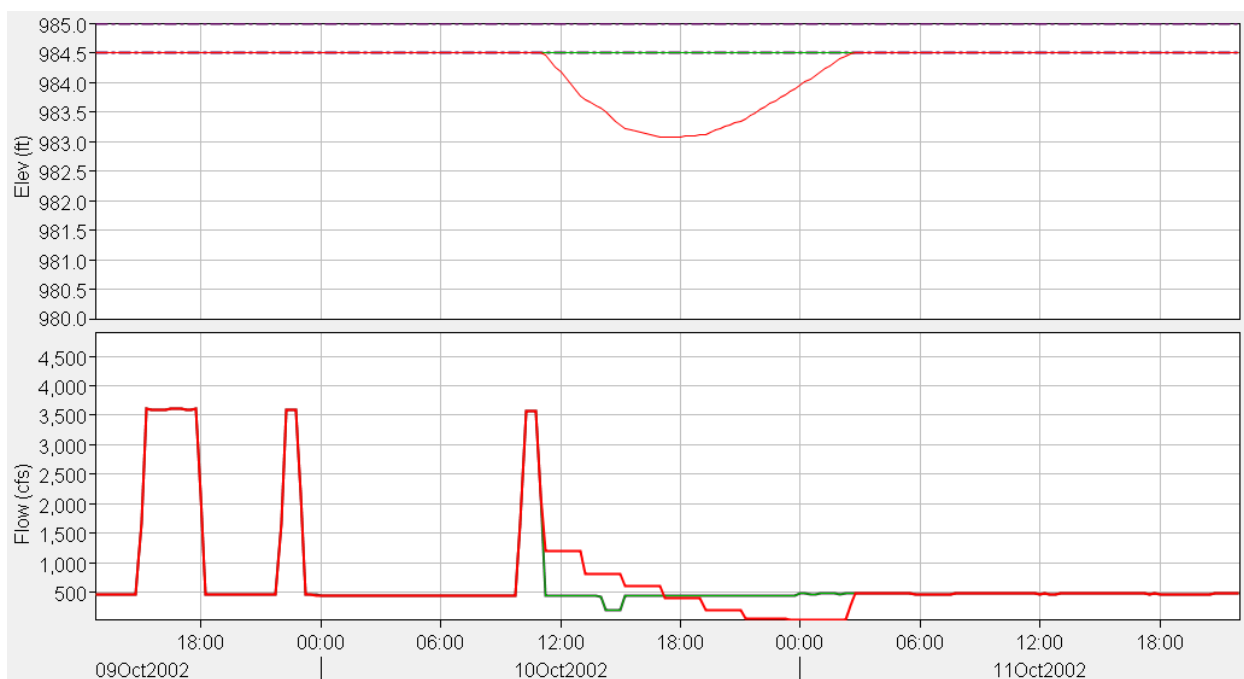
Note: Green represents Existing Conditions. Red represents Alternative 1 Conditions. Black represents inflows to Kerckhoff Reservoir.

Figure 4-10 WY 2010 Stranding Protection Down Ramping schedule.

4.1.1.4 September – October Down Ramp Measure

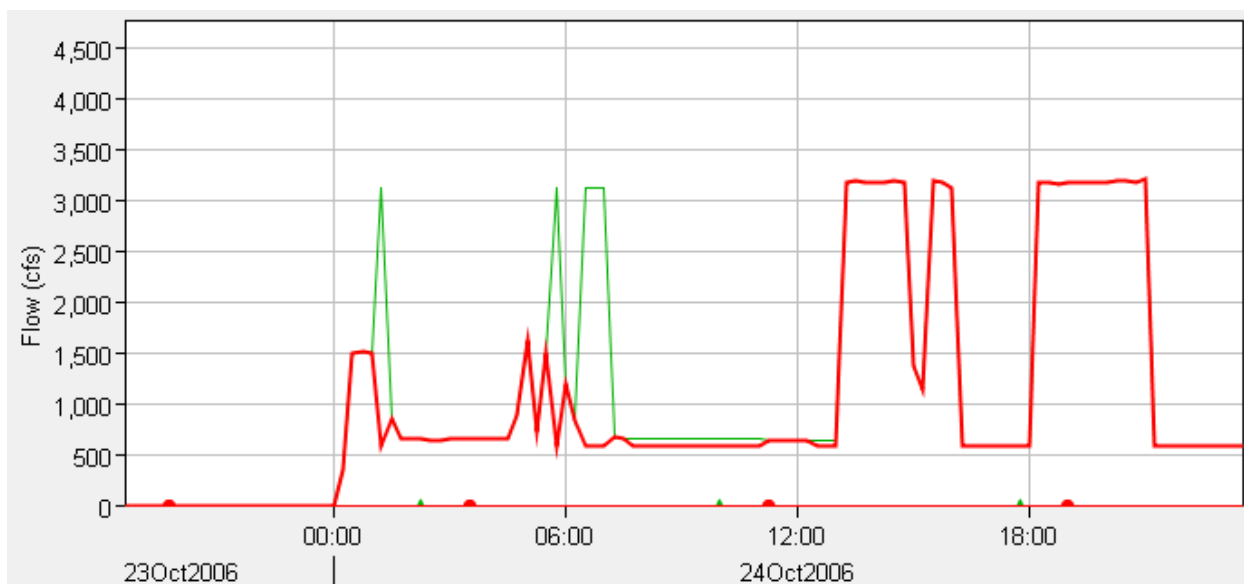
The September – October Down Ramp of spills was initiated for WYs 2003, 2007, and 2011, all occurring in the month of October. In all other WYs, either there were no spill events in September and October or the spill events lasted beyond October 31. Figure 4-11 shows an example of a successful September – October Down Ramp at the end of a spill cycle. As this ramp down has small ramping durations and starts ramping down at a lower 1,200 cfs, the reservoir pool is able to provide the volume needed to complete the ramp down. Notice the reservoir pool drops during the ramp down, as expected, to accommodate the additional spill over the inflowing load, but the pool does not drop low enough to enter the K2 Powerhouse’s minimum operating reservoir elevation to the extent it affects the ramp down schedule.

However, in a September – October Down Ramp in WY 2007, there was too much encroachment toward the K2 Powerhouse’s minimum operating reservoir elevation, which led to a brief period of powerhouse over-cycling. Figure 4-12 shows an example of the K2 Powerhouse flows being limited to prevent too much drawdown of the reservoir during the September – October Down Ramp. For WYs 2003 and 2011, the hydroelectric project was able to maintain full capacity at the K2 Powerhouse and still accommodate the September – October Down Ramp.



Note: Green represents Existing Conditions. Red represents Alternative 1 Conditions.

Figure 4-11 September – October Down Ramp for WY 2003.

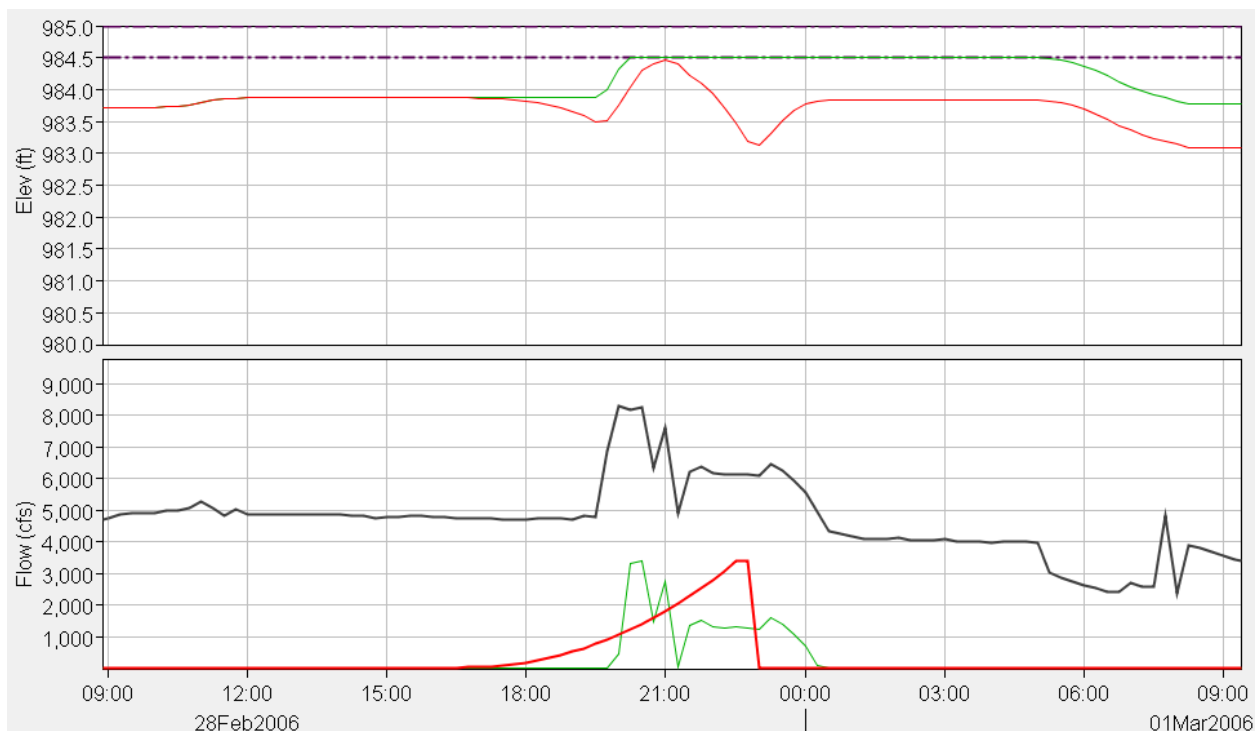


Note: Green represents Existing Conditions. Red represents Alternative 1 Conditions.

Figure 4-12 WY 2007 impacts to K2 Powerhouse generation during September – October Down Ramp.

4.1.2 Alternative 1 Ramp Up Measure

Alternative 1's Modified BLM 2024 4(e) Condition 5 (Alternative 1 Ramp Up Measure) imposes a limit on the rate increase of stage as measured at Gage J-2, for spill events starting between MIF and 4,000 cfs, regardless of time of year. A spill event in the context of the Alternative 1 Ramp Up Measure was any initiation of an increase in inflows to Kerckhoff Reservoir from MIF that lasted more than several computation time steps (i.e., three or more time steps of ~45 minutes). The Gage J-2 rating curve presented in Figure 3-1 was used to schedule a series of hourly flow increases that equates to exactly one foot of rise at Gage J-2. That schedule was then imposed for each initiation of a spill event through the period of record. Figure 4-13 shows an example of a successful Alternative 1 Ramp Up Measure for an isolated spill event that begins on February 28, 2006, at 10 p.m. (20:00 hours in the figure).



Note: Green represents Existing Conditions. Red represents Alternative 1 Conditions. Black represents inflows to Kerckhoff Reservoir.

Figure 4-13 Alternative 1 Ramp Up Measure for February 28, 2006 spill event.

The ramp up is required to begin in advance of inflow reaching Kerckhoff Reservoir, so it is forecast dependent. It is also dependent on the skill and experience of the operator to know how far in advance to initiate the Alternative 1 Ramp Up Measure. Here it is shown that the Alternative 1 Ramp Up Measure begins around 4:30 p.m., about three hours in

advance of the inflow spike. In implementing this schedule in the model, it was found that if the ramp up starts earlier than that, then too much flow is released from the reservoir before the inflow arrives, drawing down the reservoir too low, in which case the ramp up is interrupted, and spill has to reduce before completion. If the ramp up starts later than three hours prior to inflow arrival, then not enough of the reservoir is drawn down in advance of the inflow, and spill has to spike to keep the reservoir from rising above guide curve. It is evident that the initiation time of the ramp up is a key component to the success of the Alternative 1 Ramp Up Measure. However, it is likely to be a challenge for even an experienced operator to take an inflow forecast and know exactly when to initiate ramp up. This model can serve as a training mechanism to some degree, but it is likely that for any given spill event, initiation time would not be selected perfectly. In that regard, it is better to initiate the ramp up earlier than the ideal time rather than later. This would allow the operator to slow the ramp up rate (to less than one foot per hour at Gage J-2) to help tie into the arriving inflows successfully.

Of the Alternative 1 Ramp Up Measure operations, 41 of 42 were achieved successfully (97.6 percent success rate) for the entire period of record, with the model's advantage of being able to iterate to the ideal initiation time for each one.

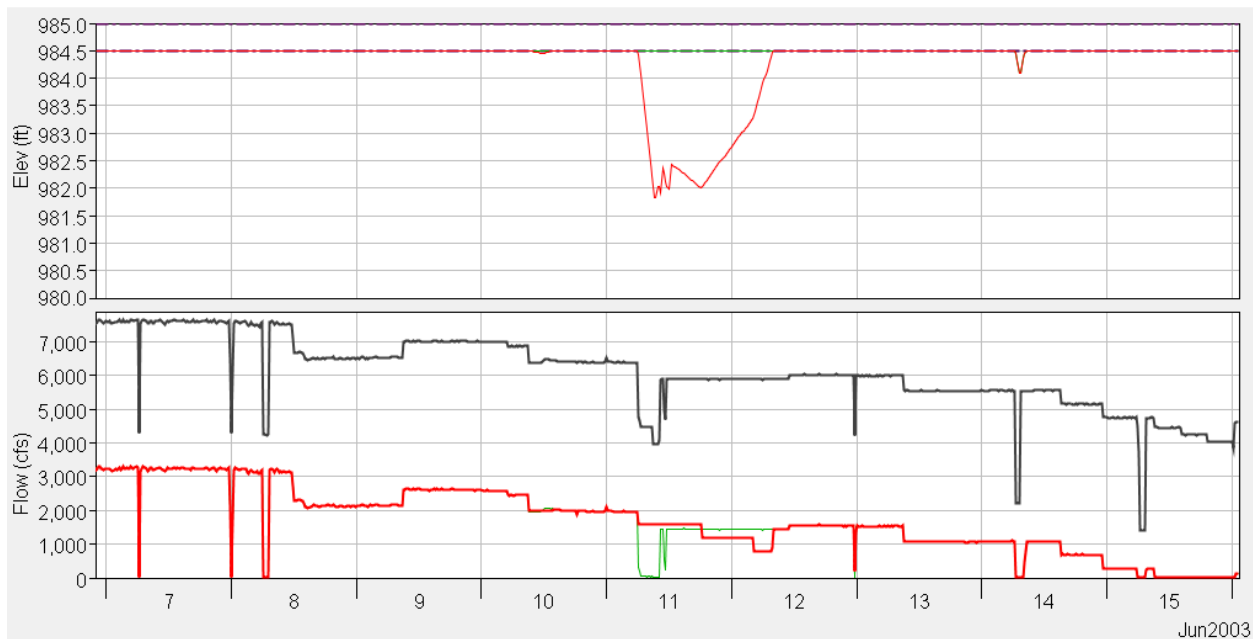
4.2 CEQA Alternative 2 Results

4.2.1 2025 Revised BLM 4(e) Condition 4

The 2025 Revised BLM 4(e) Condition 4 replaces the original Condition 4 by implementing the Modified EOS Flow Recession Measure and the original PG&E Subsequent Spill Ramp Down Measure as presented in Appendices 3 and 4 of DOI (2025).

4.2.1.1 Modified EOS Flow Recession Measure

The Modified EOS Flow Recession is applied to the largest spill event for each year's spill season (May 1 through August 31) and scheduled according to WY Type (AA or BA). All Modified EOS Flow Recession ramp downs begin at 9 a.m. Figure 4-14 shows an example of Modified EOS Flow Recession for WY 2003, which was designated a BA WY Type.



Note: Green represents Existing Conditions. Red represents Alternative 2 Conditions. Black represents inflows to Kerckhoff Reservoir.

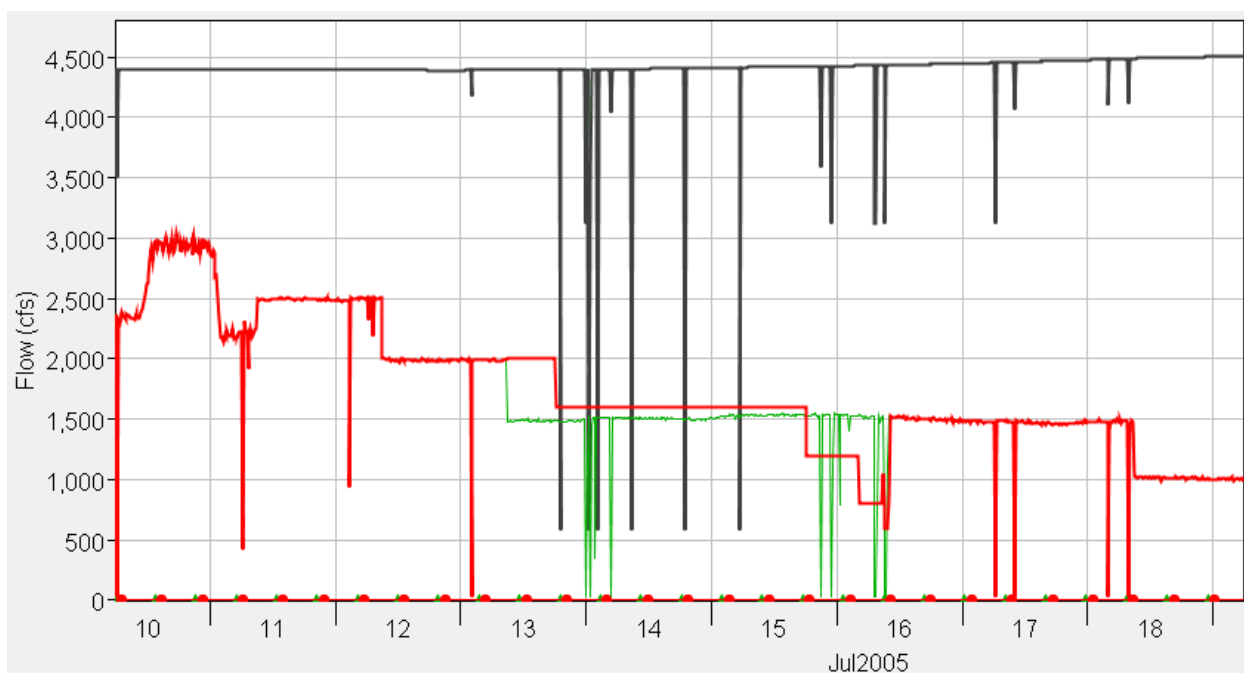
Figure 4-14 Modified EOS Flow Recession applied to WY 2003.

The BA Modified EOS Flow Recession ramp down begins on June 10 at 9 a.m. and holds around 2,000 cfs for 9 hours (the low end of the first schedule step of 2,500 to 2,000 cfs). The schedule then drops to 1,600 cfs (the low end of the second step range) and holds for 24 hours. However, here the inflows are too high to drop the spill, so it stays elevated in the first step. Around 9 a.m. on June 11, the inflow drops and the schedule is able to reduce to 1,600 cfs for another 12 hours, effectively producing boating flows (2,500-1,600 cfs) for the required duration of 33 hours.

Around midday on June 12, the ramp down flows recede at a faster rate than the inflows, and as a result, the schedule is interrupted as the hydroelectric project attempts to not exceed guide curve. This is a common occurrence for all the Modified EOS Flow Recession ramp downs, as the schedule ramps down at a faster rate than the recession rate of the inflows to Kerckhoff Reservoir. However, the step durations for the Modified EOS Flow Recession ramp down are minimums; the measure allows for longer durations at each step. An operator would be able to see the pool begin to elevate above guide curve and can increase the duration of individual steps to better match the recession rate of reservoir inflows. Consequently, while the Alternative 2 Modified EOS Flow Recession ramp downs do not necessarily look as clean as the Alternative 1 Condition 4 ramp downs, they

effectively work as intended, provided the operator extend the step durations as necessary to match the recession rates of the reservoir inflows.

The K2 Powerhouse cycling effect discussed in Alternative 1 Condition 4 is also present for Alternative 2 Modified EOS Flow Recession ramp downs. However, because the recession rate of the Modified EOS Flow Recession ramp down is faster, it can prevent long durations of excessive spill, which is where the K2 Powerhouse cycling effect takes place. Figure 4-15 shows an example of an AA Modified EOS Flow Recession schedule being applied in WY 2005. Here it is shown that the schedule is able to successfully apply the 57 hours of boating flows (as required for Schedule AA). However, during much of the boating flow period, the scheduled spill (red line) is slightly higher than the existing conditions spill (green line), which means the K2 Powerhouse (black line) must cycle down periodically to prevent exceedance of guide curve.



Note: Green represents Existing Conditions. Red represents Alternative 2 Conditions. Black represents inflows to Kerckhoff Reservoir.

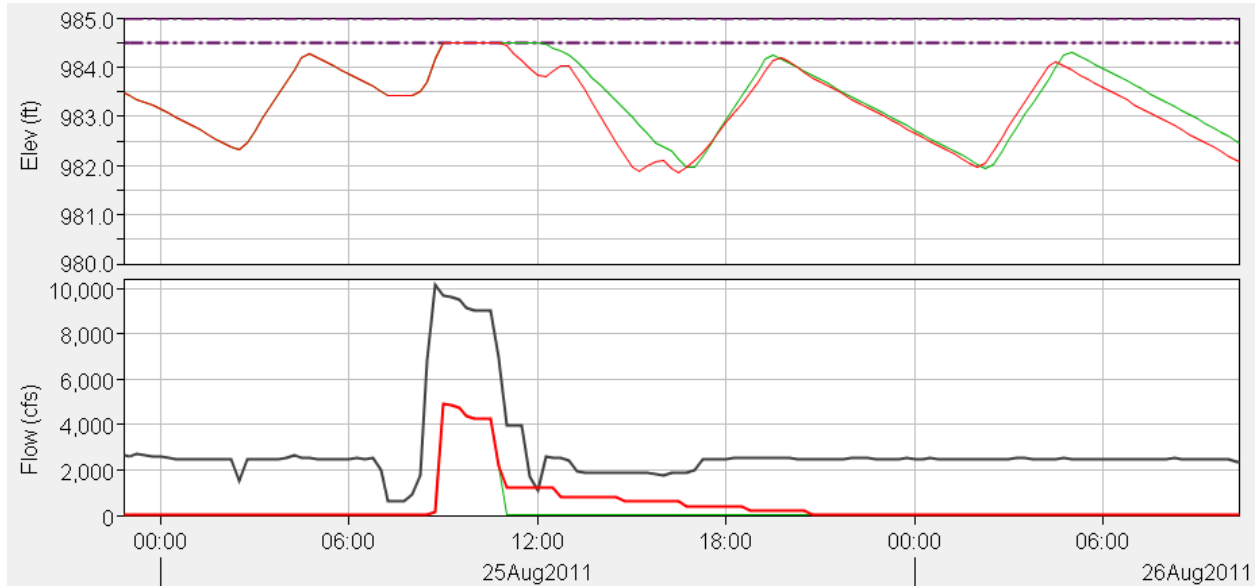
Figure 4-15 WY 2005 Alternative 2 Condition 4 (Revised) ramp down and K2 Powerhouse cycling.

4.2.1.2 Subsequent Spill Ramp Down Measure

The Subsequent Spill Ramp Down Measure in Alternative 2 is applied to any subsequent spills after the Modified EOS Flow Recession ramp down through October 31 of any given WY when daily average flows exceed 500 cfs, except during a powerhouse outage. The

Subsequent Spill Ramp Down schedule is the same regardless of WY. Subsequent Spill Ramp Downs were applied four times: twice in WY 2009, once in WY 2011, and once in WY 2016. No other WYs required Subsequent Spill Ramp Down.

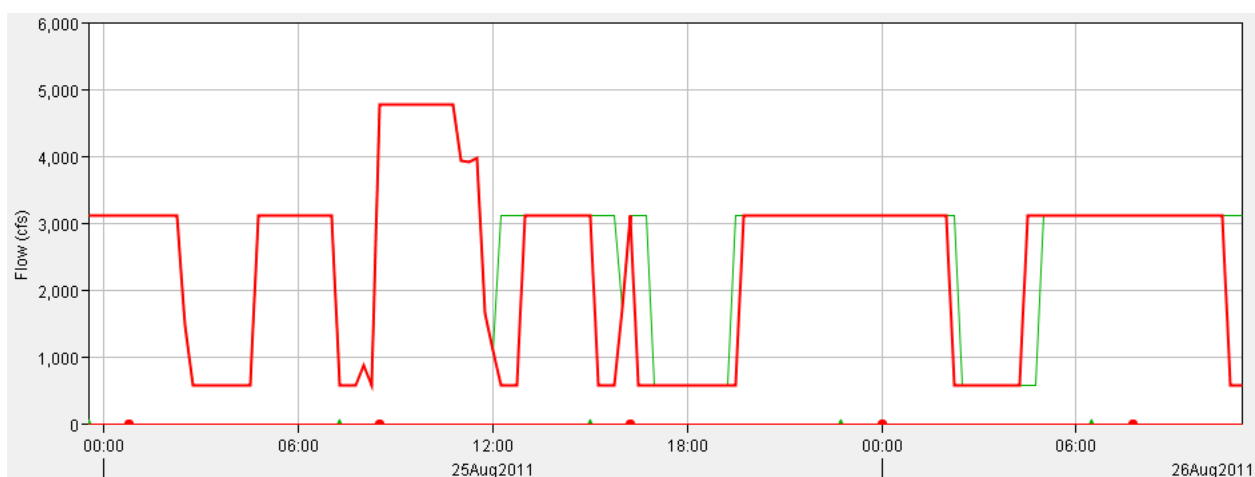
Figure 4-16 shows an example of a clean application of Subsequent Spill Ramp Down in August 2011. The Subsequent Spill Ramp Down ramp down (red line) elevates spill above existing conditions (green line), but inflows are sufficient to prevent the reservoir dropping to close to the lower end of the normal operating range, which would limit spill capacity.



Note: Green represents Existing Conditions. Red represents Alternative 2 Conditions. Black represents inflows to Kerckhoff Reservoir.

Figure 4-16 Subsequent Spill Ramp Down application in WY 2011.

While there is an effect on K2 Powerhouse operation, it appears to be minor in that there is minimal additional cycling (Figure 4-17). However, there is a slight phase shift, where ramp up and ramp down times are offset between existing and Alternative 2 conditions. This phase shift could be problematic if it affects the ability to meet power demand.



Note: Green represents Existing Conditions. Red represents Alternative 2 Conditions.

Figure 4-17 WY 2011 Subsequent Spill Ramp Down effect on K2 Powerhouse.

In general, the Subsequent Spill Ramp Down was successfully applied all five times with minimal impact on the K2 Powerhouse. This is largely due to the short durations in the ramp down steps in the Subsequent Spill Ramp Down schedule and the fact that the Subsequent Spill Ramp Down begins at a much lower flow rate (1,600-1,200 cfs) than the Modified EOS Flow Recession or Alternative 1 ramp down schedules.

4.2.2 2025 Revised BLM 4(e) Condition 5

The 2025 Revised BLM 4(e) Condition 4 replaces the Modified BLM 4(e) Condition 5 by implementing the Modified Spill Season Flow Measure and the POM as presented in Appendices 1 and 2 of DOI (2025).

4.2.2.1 Modified Spill Season Flow Measure

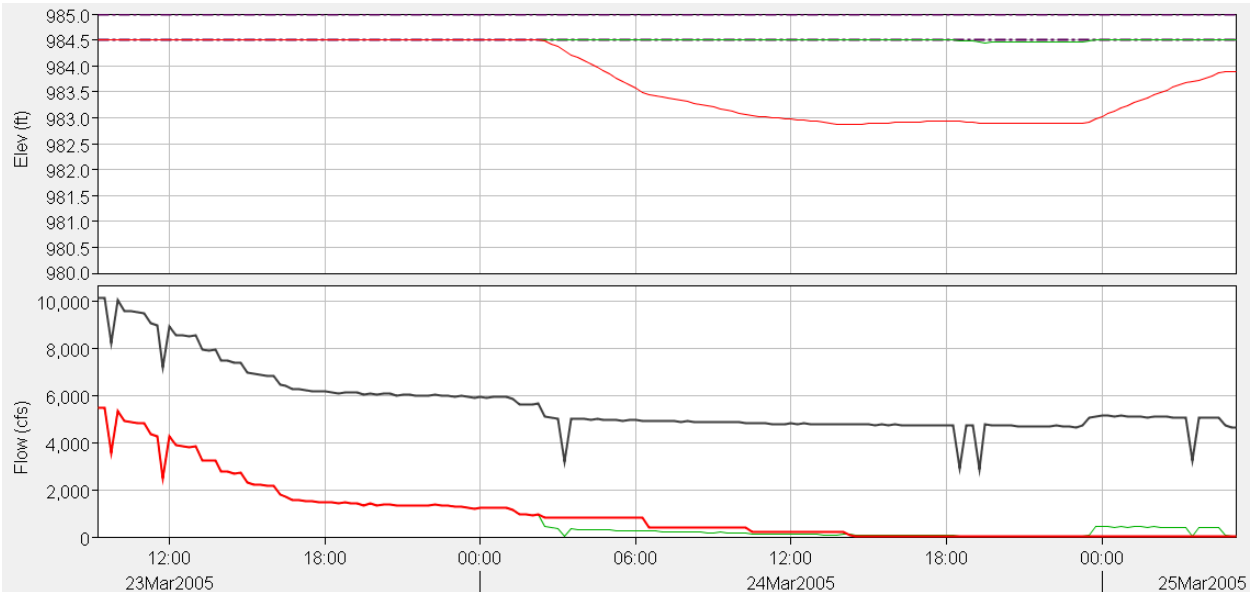
When sustained spills measured at Gage J-2 are 1,000 cfs⁶ or more (WY Type AA) or 500 cfs or more (WY Type BA) for at least 5 hours of continuous duration and neither the Modified EOS Flow Recession Measure nor the Subsequent Spill Ramp Down Measure is being implemented, subject to sufficient water availability,⁷ the model will initiate the Modified Spill Season Flow Measure schedule prior to average hourly flow declining below 800 cfs. The Modified Spill Season Flow Measure applies only from March 1 through

⁶ Flows are expressed as hourly average flows unless otherwise specified.

⁷ Sufficient water availability is dependent on combined accessible volume of water from inflow, storage within the normal operating range of Kerckhoff Reservoir, or current powerhouse diversions to complete the specified ramp down to minimum flow without decreasing below a 980-foot msl water surface elevation in Kerckhoff Reservoir.

August 31 of a given year. The Modified Spill Season Flow Measure was initiated 26 times for AA WYs and 4 times for BA WYs.

Figure 4-18 shows an example of a clean application of the Modified Spill Season Flow Measure that took place in March 2005, which is an AA WY. Because the Modified Spill Season Flow Measure schedule starts at 1,200 to 800 cfs and has short step durations of 4 hours, the storage in the reservoir can accommodate the additional spill enforced on the ramp down with or without diversions through the K2 Powerhouse.



Note: Green represents Existing Conditions. Red represents Alternative 2 Conditions. Black represents inflows to Kerckhoff Reservoir.

Figure 4-18 Modified Spill Season Flow Measure application in March 2005.

Note that the small follow-up spill event required for existing conditions (green line) that takes place early on March 25 does not require Alternative 2 (red line) to spill because the reservoir elevation is still recovering toward guide curve.

All applications of Modified Spill Season Flow Measure for the entire period of record performed as required without interruption.

4.2.2.2 Modified Planned Outage Measure

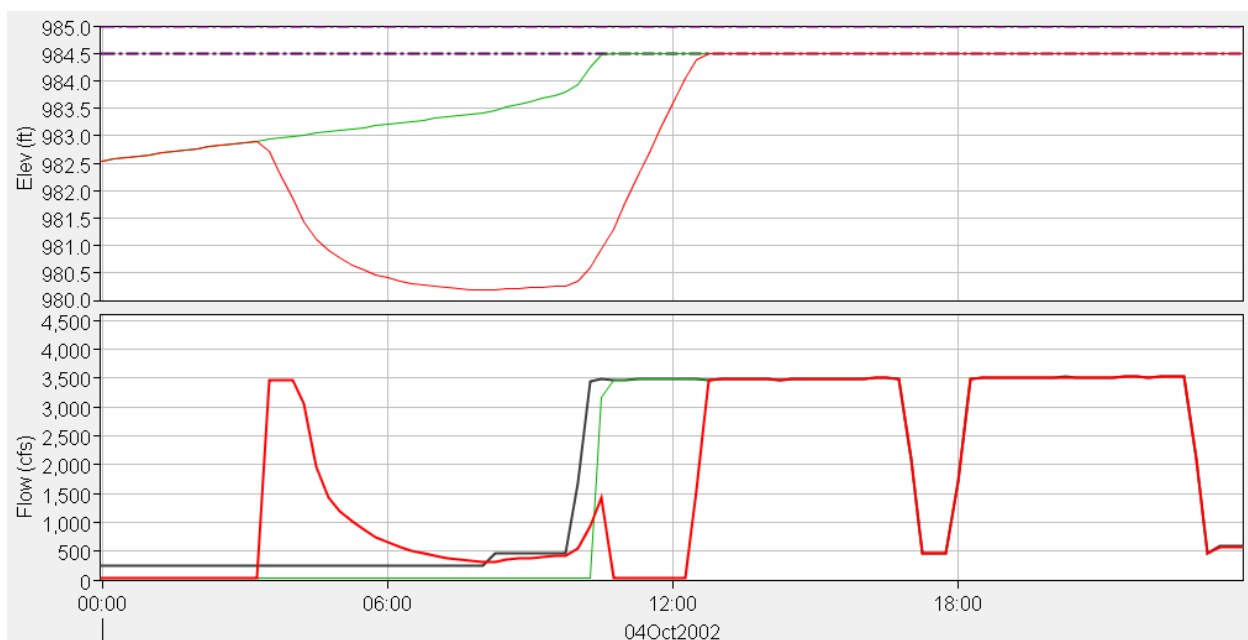
The POM has two components to it: initial release protocols associated with a planned outage, and a ramp down schedule for the end-of-spill events associated with a planned outage.

4.2.2.2.1 POM Initial Release Protocol

The POM Initial Release Protocol simply draws back an initial spill during the planned outage period to begin at 3:30 a.m. There is no ramp up schedule, rather the spill increase is mimicked at 3:30 a.m. given there is sufficient water availability. This measure only goes into effect during the planned outage period and only if flows below Kerckhoff Dam are expected to exceed a daily average flow⁸ of 1,000 cfs in AA WYs or 500 cfs in BA WYs as measured at Gage J-2. During planned outages, once the reservoir is at full capacity, any inflows would be spilled through the radial gates at Kerckhoff Dam. Thus, model simulations were run to see the effects of implementing the initial spill protocol and beginning spill operations at 3:30 a.m. when flows below Kerckhoff Dam were expected to exceed a daily average flow of 1,000 cfs in AA WYs or 500 cfs in BA WYs as measured at Gage J-2.

Of the WYs evaluated, WYs 2010, 2014, and 2015 had no spill above the initiation threshold during the planned outage time, so POM was not applied. WYs 2011 and 2012 had what could be considered gradual ramp ups to deterrence flows, so POM was not applied to those WYs. Figure 4-19 shows the POM ramp up applied at 3:30 a.m. on October 4, 2002 (WY 2003).

⁸ Daily average flow is calculated from midnight-midnight.



Note: Green represents Existing Conditions. Red represents Alternative 2 Conditions. Black represents inflows to Kerckhoff Reservoir.

Figure 4-19 WY 2003 POM Initial Release Protocol.

As there is initially very little inflow, the reservoir immediately drops to the lower end of the reservoirs normal operating range (980.0 feet above msl). It only begins to recover once inflow increases to 3,500 cfs around 10 a.m. As there is typically no or very little inflow prior to the planned outage spill, pulling back the spill flow to 3:30 a.m. produces a very similar result for all other WYs where the POM Initial Release Protocol was applied. A secondary spill spike occurs around 12:15 p.m. to balance inflows. While the initial spill under the POM ramp up protocol is drawn back to 3:30 a.m. with the intention of the initial spill beginning at early morning hours so that spill arrives downstream near the K1 Powerhouse by approximately 8:30 a.m. prior to recreators entering the river. The secondary spike occurs around noon, when recreators are likely to be around the river. This reveals an unintended consequence of the POM Initial Release Protocol. If the initial spill did not begin at 3:30 a.m. due to the low inflows at the time, a similar sudden increase in flow downstream would still have occurred later in the day when higher inflows entered Kerckhoff Reservoir given the reservoir was at or near full capacity. Since the reservoir is at capacity and the K2 Powerhouse is offline, the 3,500 cfs inflow into the reservoir would have been passed downstream through the PBR via spill through the radial gates.

The POM Initial Release Protocol was applied 12 times during the period of record. All applications produce a similar effect as shown with the WY 2003 example, but with varying stage increase rates on the secondary flow spike, most of which occur during daytime hours. There are five study sites in the PBR, where rating curves have been developed. There is significant interest in minimizing rates of rise throughout the PBR for spill events like this. The total rise of the secondary spikes for each of the five study sites (Cardno 2021) and at the Gage J-2 site are shown in Table 4-2. Please refer to PG&E's Stage Discharge Investigation (Cardno 2021) for travel times for flows to each study site.

Table 4-2 POM Initial Release Protocol secondary spike stage increase from beginning flow to largest observed flow.

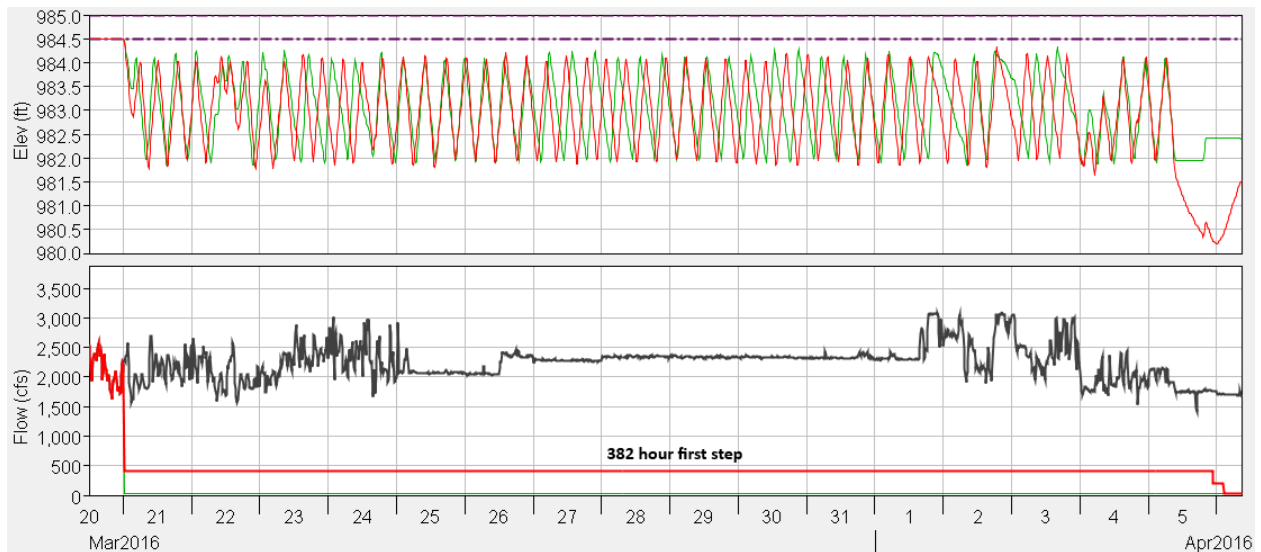
	Site 1	Site 2	Site 3	Site 4	Site 5	J2
	Rise	Rise	Rise	Rise	Rise	Rise
Date-Time	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
10/4/2002 3:30	7.2	8.9	5.2	9.0	11.7	5.5
10/23/2003 3:30	7.1	8.7	5.1	8.8	11.6	5.3
10/23/2005 3:30	3.1	4.0	2.4	4.5	4.5	2.5
10/4/2006 3:30	6.6	8.1	4.7	8.1	11.0	5.0
11/15/2007 3:30	6.8	8.3	4.8	8.3	11.2	5.1
11/19/2007 3:30	1.7	2.1	1.2	2.1	2.7	1.3
11/29/2007 3:30	7.0	8.7	5.1	8.7	11.5	5.3
11/9/2008 3:30	5.3	6.4	3.7	5.9	9.3	3.8
11/8/2012 3:30	4.9	5.9	3.3	5.3	8.7	3.5
12/12/2015 3:30	3.0	3.5	1.9	2.8	5.9	2.0
11/2/2016 3:30	4.7	5.6	3.1	4.9	8.4	3.3

4.2.2.2.2 Modified POM Ramp Down

The Modified POM Ramp Down is unique in its application in that during the first step of the ramp down schedule, the measure calls for running that step as long as sufficient water is available. Otherwise, the schedule mimics the Modified Spill Season Flow Measure. To implement the varying duration of the first step in the different WY applications, a trial-and-error approach was used to test out how long the first step could be run before the remainder of the schedule broke down and was not able to successfully complete.

WY 2016 was unusual in that the planned outage lasted from October to March and, at the conclusion of the outage, inflows to Kerckhoff Reservoir remained high enough that even with the K2 Powerhouse coming back online, there was still volume available to

service the Modified POM Ramp Down spill (Figure 4-20). This resulted in the first step of the Modified POM Ramp Down lasting 382 hours (~16 days).



Note: Green represents Existing Conditions. Red represents Alternative 2 Conditions. Black represents inflows to Kerckhoff Reservoir.

Figure 4-20 WY 2016 Modified POM Ramp Down.

The Modified POM Ramp Down was successful in all WYs where it was applied. Table 4-3 presents the first step durations for each WY. WYs 2010, 2014, and 2015 did not meet the flow threshold during the planned outage to initiate a Modified POM Ramp Down Measure.

Table 4-3 POM first step durations for all WYs.

WY	POM First Step Duration (hr)		WY	POM First Step Duration (hr)
2003	4		2011	25
2005	10		2012	4
2006	8		2013	50
2007	26		2014	NA
2008	17		2015	NA
2009	151		2016	382
2010	NA		2017	59

4.3 Reservoir Performance

Implementation of the two Alternatives affects the reservoir storage, as volume from the reservoir needs to be converted to spill to accommodate various ramp down and ramp up schedules.

Maxima, averages, and minima reservoir storage are plotted for each month of the period of record, presented in Figure 4-21, Figure 4-22, and Figure 4-23, respectively. This tabular output is presented in Appendix A of this report. Water year 2004 is included in the modeling simulation only for continuity in the modeling.

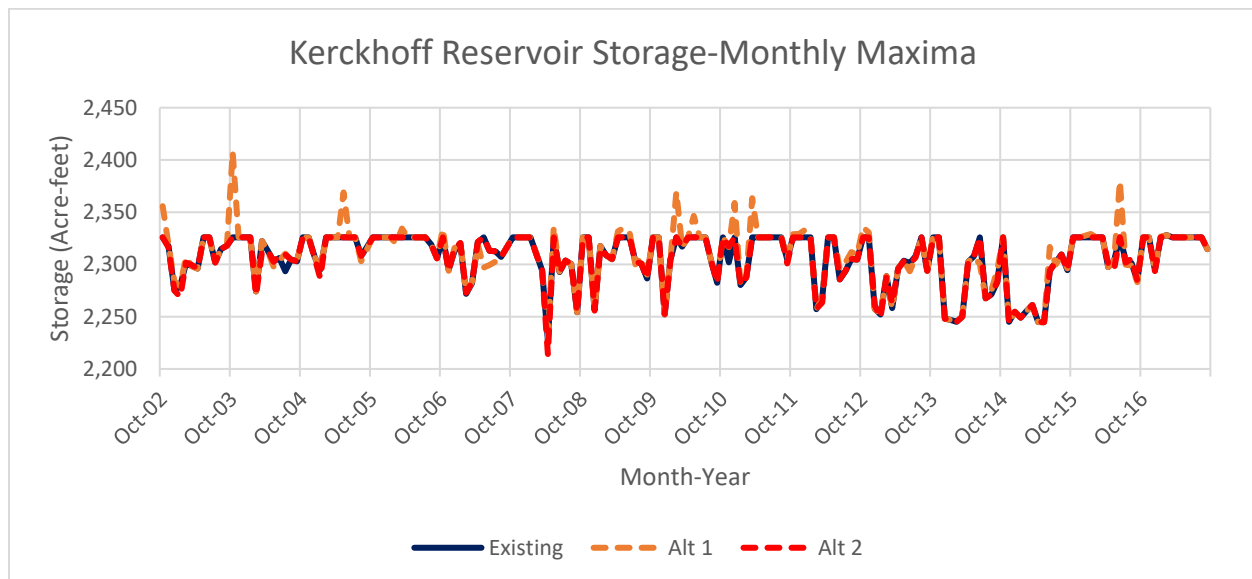


Figure 4-21 Kerckhoff Reservoir storage – monthly maxima.

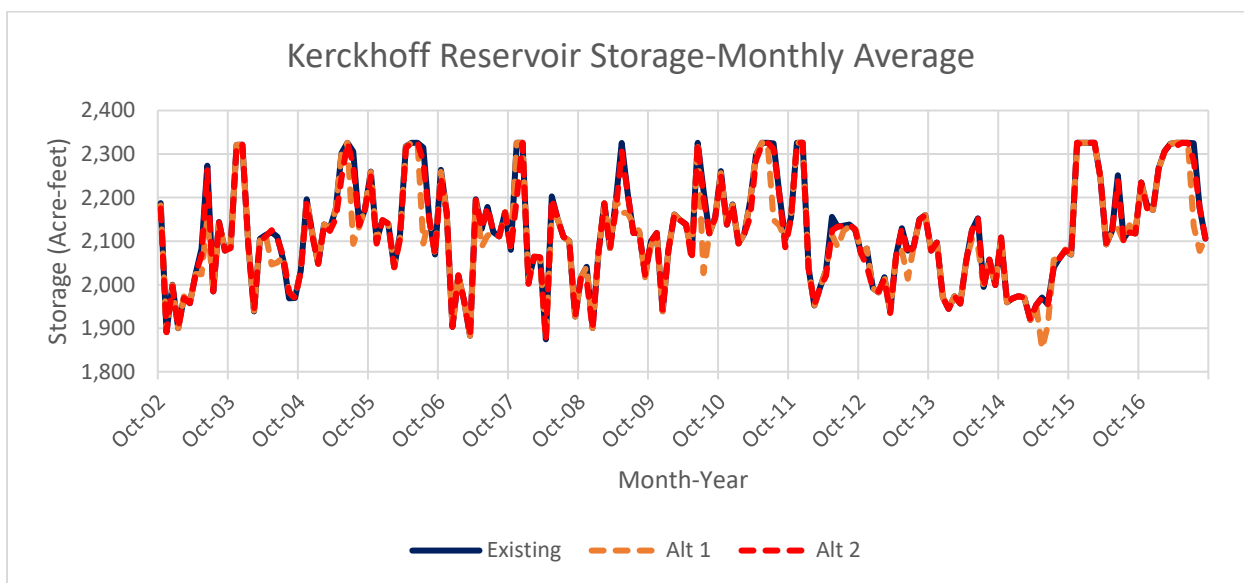


Figure 4-22 Kerckhoff Reservoir storage – monthly averages.

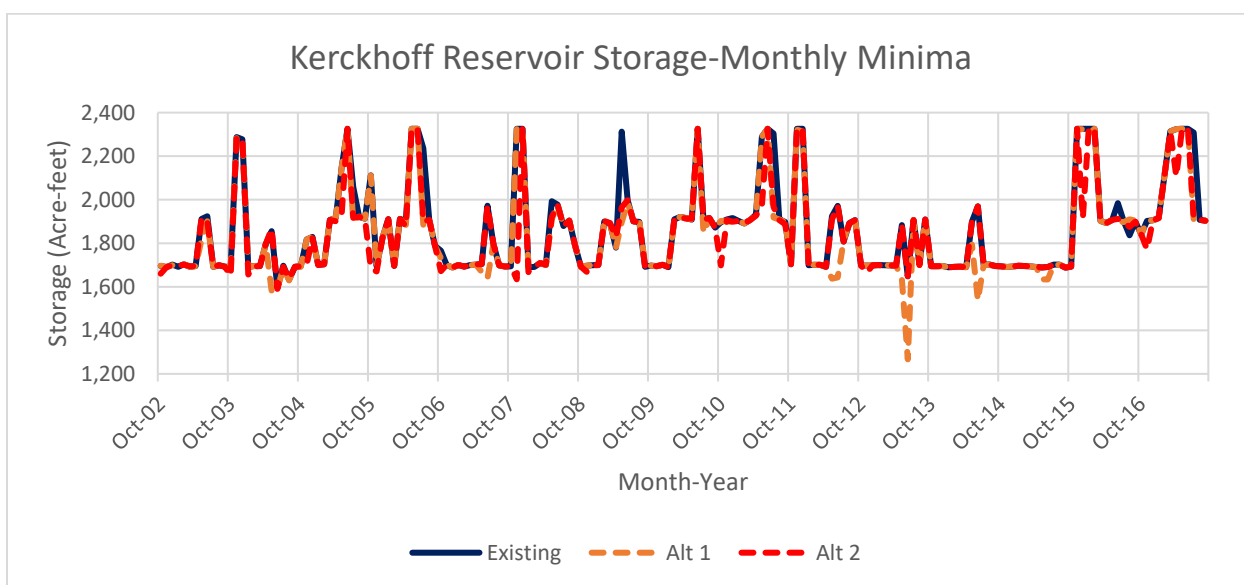


Figure 4-23 Kerckhoff Reservoir storage – monthly minima.

4.4 Stage Change Exceedance Analysis

There are two measures evaluated that are meant to mitigate excessive stage increases for initiation of spill events: the Alternative 1 Ramp Up Measure, discussed in Section 4.1.2., and the Alternative 2 POM Initial Release Protocol, discussed in Section 4.2.2.2.1.

The Alternative 1 Ramp Up Measure is explicitly limited in the model to an increase in spill of one foot of rise per hour at the Gage J-2 site. This measure was successfully applied 41

out of 42 times (97.6 percent success rate) in the period of record with no secondary spill spikes or negative effects on the K2 Powerhouse, with the important caveat of the dam operator having to have advanced notification of the magnitude and timing of incoming flows.

The Alternative 2 POM Initial Release Protocol simply maintains the same rate of discharge increase as the inflows, only with an earlier initiation time of 3:30 a.m. This measure failed to fulfill the intention of avoiding excessive stage increases in the PBR due to the resulting secondary spike in flow that occurs during daylight hours. This secondary spill spikes produced stage increases from a low of 1.2 feet at Study Site 3 to 11.7 feet at Study Site 5. The rating curves for PG&E's Stage Discharge Investigation (Cardno 2021) for Study Sites 1 through 5 were used to analyze stage changes from different flow levels up to 3,500 cfs in the PBR. Rating curves for higher flows were not analyzed for their associated stage changes under PG&E's stage-discharge investigation, which was utilized for the modeling effort. A skilled operator might be able to moderate this effect by limiting spill flows to a more gradual increase on the secondary spike, but the operator would be constrained by reservoir limits and their forecasting skill.

As discussed earlier, if the initial spill did not begin at 3:30 a.m. due to low inflows at the time, a similar sudden increase in flow downstream would still have occurred later in the day when higher inflows entered Kerckhoff Reservoir given the reservoir was at or near full capacity. Since the reservoir is at capacity and the K2 Powerhouse is offline, the 3,500 cfs inflow into the reservoir would have been passed downstream through the PBR via spill through the radial gates.

4.5 Reservoir Pool Limitations

Most of the Alternatives 1 and 2 ramp down measures create a drawdown effect on the reservoir, as the ramp down steps typically keep spill above inflows during the applied schedule. Some measures draw down the reservoir more than others. Typically, the higher initial flow measures with longer step durations draw down the reservoir to a point where it ultimately encroaches toward the K2 Powerhouse's minimum operating reservoir elevation, and to maintain the ramp down schedule, the pool is kept higher by cycling on and off the K2 Powerhouse (over-cycle, as discussed previously). The percentage of times a given measure encroaches toward the K2 Powerhouse's minimum operating reservoir elevation and the percentage of times that leads to over-cycling is discussed in Section 5.0.

4.6 Flow Dips

Common throughout the period of record are periodic and short-duration flow dips on the inflows to Kerckhoff Reservoir as discussed in Section 2.2. Figure 4-24 shows a few examples of flow dips during June 2005, but these flow dips are present frequently and throughout the period of record. It is unclear what the causes of the flow dips are, but during the model simulation, spill at Kerckhoff Dam is halted and ramped back up to match the flow spikes to attempt to maintain guide curve. This may just be a model artifact, and in reality, an operator may be able to mitigate these spikes by maintaining spill during the brief dip in inflows, causing the reservoir to draw down slightly to make up the difference in flows. However, if the operator elected to match spill with inflows during any of these flow dips, it would cause a sudden decrease in flow followed by a sharp increase in flow in the PBR, resulting in extreme stage decreases and increases.

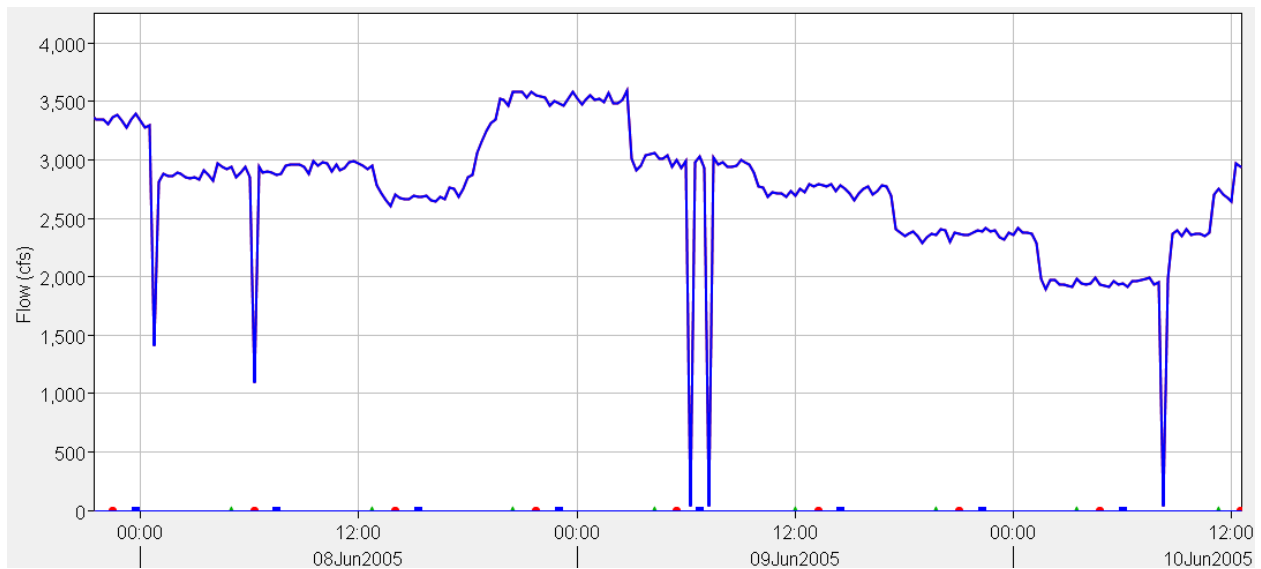


Figure 4-24 Flow dips.

As an example, the first of the two flow dips on June 9, shown in Figure 4-24, was evaluated for stage rate of rise at all five study sites, as well as the Gage J-2 site. The rates of rise are shown in Table 4-4.

Table 4-4 Flow dip stage rate of rise from lowest flow to highest observed flow.

Location	Stage Increase (feet)
Site 1	6.7
Site 2	8.3
Site 3	4.8
Site 4	8.2
Site 5	11.2
Gage J-2	5.1

There are hundreds of these flow dips of varying degrees, mostly occurring during the larger spill events.

5.0 SUMMARY AND CONCLUSIONS

When a substantial inflow to the reservoir is detected, the hydroelectric project reacts by increasing spill to try to maintain the reservoir pool at guide curve (984.5 feet msl). At the same time, there is an outflow demand for K2 Powerhouse flows that must be balanced. Alternatives 1 and 2 disrupt the balanced spill by imposing various measures. This imposition can create notable consequences that are described here:

- Encroachment toward the K2 Powerhouse's minimum operating reservoir elevation. When an Alternative's measure induces more spill than required to balance inflows, the reservoir services the additional required volume, which results in a decrease in reservoir stage. Severe spill flow imbalances with longer durations can cause the reservoir to encroach toward the K2 Powerhouse's minimum operating reservoir elevation, which can limit its ability to divert flows. If there are sufficient K2 Powerhouse flows at the time, the model would try to raise the pool by decreasing K2 Powerhouse flow. If the decrease in K2 flows requires skipping over the ROZ or dropping toward or below minimum reservoir operational levels, this can create an over-cycling effect as described in the next item.
- K2 Powerhouse over-cycling. When spill flows are limited, and the reservoir pool encroaches toward the K2 Powerhouse's minimum operating reservoir elevation (i.e., the K2 Powerhouse can no longer pass flows), if there is powerhouse flow at the time, the model reacts by cyclically ramping down K2 Powerhouse flows to keep the pool high enough to stay above the minimum operating elevation for the K2 Powerhouse. This can lead to powerhouse over-cycling—an unrealistic operation of the K2 Powerhouse. Based on the documented operational constraints, any operation that requires K2 to dwell in the ROZ is considered infeasible due to excessive cavitation and vibration impacts and the associated maintenance and outage consequences. That means operating strategies that require repeated short interval oscillations across the ROZ are not part of operating scenarios, as they can increase cycling wear and raise reliability/maintenance risk even if each individual crossing is brief. A likely strategy by the operator to avoid over-cycling would be to shut down the K2 Powerhouse for an extended period—long enough to bring the pool back to guide curve—before bringing it back online. However, starting and stopping the powerhouse are high stress events that are fundamentally different from steady state operation. They impose combined hydraulic, mechanical, thermal, and electrical stresses on the unit (e.g., rapid changes in wicket gate position and hydraulic loading, increased vibration and bearing loads, and braking/starting

wear). Frequent start/stop cycling is understood to accelerate cumulative damage mechanisms, including fatigue and cavitation-related runner damage, and it can increase the likelihood of forced outages and reduce component life. As a result, PG&E does not perform more than 10 start/stop cycles in a given year, and thus shutting down the K2 Powerhouse to complete the down ramp and avoid over-cycling is likely infeasible (personal email communication, J. Hartman and C. McCormick, March 5, 2026). Also exacerbating this situation is the restriction to operating the K2 Powerhouse in the ROZ (between 3,117 cfs and 1,744 cfs) and turbine unit start/stop limitations. If the powerhouse were running just above the ROZ, and an increase in spill (to meet an Alternative measure's schedule) initiated a reduction in flow at the K2 Powerhouse, it would have to jump down to 1,744 cfs, rather than just reducing K2 Powerhouse flows modestly. That jump down then creates an under-discharge of reservoir outflows, leading to the reservoir rising, which would then prompt an increase in K2 Powerhouse flows to compensate. This oscillatory effect then continues through the implementation of the ramp down schedule and, as discussed previously, it is not considered feasible.

Table 5-1 presents a qualitative assessment of the success of CEQA Alternative 1 and 2 measures. The success rate provides a percentage of time the measure was successfully completed. The percentage of time the application of the measure caused K2 Powerhouse over-cycling is also presented. For example, on the first row, "Spill Year Schedule Boating Flows and Down Ramping of Spill Flows," the schedule was completed successfully 100 percent of the time, but it also produced an encroachment toward K2's minimum operating elevation that induced a K2 Powerhouse over-cycling effect 91.7 percent of the time.

Table 5-1 CEQA Alternatives 1 and 2 performance.

Measure	Count	Success Rate (%)	K2 Powerhouse Over-Cycling (%)
Alternative 1 Ramping Conditions			
Spill Year Schedule Boating Flows and Down Ramping of Spill Flows	12	100	91.7
Non-Spill Year Boating Flows and Down Ramping	28	28.6	4.6
Stranding Protection Down Ramping	8	100	12.5
September – October Down Ramp	4	100	0**
Alternative 1 Ramp Up Measure *	42	97.6	0
Alternative 2 Ramping Conditions			

Measure	Count	Success Rate (%)	K2 Powerhouse Over-Cycling (%)
Modified EOS Flow Recession	10	100	100
Subsequent Spill Ramp Down	5	100	0
Modified Spill Season Flow Measure	30	100	0
POM Initial Release Protocol	12	0	0
Modified POM Ramp Down	12	100	0

*Success would depend on the operator's ability to receive advanced notification of the timing and magnitude of inflows and accurately predict the optimal initiation time of the ramp up.

**K2 Powerhouse Over-Cycling in WY2007 was not included here since it was very brief.

The following conclusions are presented for each of the Alternative measures:

5.1 CEQA Alternative 1

- 2024 BLM 4(e) Condition 4 – Spill Year Schedule Boating Flows and Down Ramping of Spill Flows. This measure was successful each of the 12 times it was applied during the period of record. However, due to the relatively high flows for ramp down initiation and the relatively long step durations, the K2 Powerhouse's minimum operating reservoir elevation was encroached upon every instance, and all but one of those encroachments led to K2 Powerhouse over-cycling.
- 2024 BLM 4(e) Condition 4 – Non-Spill Year Boating Flows and Down Ramping. In general, there are typically not enough inflows during the summer months in non-spill years to sustain this schedule. Of the 28 times this was implemented in the period of record (over 6 non-spill years), only 28.6 percent of the time did it produce adequate boating flows. WY 2014 was rather successful, with four of five weekends producing successful boating flows. However, the other non-spill years at best only produced one or two successful weekends each.
- 2024 BLM 4(e) Condition 4 – Stranding Protection Down Ramping. With a more modest schedule initiation flow and shorter step durations, along with elevated inflows during the times this measure is applied, the Stranding Protection Down Ramping was not only 100 percent successful in its application, but it only encroached on the K2 Powerhouse's minimum operating reservoir elevation 37.5 percent of the time and only induced K2 Powerhouse over-cycling 12.5 percent of the time (one instance in WY 2016).
- September – October Down Ramp. This measure has a similar modest schedule as the Stranding Protection Down Ramping; however, there is typically less inflow

during the months of September and October. So, while this measure was 100 percent successful in its applications, it did encroach on the K2 Powerhouse's minimum operating reservoir elevation 100 percent of the time. However, none of those induced K2 Powerhouse over-cycling, except during a very brief period during WY2007.

- Alternative 1 Ramp Up Measure. The Alternative 1 Ramp Up Measure works very well across the board. It was successful 97.6 percent of the time and caused no encroachment toward Kerckhoff Reservoir's minimum operating elevation or K2 Powerhouse over-cycling. However, the success of the application of this measure depends heavily on advanced notification of the magnitude and timing of forecasted inflows from upstream projects, as well as the skill of the operator to predict the time, in advance of an increase in inflows, at which initiation of the ramp up protocol should begin. It would be better for the operator to initiate the protocol earlier than later, as an earlier start would allow the operator to back off spill if the reservoir were draining too fast and still maintain a rate of stage increase at Gage J-2 of less than one foot per hour. A late start would require the operator to spill more than the protocol allows to prevent the reservoir from rising above guide curve.

5.2 CEQA Alternative 2

- Modified End-of-Spill Flow Recession. There is a 100 percent success rate with this measure; however, the higher initiation flows and longer durations of the schedule lead to significant drawdowns of the reservoir toward the K2 Powerhouse's minimum operating reservoir elevation such that K2 Powerhouse over-cycling happened 100 percent of the time this measure was applied.
- Subsequent Spill Ramp Down Measure. Similar to Alternative 1's Stranding Protection Down Ramping Measure, the modest schedule allows for 100 percent successful application but also minimal effect on reservoir drawdown toward the K2 Powerhouse's minimum operating reservoir elevation and no K2 Powerhouse over-cycling.
- Modified Spill Season Flow Measure. Similar to Alternative 1's Stranding Protection Down Ramping Measure, the modest schedule allows for 100 percent successful application with no significant effect on reservoir drawdown toward the K2 Powerhouse's minimum operating reservoir elevation and no K2 Powerhouse over-cycling.
- Planned Outage Measure Initial Release Protocol. The POM Initial Release Protocol anticipates an initial flow release to Kerckhoff Reservoir through forecasts and alerts, and it pre-spills to match that inflow at 3:30 a.m., when recreators are less likely to be in or around the river. While each application of

the POM Initial Release Protocol can mimic the initial planned outage spill at 3:30 a.m., the protocol is only able to hold that spill for a brief time, before the reservoir drops and available storage volume is depleted. This was the case for 100 percent of the POM Initial Release Protocol applications. While moving the initiation of the spill to 3:30 a.m. creates the sudden rise during nighttime hours, where few if any recreators would be expected to be near the river, moving the spill to happen before inflows arrive causes a drop in spill followed by a secondary spike once inflows do arrive. This secondary spike commonly happens in the middle of the day and typically results in large stage increases at the monitoring sites in the PBR of 1.2 feet to as high as 11.7 feet. As discussed previously, if the initial release protocol was not implemented due to insufficient water availability, if the reservoir received high inflows when it was at full capacity, a similar flow and stage change increase would have occurred due to the K2 Powerhouse being offline.

- Modified Planned Outage Measure Ramp Down. Similar to Alternative 1's Stranding Protection Down Ramping Measure, the modest schedule allows for 100 percent successful application. However, there is significant effect on reservoir drawdown, but no K2 Powerhouse over-cycling.

5.3 Sensitivity Analysis

No sensitivity analysis runs were completed for the modeling effort. Several inputs to the Operations Model have varying degrees of uncertainty. For the purposes of this report, inputs were set to best estimates, based on available data, Kerckhoff Hydroelectric Project understanding, and modeler experience. However, a sensitivity analysis could be conducted to further understand a realistic range of potential results.

This analysis would test the sensitivity of the model results to uncertain inputs, such as the following:

- Spillway rating curves
- Reservoir stage storage curves
- LTOR inflows
- Flood wave travel times in the PBR

In addition, model computation parameters could also be included in this sensitivity analysis, most notably the computation time step. Furthermore, many of the operational measures tested in this report suggest ranges for discharge and variability in step

durations. A sensitivity analysis could test flows and durations within the prescribed ranges to gauge how results react.

6.0 REFERENCES

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- Personal Email Communication between J. Hartman, Project Manager, Pacific Gas and Electric Company, San Francisco, CA, and C. McCormick, Environmental Scientist, State Water Resources Control Board, CA, regarding "Follow Up Questions and Project Updates," on March 5, 2026.
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APPENDIX A

STORAGE PRESENTED IN MONTHLY MINIMA, AVERAGES, AND MAXIMA

	Max				Avg				Min		
Month	Existing	Alt 1	Alt 2		Existing	Alt 1	Alt 2		Existing	Alt 1	Alt 2
Oct-02	2,325.90	2,355.70	2,325.90		2,187.20	2,182.00	2,175.30		1,695.70	1,697.00	1,659.80
Nov-02	2,317.50	2,318.50	2,316.30		1,891.10	1,891.00	1,890.60		1,690.40	1,691.40	1,690.20
Dec-02	2,275.20	2,283.40	2,274.90		1,999.90	1,998.80	1,996.00		1,701.80	1,698.70	1,699.50
Jan-03	2,279.40	2,279.20	2,268.90		1,900.00	1,900.10	1,901.50		1,692.00	1,691.80	1,697.90
Feb-03	2,300.80	2,306.90	2,301.70		1,971.00	1,973.10	1,969.50		1,703.60	1,703.30	1,701.50
Mar-03	2,298.50	2,298.20	2,299.40		1,957.20	1,957.00	1,957.60		1,692.00	1,691.80	1,694.60
Apr-03	2,296.10	2,295.90	2,296.00		2,024.80	2,024.60	2,024.70		1,695.10	1,694.80	1,694.90
May-03	2,325.90	2,326.60	2,325.90		2,082.70	2,023.60	2,067.90		1,911.60	1,817.10	1,917.20
Jun-03	2,325.90	2,325.90	2,325.90		2,273.10	2,153.60	2,262.90		1,923.80	1,900.80	1,901.40
Jul-03	2,301.90	2,301.90	2,301.90		1,984.50	1,985.90	1,984.50		1,691.60	1,691.60	1,691.60
Aug-03	2,314.80	2,314.90	2,314.80		2,143.80	2,143.80	2,143.80		1,699.00	1,699.00	1,699.00
Sep-03	2,317.90	2,317.90	2,317.90		2,078.20	2,078.20	2,078.20		1,692.10	1,692.10	1,692.10
Oct-03	2,325.90	2,407.40	2,325.90		2,089.20	2,089.60	2,084.20		1,690.40	1,690.40	1,650.80
Nov-03	2,325.90	2,325.90	2,325.90		2,321.00	2,321.00	2,321.00		2,287.70	2,287.70	2,287.70
Dec-03	2,325.90	2,325.90	2,325.90		2,321.30	2,321.30	2,321.30		2,277.70	2,277.70	2,277.70
Jan-04	2,325.90	2,325.90	2,325.90		2,093.70	2,093.70	2,091.80		1,690.80	1,690.80	1,656.30
Feb-04	2,274.10	2,274.10	2,270.60		1,938.50	1,938.50	1,941.40		1,695.00	1,695.00	1,693.20
Mar-04	2,322.40	2,322.40	2,311.70		2,105.20	2,105.20	2,100.10		1,695.40	1,695.40	1,695.60
Apr-04	2,313.20	2,313.20	2,313.50		2,114.10	2,114.10	2,110.80		1,795.40	1,795.40	1,795.70
May-04	2,303.00	2,297.70	2,302.50		2,120.40	2,046.10	2,125.20		1,855.70	1,580.80	1,866.30
Jun-04	2,306.10	2,303.80	2,309.30		2,110.20	2,050.80	2,105.80		1,595.60	1,591.00	1,590.30
Jul-04	2,293.40	2,310.30	2,309.50		2,056.10	2,064.60	2,064.70		1,697.10	1,687.90	1,691.80
Aug-04	2,304.70	2,303.90	2,304.70		1,968.60	1,984.10	1,981.80		1,632.80	1,629.10	1,636.60
Sep-04	2,302.90	2,303.70	2,302.90		1,969.40	1,969.40	1,969.50		1,692.00	1,692.80	1,692.10
Oct-04	2,325.90	2,325.90	2,325.90		2,031.70	2,032.60	2,029.10		1,693.60	1,691.60	1,693.60
Nov-04	2,325.90	2,325.90	2,325.90		2,196.10	2,196.10	2,186.90		1,817.60	1,817.60	1,702.50
Dec-04	2,307.80	2,307.80	2,306.80		2,116.10	2,116.10	2,109.80		1,829.20	1,829.20	1,825.20
Jan-05	2,294.80	2,294.80	2,287.00		2,048.30	2,048.30	2,047.50		1,700.90	1,700.90	1,699.40

	Max				Avg				Min		
Feb-05	2,325.90	2,325.90	2,325.90		2,138.30	2,138.30	2,137.00		1,703.10	1,703.10	1,703.30
Mar-05	2,325.90	2,325.90	2,325.90		2,129.40	2,129.40	2,123.50		1,906.70	1,906.70	1,906.70
Apr-05	2,325.90	2,325.90	2,325.90		2,174.10	2,174.10	2,151.70		1,916.20	1,916.20	1,901.00
May-05	2,325.90	2,368.90	2,325.90		2,302.40	2,302.50	2,245.80		2,145.20	2,145.20	1,925.10
Jun-05	2,325.90	2,325.90	2,325.90		2,325.80	2,325.80	2,325.80		2,325.80	2,325.80	2,325.80
Jul-05	2,325.90	2,325.90	2,325.90		2,305.60	2,093.70	2,275.40		2,058.30	1,899.90	1,916.20
Aug-05	2,308.20	2,303.10	2,308.20		2,136.30	2,132.30	2,136.30		1,921.30	1,922.30	1,921.30
Sep-05	2,316.50	2,314.50	2,316.50		2,172.50	2,174.10	2,172.50		1,913.20	1,913.90	1,913.20
Oct-05	2,325.90	2,325.90	2,325.90		2,259.80	2,258.70	2,248.80		2,112.40	2,111.60	1,687.00
Nov-05	2,325.90	2,325.90	2,325.90		2,101.30	2,101.30	2,094.40		1,694.40	1,694.40	1,670.30
Dec-05	2,325.90	2,325.90	2,325.90		2,147.90	2,147.90	2,148.40		1,825.50	1,825.50	1,824.70
Jan-06	2,325.90	2,325.90	2,325.90		2,139.80	2,139.80	2,139.80		1,910.50	1,910.50	1,910.50
Feb-06	2,325.90	2,320.00	2,325.90		2,040.40	2,039.60	2,040.40		1,696.20	1,696.20	1,696.20
Mar-06	2,325.90	2,334.40	2,325.90		2,114.50	2,106.80	2,104.70		1,911.10	1,912.50	1,912.20
Apr-06	2,325.90	2,325.90	2,325.90		2,317.90	2,316.20	2,313.70		1,903.20	1,884.50	1,877.30
May-06	2,325.90	2,325.90	2,325.90		2,325.80	2,325.80	2,325.80		2,325.80	2,325.80	2,325.80
Jun-06	2,325.90	2,325.90	2,325.90		2,325.80	2,325.80	2,325.80		2,325.80	2,325.80	2,325.80
Jul-06	2,325.90	2,325.90	2,325.90		2,314.70	2,094.50	2,282.70		2,236.20	1,882.80	1,897.80
Aug-06	2,319.00	2,319.00	2,319.00		2,151.60	2,151.60	2,151.60		1,907.70	1,907.70	1,907.70
Sep-06	2,305.90	2,305.90	2,305.90		2,069.20	2,069.20	2,069.20		1,788.00	1,788.00	1,788.00
Oct-06	2,325.90	2,334.10	2,325.90		2,263.90	2,259.50	2,246.10		1,765.80	1,732.30	1,671.80
Nov-06	2,294.90	2,293.90	2,293.80		2,166.10	2,165.90	2,165.90		1,700.10	1,701.50	1,701.50
Dec-06	2,312.60	2,315.60	2,315.60		1,902.80	1,902.70	1,903.10		1,688.80	1,688.70	1,688.70
Jan-07	2,320.30	2,320.60	2,320.60		2,020.10	2,021.90	2,021.90		1,700.70	1,700.10	1,700.00
Feb-07	2,271.90	2,272.90	2,272.90		1,962.30	1,963.10	1,963.10		1,692.70	1,693.00	1,693.00
Mar-07	2,282.20	2,283.30	2,283.10		1,882.60	1,882.70	1,882.60		1,700.10	1,698.40	1,698.40
Apr-07	2,321.30	2,319.20	2,321.60		2,196.00	2,194.40	2,194.50		1,702.20	1,702.70	1,702.50
May-07	2,325.90	2,296.90	2,325.90		2,128.30	2,086.80	2,128.50		1,703.90	1,668.10	1,704.30
Jun-07	2,313.00	2,299.40	2,313.00		2,178.40	2,112.70	2,178.40		1,972.50	1,639.80	1,972.50

	Max				Avg				Min		
Jul-07	2,312.60	2,302.60	2,312.60		2,120.30	2,120.10	2,120.30		1,797.10	1,796.10	1,797.10
Aug-07	2,307.20	2,307.30	2,307.20		2,110.90	2,111.00	2,110.90		1,698.40	1,698.50	1,698.40
Sep-07	2,316.80	2,316.90	2,316.80		2,166.00	2,166.30	2,166.00		1,693.10	1,693.20	1,693.10
Oct-07	2,325.90	2,325.90	2,325.90		2,079.90	2,080.00	2,079.90		1,693.90	1,694.10	1,693.90
Nov-07	2,325.90	2,325.90	2,325.90		2,325.80	2,325.80	2,197.50		2,325.80	2,325.80	1,634.40
Dec-07	2,325.90	2,325.90	2,325.90		2,325.80	2,325.80	2,325.80		2,325.80	2,325.80	2,325.80
Jan-08	2,325.90	2,325.90	2,325.90		2,009.80	2,009.80	2,001.60		1,690.10	1,690.10	1,667.50
Feb-08	2,310.60	2,310.60	2,310.00		2,063.90	2,063.90	2,064.60		1,690.80	1,690.80	1,692.00
Mar-08	2,294.20	2,294.20	2,294.80		2,061.70	2,061.70	2,063.00		1,708.50	1,708.50	1,709.10
Apr-08	2,227.60	2,227.60	2,214.10		1,874.40	1,874.40	1,873.30		1,700.80	1,700.80	1,700.90
May-08	2,325.90	2,336.00	2,325.90		2,202.90	2,159.00	2,197.40		1,993.30	1,910.90	1,920.50
Jun-08	2,292.70	2,292.70	2,292.70		2,151.70	2,151.70	2,151.70		1,977.40	1,977.40	1,977.40
Jul-08	2,303.70	2,303.70	2,303.70		2,109.60	2,109.60	2,109.60		1,878.90	1,878.90	1,878.90
Aug-08	2,300.40	2,300.40	2,300.40		2,100.30	2,100.30	2,100.30		1,904.00	1,904.00	1,904.00
Sep-08	2,254.20	2,254.20	2,254.20		1,926.70	1,926.70	1,926.70		1,788.10	1,788.10	1,788.10
Oct-08	2,325.90	2,325.90	2,325.90		2,016.50	2,016.50	2,016.50		1,692.50	1,692.50	1,692.50
Nov-08	2,325.90	2,325.90	2,325.90		2,041.10	2,041.10	2,009.40		1,696.90	1,696.90	1,669.00
Dec-08	2,256.70	2,256.70	2,255.80		1,900.20	1,900.20	1,898.80		1,699.00	1,699.00	1,697.80
Jan-09	2,317.70	2,317.70	2,315.50		2,071.00	2,071.00	2,071.40		1,700.40	1,700.40	1,699.60
Feb-09	2,308.60	2,308.60	2,308.90		2,186.80	2,186.80	2,186.60		1,899.30	1,899.30	1,902.50
Mar-09	2,305.00	2,305.00	2,305.20		2,083.90	2,083.90	2,084.20		1,891.80	1,891.80	1,892.10
Apr-09	2,325.90	2,331.80	2,325.90		2,195.40	2,195.40	2,172.90		1,780.00	1,780.00	1,828.70
May-09	2,325.90	2,334.80	2,325.90		2,325.30	2,165.30	2,305.60		2,313.00	1,896.50	1,965.00
Jun-09	2,325.90	2,330.20	2,325.90		2,210.30	2,164.70	2,210.30		1,998.20	1,986.00	1,998.20
Jul-09	2,302.70	2,300.10	2,302.70		2,118.50	2,138.60	2,118.50		1,900.20	1,907.10	1,900.20
Aug-09	2,300.80	2,306.60	2,300.80		2,119.40	2,122.50	2,119.40		1,898.30	1,903.50	1,898.30
Sep-09	2,286.50	2,290.20	2,286.50		2,022.70	2,016.80	2,022.70		1,691.90	1,700.30	1,691.90
Oct-09	2,325.90	2,325.90	2,325.90		2,099.80	2,090.30	2,099.80		1,697.30	1,696.90	1,697.30
Nov-09	2,325.90	2,325.90	2,325.90		2,118.50	2,118.50	2,118.50		1,694.70	1,694.70	1,694.70

	Max				Avg				Min		
Dec-09	2,252.10	2,252.10	2,252.10		1,938.80	1,938.80	1,938.80		1,701.20	1,701.20	1,701.20
Jan-10	2,304.80	2,304.80	2,304.80		2,079.60	2,079.60	2,079.60		1,690.40	1,690.40	1,690.40
Feb-10	2,325.90	2,369.20	2,325.90		2,161.10	2,160.70	2,161.10		1,909.60	1,909.60	1,909.60
Mar-10	2,317.10	2,317.10	2,317.10		2,148.30	2,148.30	2,148.30		1,920.60	1,920.60	1,920.60
Apr-10	2,325.90	2,325.90	2,325.90		2,138.50	2,138.50	2,138.20		1,915.70	1,915.70	1,913.20
May-10	2,325.90	2,346.40	2,325.90		2,074.60	2,069.40	2,055.70		1,908.60	1,908.60	1,913.40
Jun-10	2,325.90	2,325.90	2,325.90		2,325.80	2,325.80	2,325.80		2,325.80	2,325.80	2,325.80
Jul-10	2,325.90	2,325.90	2,325.90		2,217.10	2,026.20	2,199.00		1,908.50	1,849.00	1,908.50
Aug-10	2,302.40	2,302.60	2,302.40		2,117.90	2,116.40	2,117.90		1,915.60	1,913.10	1,915.60
Sep-10	2,282.50	2,287.30	2,282.50		2,154.00	2,155.20	2,154.00		1,871.40	1,872.80	1,871.40
Oct-10	2,325.90	2,325.90	2,325.90		2,260.80	2,256.60	2,250.30		1,896.80	1,902.30	1,698.50
Nov-10	2,302.00	2,316.60	2,317.20		2,137.50	2,138.70	2,138.50		1,909.30	1,900.70	1,907.10
Dec-10	2,325.90	2,358.80	2,325.90		2,184.40	2,182.90	2,182.80		1,915.70	1,898.40	1,899.00
Jan-11	2,280.30	2,280.30	2,280.30		2,094.70	2,094.70	2,094.70		1,902.90	1,902.90	1,902.90
Feb-11	2,287.70	2,287.70	2,287.70		2,116.90	2,116.90	2,116.90		1,890.60	1,890.60	1,890.60
Mar-11	2,325.90	2,363.50	2,325.90		2,191.90	2,191.80	2,155.40		1,906.80	1,906.80	1,906.80
Apr-11	2,325.90	2,325.90	2,325.90		2,297.50	2,297.50	2,285.70		1,932.30	1,932.30	1,926.00
May-11	2,325.90	2,325.90	2,325.90		2,325.80	2,325.80	2,320.20		2,289.30	2,289.30	1,971.90
Jun-11	2,325.90	2,325.90	2,325.90		2,325.80	2,325.80	2,325.80		2,325.80	2,325.80	2,325.80
Jul-11	2,325.90	2,325.90	2,325.90		2,324.20	2,148.50	2,312.40		2,303.70	1,918.10	1,967.00
Aug-11	2,325.90	2,325.90	2,325.90		2,209.50	2,136.30	2,208.00		1,910.80	1,909.40	1,906.40
Sep-11	2,304.80	2,304.80	2,301.00		2,105.10	2,105.10	2,085.70		1,897.10	1,897.10	1,887.40
Oct-11	2,325.90	2,329.00	2,325.90		2,153.90	2,153.90	2,151.50		1,704.30	1,704.30	1,701.70
Nov-11	2,325.90	2,329.20	2,325.90		2,325.80	2,325.90	2,325.80		2,325.80	2,322.50	2,325.80
Dec-11	2,325.90	2,332.80	2,325.90		2,325.90	2,325.80	2,325.90		2,325.80	2,312.80	2,325.80
Jan-12	2,325.90	2,325.90	2,325.90		2,037.70	2,037.70	2,036.90		1,698.70	1,698.70	1,699.10
Feb-12	2,257.10	2,257.10	2,257.50		1,952.00	1,952.00	1,953.40		1,701.40	1,701.40	1,701.80
Mar-12	2,268.30	2,268.30	2,263.60		1,994.60	1,994.60	1,993.80		1,700.70	1,700.70	1,701.50
Apr-12	2,325.90	2,325.90	2,325.90		2,033.10	2,033.10	2,020.40		1,691.60	1,691.60	1,691.60

	Max				Avg				Min		
May-12	2,325.90	2,325.90	2,325.90		2,155.70	2,114.40	2,124.50		1,923.70	1,637.10	1,909.40
Jun-12	2,285.60	2,295.90	2,285.60		2,133.10	2,086.10	2,133.10		1,971.60	1,642.90	1,971.60
Jul-12	2,293.90	2,302.20	2,293.90		2,135.30	2,124.20	2,135.30		1,807.50	1,810.80	1,807.50
Aug-12	2,305.20	2,311.80	2,305.20		2,138.20	2,133.10	2,138.20		1,892.50	1,898.40	1,892.50
Sep-12	2,304.70	2,309.40	2,304.70		2,126.50	2,132.80	2,126.50		1,905.90	1,906.30	1,905.90
Oct-12	2,325.90	2,335.50	2,325.90		2,071.50	2,072.50	2,071.50		1,697.30	1,696.00	1,697.30
Nov-12	2,325.90	2,330.50	2,325.90		2,082.80	2,082.80	2,042.20		1,697.30	1,697.30	1,665.20
Dec-12	2,257.40	2,257.40	2,260.70		1,992.60	1,992.60	1,992.50		1,697.30	1,697.30	1,699.50
Jan-13	2,252.10	2,252.10	2,249.30		1,982.10	1,982.10	1,984.20		1,699.50	1,699.50	1,699.60
Feb-13	2,288.90	2,288.90	2,287.80		2,017.10	2,017.10	2,013.20		1,699.20	1,699.20	1,693.60
Mar-13	2,258.20	2,258.20	2,262.60		1,938.90	1,938.90	1,934.70		1,698.20	1,698.20	1,698.10
Apr-13	2,296.00	2,296.00	2,295.80		2,066.60	2,066.60	2,066.70		1,697.30	1,697.30	1,697.10
May-13	2,303.50	2,303.50	2,303.30		2,129.60	2,078.20	2,129.40		1,883.70	1,635.30	1,883.60
Jun-13	2,301.20	2,293.40	2,301.00		2,078.20	2,013.60	2,069.10		1,648.30	1,266.70	1,648.10
Jul-13	2,307.90	2,306.80	2,306.60		2,086.60	2,086.00	2,086.60		1,907.20	1,906.70	1,906.50
Aug-13	2,325.90	2,325.90	2,325.90		2,150.10	2,149.30	2,149.20		1,704.90	1,700.10	1,699.90
Sep-13	2,293.90	2,293.90	2,293.90		2,159.70	2,159.70	2,159.70		1,909.50	1,909.50	1,909.50
Oct-13	2,325.90	2,327.80	2,325.90		2,078.10	2,078.10	2,078.10		1,694.50	1,694.50	1,694.50
Nov-13	2,325.90	2,325.90	2,325.90		2,096.80	2,096.80	2,096.80		1,694.70	1,694.70	1,694.70
Dec-13	2,248.20	2,248.20	2,248.20		1,970.90	1,970.90	1,970.90		1,695.00	1,695.00	1,695.00
Jan-14	2,246.90	2,246.90	2,246.90		1,944.30	1,944.30	1,944.30		1,689.60	1,689.60	1,689.60
Feb-14	2,245.10	2,245.10	2,245.10		1,973.60	1,973.60	1,973.60		1,691.80	1,691.80	1,691.80
Mar-14	2,250.00	2,250.00	2,250.00		1,956.60	1,956.60	1,956.60		1,692.10	1,692.10	1,692.10
Apr-14	2,302.50	2,302.50	2,302.50		2,054.30	2,054.30	2,054.30		1,690.10	1,690.10	1,690.10
May-14	2,307.90	2,307.20	2,307.90		2,124.80	2,105.30	2,124.80		1,899.70	1,793.90	1,899.70
Jun-14	2,325.90	2,300.40	2,325.90		2,152.50	2,089.60	2,152.50		1,969.30	1,538.90	1,969.30
Jul-14	2,267.60	2,268.20	2,267.60		1,994.80	1,996.70	1,994.80		1,701.40	1,700.00	1,701.40
Aug-14	2,271.30	2,275.20	2,271.30		2,057.50	2,057.40	2,057.50		1,702.80	1,702.20	1,702.80
Sep-14	2,283.50	2,294.90	2,283.50		1,999.00	1,999.30	1,999.00		1,695.10	1,691.30	1,695.10

	Max				Avg				Min		
Oct-14	2,325.90	2,325.90	2,325.90		2,108.30	2,107.30	2,108.30		1,694.20	1,694.20	1,694.20
Nov-14	2,245.00	2,245.00	2,245.00		1,959.60	1,959.60	1,959.60		1,691.10	1,691.10	1,691.10
Dec-14	2,254.70	2,254.70	2,254.70		1,968.60	1,968.60	1,968.60		1,692.80	1,692.80	1,692.80
Jan-15	2,249.00	2,249.00	2,249.00		1,973.70	1,973.70	1,973.70		1,696.50	1,696.50	1,696.50
Feb-15	2,255.40	2,255.40	2,255.40		1,969.60	1,969.60	1,969.60		1,695.00	1,695.00	1,695.00
Mar-15	2,261.20	2,261.20	2,261.20		1,918.90	1,918.90	1,918.90		1,694.10	1,694.10	1,694.10
Apr-15	2,244.90	2,244.90	2,244.90		1,952.70	1,952.70	1,952.70		1,691.00	1,691.00	1,691.00
May-15	2,244.80	2,244.60	2,244.80		1,970.50	1,853.60	1,970.50		1,688.70	1,634.00	1,688.70
Jun-15	2,294.20	2,316.70	2,294.20		1,954.60	1,905.90	1,954.60		1,690.80	1,633.80	1,690.80
Jul-15	2,302.00	2,299.90	2,302.00		2,039.70	2,056.90	2,039.70		1,702.20	1,699.40	1,702.20
Aug-15	2,309.60	2,308.80	2,309.60		2,060.40	2,060.50	2,060.40		1,702.10	1,701.30	1,702.10
Sep-15	2,294.60	2,296.20	2,294.60		2,079.30	2,080.60	2,079.30		1,688.30	1,690.00	1,688.30
Oct-15	2,325.90	2,325.90	2,325.90		2,069.00	2,069.80	2,069.00		1,692.20	1,692.50	1,692.20
Nov-15	2,325.90	2,326.30	2,325.90		2,325.90	2,325.80	2,325.90		2,325.80	2,324.20	2,325.80
Dec-15	2,325.90	2,327.50	2,325.90		2,325.80	2,325.80	2,319.80		2,325.80	2,323.80	1,914.80
Jan-16	2,325.90	2,329.20	2,325.90		2,325.90	2,325.80	2,325.90		2,325.80	2,301.10	2,325.80
Feb-16	2,325.90	2,325.90	2,325.90		2,325.90	2,325.90	2,325.90		2,325.80	2,325.80	2,325.80
Mar-16	2,325.90	2,325.90	2,325.90		2,245.20	2,245.20	2,246.20		1,902.60	1,902.60	1,901.90
Apr-16	2,297.40	2,297.40	2,301.00		2,092.30	2,092.30	2,095.40		1,892.80	1,892.80	1,892.10
May-16	2,303.80	2,303.80	2,295.50		2,124.10	2,124.10	2,123.30		1,906.60	1,906.60	1,907.30
Jun-16	2,325.90	2,379.70	2,325.90		2,251.30	2,129.80	2,237.70		1,984.10	1,903.10	1,911.80
Jul-16	2,304.50	2,299.70	2,301.70		2,105.60	2,099.10	2,099.20		1,902.10	1,896.60	1,898.70
Aug-16	2,301.20	2,298.90	2,305.50		2,125.40	2,136.50	2,119.90		1,836.60	1,910.30	1,874.40
Sep-16	2,284.50	2,283.00	2,284.40		2,117.40	2,118.60	2,117.30		1,899.20	1,904.10	1,899.10
Oct-16	2,325.90	2,325.90	2,325.90		2,234.70	2,233.60	2,234.60		1,840.90	1,839.40	1,840.90
Nov-16	2,325.90	2,325.90	2,325.90		2,182.00	2,182.00	2,175.60		1,902.90	1,902.90	1,772.30
Dec-16	2,294.60	2,294.60	2,293.60		2,171.50	2,171.50	2,171.10		1,905.20	1,905.20	1,904.50
Jan-17	2,325.90	2,326.50	2,325.90		2,267.30	2,266.70	2,267.10		1,916.40	1,916.40	1,915.40
Feb-17	2,328.10	2,328.10	2,328.10		2,306.30	2,306.00	2,306.30		2,114.60	2,114.60	2,114.60

	Max					Avg					Min		
Mar-17	2,325.90	2,325.90	2,325.90			2,323.60	2,323.60	2,323.60			2,314.00	2,314.00	2,314.00
Apr-17	2,325.90	2,325.90	2,325.90			2,325.80	2,325.80	2,318.50			2,324.70	2,324.70	2,108.00
May-17	2,325.90	2,325.90	2,325.90			2,325.80	2,325.80	2,325.80			2,325.80	2,325.80	2,325.80
Jun-17	2,325.90	2,325.90	2,325.90			2,325.80	2,325.80	2,325.80			2,325.80	2,325.80	2,325.80
Jul-17	2,325.90	2,325.90	2,325.90			2,324.80	2,134.20	2,285.70			2,308.50	1,907.70	1,913.40
Aug-17	2,325.90	2,325.90	2,325.90			2,176.60	2,077.30	2,176.60			1,908.00	1,908.00	1,908.00
Sep-17	2,314.60	2,314.60	2,314.60			2,105.80	2,105.80	2,105.80			1,903.50	1,903.50	1,903.50

Appendix H

Response to Comments on Draft Environmental Impact Report

Appendix H: Response to Comments on Draft Environmental Impact Report

Commenter	Comment Code	Comment	Response	EIR Edits
American Whitewater (AW) (verbal comments from Dave Steindorf at the April 30, 2026, public meeting)	AW-1	Alternative one reflects a consensus recommendation of state and federal resource agencies and stakeholders including BLM, U.S. Fish and Wildlife Service, National Park Service, U.S. Forest Service, California Department of Fish and Wildlife, and American Whitewater.	State Water Board staff is aware of the history of filings referenced in American Whitewater’s comments and development of Alternative 1 is based on those previous filings. However, the Bureau of Land Management (BLM), United States Fish and Wildlife Service (USFWS), National Park Service (NPS), United States Forest Service (USFS), and California Department of Fish and Wildlife (CDFW) have revised their preliminary 4(e) Conditions and 10(j) recommendations associated with the flow measures following settlement discussions between DOI and PG&E.	No Change.
AW (verbal comments from Dave Steindorf at the April 30, 2026, public meeting)	AW-2	First, passing the LTOR flows from Southern California Edison's Big Creek Project through the Kerckhoff bypass reach. These flows were developed over decades to restore key components of the natural snow melt hydrograph and are already required on Southern California's Edison's upstream projects. This is not new; it's simply the completing of an existing restoration framework.	The EIR analyzed the feasibility of implementation of Southern California Edison’s (SCE) long term operating rules (LTOR) through the Kerckhoff Bypass Reach in modeling efforts under Alternative 1 and described in Appendix G of the Draft Environmental Impact Report (DEIR).	No Change.
AW (verbal comments from Dave Steindorf at the April 30, 2026, public meeting)	AW-3	Second, the one foot per hour ramping rate for public safety, which is standard requirement across hydropower projects in California. The need for this is clear, flow changes below Kerckhoff Dam can be extreme. In 2018 flows increased from roughly 60 CFS to 6,000 CFS in minutes resulting in a fatality. That risk remains today.	Operational feasibility of implementing a one foot per hour ramp up rate, as measured at Gage J-2, was analyzed through modeling efforts under Alternative 1 and described in Appendix G of the DEIR. State Water Board staff identified the Environmentally Superior Alternative as the Alternative 2 down ramping measures combined with the Alternative 1 Ramp Up Measure. State Water Board staff found that the down ramping measures within Alternative 2 were operationally feasible, providing scheduled whitewater flows releases and reduced the likelihood of stranding occurrences below Kerckhoff Dam through flow measures that provided gradual flow recessions. The Alternative 1 Ramp Up Measure is expected to improve conditions relation to baseline condition and more than Alternative 2 flow measures. As a result, this was chosen as the Environmentally Superior Alternative due to the feasible enhancements to recreation beneficial uses and aquatic habitat compared to the Proposed Project or stand-alone Alternative.	No Change.

Commenter	Comment Code	Comment	Response	EIR Edits
AW (verbal comments from Dave Steindorf at the April 30, 2026, public meeting)	AW-4	PG&E continues to claim that it cannot meet these requirements due to upstream operations and limited storage. That claim is not supported by the available evidence. The upstream powerhouse that PG&E points to has a capacity of 3,500 CFS yet we routinely see observed downstream fluctuations of 4,000 to 8,000 CFS. The only plausible explanations are releases from Kerckhoff Reservoir storage.	Using the Project operations model developed by PG&E, Appendix G of the DEIR looked at the Proposed Project along with Alternatives 1 and 2. The modeling report found that rapid changes in inflow, in addition to the rough operating zone, small reservoir storage, and physical infrastructure of Kerckhoff Dam are controlling factors for operations. Please see Section 4.11.1.3 for a description of baseline conditions.	No Change.
AW (verbal comments from Dave Steindorf at the April 30, 2026, public meeting)	AW-5	The board should require hourly or 15-minute reservoir storage data and gate operations record. This data would resolve this question immediately, and the fact that they have not been provided and are not required in this EIR is a significant deficiency.	State Water Board staff believe using the model developed by PG&E and updated to reflect operational scenarios for CEQA Alternatives 1 and 2 most accurately reflects how PG&E would operate and allows for a more “apples to apples” comparison with analysis performed by PG&E. The operations model in Appendix G used Kerckhoff reservoir elevation computed at 15-minute output intervals based on the elevation-volume relationship, (i.e. flow in and flow out for each time step).	No Change.
AW (verbal comments from Dave Steindorf at the April 30, 2026, public meeting)	AW-6	Turning to the draft EIR appendix modeling, which concludes that PG&E cannot reliably meet the LTOR flow requirements. There’s several serious problems with this analysis. First, much of the justification appears to rely on communications with PG&E that are not included in the record. If the board is relying on those communications, they must be disclosed so that the analysis can be independently evaluated.	State Water Board staff shared the requested email communications with American Whitewater on May 20, 2026. State Water Board staff requested PG&E input about the feasibility of operating for extended periods in the Rough Operating Zone (ROZ) or repeatedly passing through the ROZ before Appendix G modeling was publicly available. Communications cited in the FEIR are available upon request.	No Change.

Commenter	Comment Code	Comment	Response	EIR Edits
AW (verbal comments from Dave Steindorf at the April 30, 2026, public meeting)	AW-7	Second, it is unclear why the modeling does not rely on recent hydrology, particularly the past several years where LTOR flows have actually been implemented upstream. Real world data exists that should be the foundation of this analysis.	The first year where SCE implemented the LTOR flows for the Big Creek No. 4 Hydroelectric Project (Big Creek 4) was 2021, with the first spill year designation in 2023. For the purposes of the CEQA analysis, baseline for the Project is the environment at the time the NOP is published. This would leave only two years for analysis, both of which were designated non-spill years. This small sample size does not account for variability in the system that would be seen over the course of a 50-year license and would be better accounted for in a larger data set. The DEIR used a larger data set developed by PG&E (14 years, 2003, and 2005 -2017). LTOR year types were identified, and when the historical Redinger Dam (Part of Big Creek 4) flow met the trigger for the given LTOR year type, the historical Redinger Dam releases were replaced with the applicable LTOR release for that water year type (PG&E 2023a). As a result, the DEIR models and analyzes how the Project would operate in all spill year schedules (AB, BC, D, and Non-Spill) in multiple years.	No Change.
AW (verbal comments from Dave Steindorf at the April 30, 2026, public meeting)	AW-8	Third, the conclusion that PG&E cannot meet the LTOR flows is driven in large part by constraints associated with the Kerckhoff powerhouse rough operating zones or ROZs. ROZs are not a natural constraint. They're a mechanical and operational limitation of generation units, typically related to vibration, cavitation, or inefficient operating ranges. These are engineering issues. They're not fixed environmental constraints, and they can be addressed through turbine upgrades, operational changes or by bypassing generation when necessary. The EIR treats these limitations as permanent and then uses them to constrain environmental protection. That sets a troubling precedent.	The DEIR provides an assessment of CEQA alternatives and potential impacts of the Proposed Project that have the potential to cause a substantial, adverse change in the physical environment compared to existing conditions. The limitations of the Kerckhoff Hydroelectric Project's facilities were a baseline component of the Project at the date the State Water Board staff released the Notice of Preparation on May 30, 2023, and therefore, were included as a part of existing conditions for each alternative. For this reason, infrastructure limitations themselves did not result in potentially significant impacts in the DEIR. The DEIR found significant impacts as a result of large flow fluctuations, including rapid stage change increases stemming from the proposed flow measures that have the potential to impact recreation beneficial uses (contact (REC-1), canoeing and rafting (REC-1), other non-contact (REC-2)) compared with baseline conditions. The DEIR does not consider alternatives that would include engineered upgrades to Kerckhoff Dam, the Kerckhoff 2 Penstock, or the Kerckhoff 2 Powerhouse that eliminate or reduce the size of the rough operating zone because any alternative is designed to avoid or lessen significant environmental effects of the relicensing the Kerckhoff Hydroelectric Project compared to baseline conditions.	No Change.

Commenter	Comment Code	Comment	Response	EIR Edits
AW (verbal comments from Dave Steindorf at the April 30, 2026, public meeting)	AW-9	Finally, it's important to understand how alternative to specifically the Bureau of Land Management's revised 4(e) conditions came to be. As I mentioned before, all of the resource agencies recommended the same flow and ramping conditions included in alternative one. PG&E challenged those through a trial type hearing process. That process did not result in scientific findings that the original conditions were infeasible. Instead, it led to a series of closed door negotiations between PG&E and Interior agencies where other stakeholders were excluded. Notably, while the conditions themselves were revised, the underlying agency rationale was not meaningfully changed. The scientific and public safety justification for the original requirements remains intact. That's important context. The revisions of a negotiated outcome, not a determination based on new data or analysis that the original recommendations were flawed. So the State Water Board has an important role here. This is an important opportunity to ensure that the original science and public safety objectives and agency intent by this project are carried forward. This requires a complete and transparent record. At a minimum, the board should require full disclosure of operational data, inclusion of all relied upon communications in the record, a revised analysis grounded in actual hydrology and realistic operational flexibility. We believe that this information will make it clear that alternative one is the superior alternative and should be adopted by the board. Thank you.	As described in comment response AW-6, the DEIR presents an independent analysis using PG&E's operations model that looked at operations of the Proposed Project and alternatives. While the context for changes in other agencies' mandatory conditions is informative, it is not the primary source of data considered in the DEIR. The DEIR provides citations where communications with PG&E resulted in information critical to analysis. Appendix G of the DEIR provides information on the datasets used for the model, assumptions made, and rules included in the modeling effort. See response to AW-7 above.	No Change.
American Whitewater (AW), California Sportfishing Protection Alliance (CSPA), and Friends of the River (FOR) Comment Letter	AW-10	I. The DEIR Does Not Adequately Evaluate Public Safety and Flow-Management Impacts Below Kerckhoff Dam A central issue throughout this proceeding has been the public safety risk associated with rapid flow fluctuations below Kerckhoff Dam. The DEIR recognizes that sudden changes in river stage can create hazardous conditions for members of the public recreating in and adjacent to the river corridor. (DEIR, pp. 4.11-149–150.) However, the DEIR does not fully evaluate the magnitude, frequency, and operational causes of these rapid stage fluctuations or whether the proposed measures would meaningfully reduce associated public safety risks. The record demonstrates that Project operations are capable of producing extremely rapid and substantial flow fluctuations. Most notably, on November 4, 2025, flows below Kerckhoff Dam increased from approximately 35 cubic feet per second ("cfs") to approximately 4,541 cfs within a single hour. (California Data Exchange Center ("CDEC"), Station SJF – San Joaquin River below Kerckhoff Powerhouse, Nov. 4, 2025 hourly flow records.) Based on	To clarify, the Alternative 1 Ramp Up Measure would be implemented in place of the ramp up components of the Applicant-proposed Spill Season Flow Measure (SSFM) and Planned Outage Measure (POM). As described in the DEIR, the Spill Season Flow Measure maintains flows (500 cfs) after spill and does not ramp up spill flows. This is the same for the Planned Outage Measure. Since the Planned Outage Ramp Down Protocol and Planned Outage Winter Ramp Down Protocol do not include ramp up measures, Alternative 1's Ramp Up Measure would still be applicable during the implementation of these planned outage protocols. The <i>Project Operations Model – CEQA ALTERNATIVES 1 & 2 Report (Modeling Report)</i> included as Appendix G of the DEIR evaluated flow management conditions in Alternatives 1 and 2. Table 5-1 in Appendix G of the DEIR displays the success rate for each ramping measure, the amount of times the measure was modeled over the 14 year period of record,	No Change.

Commenter	Comment Code	Comment	Response	EIR Edits
		PG&E's own stage-discharge information, that operational change likely produced a dramatic rise in river stage over a very short period of time. (Cardno, Kerckhoff Hydroelectric Project Stage-Discharge Investigation, Technical Memorandum, Sept. 13, 2021, Table 3.5-5.) Similar operational conditions contributed to the 2018 fatality downstream of Kerckhoff Dam, where rapidly changing flow conditions created dangerous river conditions for members of the public. (Environmental Assessment for Hydropower License, Kerckhoff Hydroelectric Project, FERC Project No. 96-048, Dec. 2025 ("EA"), p. 55 (eLibrary Accession No. 20251231-3001).) The DEIR acknowledges that public-safety protections below Kerckhoff Dam rely heavily on warning-based measures, including signage, sirens, deterrence flows, and "visual cue" flows intended to alert river users to spill and operational conditions. (DEIR, pp. 4.11-149–150, 4.17-56–57.) The DEIR states that the Spill Season Flow Measure is intended to "provide the recreating public with visual cues as to water conditions when Kerckhoff Dam is spilling" and that the visual cue flows would "act as a deterrent to recreators from entering the water." (DEIR, p. 4.17-56.) However, the DEIR also acknowledges that "[t]he efficacy of how well recreators will be able to identify that Kerckhoff Dam is spilling based on water conditions is unclear" and further recognizes that the measure "relies heavily on recreators having a nuanced understanding of the river conditions." (DEIR, pp. 4.11-149–150.) Similarly, the Environmental Assessment (EA) in concurrent proceeding before the Federal Energy Regulatory Commission for the Kerckhoff Project recognizes that warning systems such as signage and sirens require active attention and understanding by river users and may be ineffective where individuals fail to hear warnings, do not understand their significance, or are otherwise inattentive to changing river conditions. (EA, pp. 56–57 (eLibrary Accession No. 20251231-3001).) The EA further recognizes that gradual ramping can provide a more effective indicator that hazardous river conditions are developing. (EA, p. 57.) Despite these acknowledgements, the DEIR does not adequately evaluate whether reliance on warning-based measures and static visual cue flows would meaningfully reduce public safety risks to a less-than-significant level. Warning flows do not reduce downstream velocities, slow the rate of stage increase, or ensure that individuals recreating within the river corridor have sufficient time to safely exit the channel. The DEIR also does not meaningfully evaluate how quickly river conditions can change relative to realistic human	and the percentage of time the measure caused over cycling within the K2 Powerhouse for Alternative 1 and 2. The Modeling Report found that the shorter duration and lower initial step down ramping measures under Alternative 1 and 2 (i.e. Subsequent Spill Ramp Down and Stranding Protection Down Ramping) were modeled successfully with minimal operational conflicts. However both Alternative 1's Spill Year Schedules and Alternative 2's End-of-Spill Flow Recession consistently forced the reservoir toward the K2 Powerhouse's minimum operating reservoir elevation and caused K2 Powerhouse over-cycling. This was mainly caused by the larger initial flow steps and the longer time period they were required to be held at. However, Alternative 2's encroachment toward the K2 Powerhouse's minimum operating reservoir elevation and powerhouse over-cycling occurred less often and in smaller magnitudes compared to Alternative 1. This informs the conclusion in the DEIR that Alternative 1's Spill Year Schedules, which were the primary component of potentially enhancing whitewater boating recreation opportunities, were infeasible. Alternative 2's End-of-Spill Flow Recession still provided increased whitewater boating opportunities and feasibly worked within Kerckhoff's facility limitations. The DEIR also identifies significant and unavoidable impacts under Impact HYD-5 in relation to the potential flow fluctuations and large stage change increases associated with the Spill Season Flow Measure and Planned Outage Measure. The DEIR concluded that the Proposed Project and Alternatives 1 and 2 would result in significant and unavoidable impacts without Recommended Measure WQ-5. Recommended Mitigation Measure WQ-5 would require siren activations for situations where a larger stage change than one foot per hour, as measured at Gage J-2 (emphasis added), is expected and has the potential to impact recreators or whitewater boaters as determined in consultation with BLM, USFS and the State Water Board. In addition, Recommended Mitigation Measure WQ-5 would identify any facility upgrades needed for PG&E to ensure these sirens can be heard at targeted recreation sites while	

Commenter	Comment Code	Comment	Response	EIR Edits
		response times within the steep and complex terrain of the San Joaquin River Gorge. (Pisaturo, G.R., Righetti, M., Castellana, C., Larcher, M., & Menapace, A., A Procedure for Human Safety Assessment During Hydropeaking Events , 661 Sci. Total Env't 294–305 (2019).) The DEIR similarly does not adequately evaluate the physical effects associated with implementation of the proposed visual cue flows themselves. PG&E's stage-discharge analysis demonstrates that increasing flows from baseflow conditions to approximately 500 cfs can produce stage increases exceeding six feet within confined portions of the Gorge before larger operational releases even occur. (Stage-Discharge Technical Memorandum, pp. 16, 27, Table 3.5-5.) Yet the DEIR does not meaningfully evaluate these physical changes or explain how a static elevated baseflow meaningfully functions as a public-safety mitigation.	identifying times of day PG&E shall activate sirens that consider the potential impacts on sensitive receptors or homeowners. Please see response to comment AW-8 that discusses limitations of the Kerckhoff Hydroelectric Project facilities. The FEIR ultimately included Mitigation Measure WQ-5 which resulted in the impacts to HYD-5 being considered less than significant with mitigation incorporated. Recommended Measure WQ-5 is now Mitigation Measure WQ-5. Please see response to comment AW-8 that discusses limitations of the Kerckhoff Hydroelectric Project facilities.	
AW, CSPA, FOR Comment Letter	AW-11	II. The DEIR Does Not Adequately Evaluate Operational Assumptions, LTOR Baseline Conditions, and Feasible Measures to Reduce Hydropeaking Impacts The DEIR repeatedly suggests that Project operations cannot reliably accommodate pass-through of the upstream Southern California Edison Big Creek Long-Term Operating Rules ("LTOR") flow framework or stronger ramping protections because of upstream operational constraints, limited storage flexibility, and Rough Operating Zone ("ROZ") limitations. (DEIR, Appendix G.) However, the DEIR does not provide sufficient operational or engineering analysis to independently evaluate the scope or severity of those asserted limitations. Critically, portions of the DEIR's operational and recreation analysis in Appendix G rely on historic hydrologic and operational data predating implementation of the LTOR framework, which did not take effect until May 2021. As a result, the baseline operational analysis reflects historical hydropeaking patterns and operational variability but does not fully evaluate operational conditions under the current LTOR framework. That distinction materially affects the adequacy of the DEIR's analysis. LTOR implementation altered aspects of spring flow timing, recession management, and operational coordination upstream of Kerckhoff. By relying on pre-LTOR operational datasets without evaluation of current operating conditions, the DEIR does not meaningfully evaluate whether LTOR operational experience	As detailed in Appendix G of the DEIR, PG&E's Kerckhoff Hydroelectric Project operations model was used to evaluate Alternatives 1 and 2. The model incorporated facility constraints (including the rough operating zone and normal operating range) and a PG&E-developed dataset estimating LTOR releases for Water Years 2003 and 2005–2017 (see response to AW-7). These data, combined with historical inflows from Big Creek Powerhouse No. 4, A.G. Wishon Powerhouse, and Willow Creek, were used to estimate total inflow to Kerckhoff Reservoir under LTOR conditions and assess the feasibility of passing Big Creek No. 4 LTOR releases through the Kerckhoff system to the San Joaquin River. For environmental setting and baseline development, the DEIR uses the May 2023 NOP date. Please refer to responses AW-7 (gage data availability), AW-6 (previous disclosure of PG&E facility limitation communications), and AW-10 (discussion of project impacts). Regarding coordinated operations, the State Water Board cannot require SCE to disclose release information in a water quality certification for a PG&E project, though PG&E may be required to attempt coordination.	No Change.

Commenter	Comment Code	Comment	Response	EIR Edits
		demonstrates that greater seasonal flow stability, improved coordination, or more predictable recession management may already be operationally achievable within the broader Big Creek and San Joaquin River system. The administrative record also lacks several categories of operational information necessary to meaningfully evaluate Project flexibility, including hourly reservoir storage data, detailed gate operation records, turbine loading information, unit commitment and dispatch records, and operational information associated with major outage and hydropeaking events. Those data are important to evaluating how the Project is actually operated and whether additional operational flexibility exists. The DEIR also appears to rely in part on operational assumptions and communications developed through consultation with PG&E that are not fully disclosed within the public administrative record. If the Board relies on operational modeling assumptions, engineering analyses, turbine studies, or other technical evaluations in reaching conclusions regarding operational feasibility or environmental impacts, those materials should be fully disclosed for public review and comment. (CEQA Guidelines §§ 15003, 15088, 15144, 15201.) The DEIR further acknowledges that inflows from Southern California Edison’s Big Creek No. 4 Project are highly variable and difficult to predict. However, the DEIR does not meaningfully evaluate whether additional coordination with upstream operations could reduce sub-daily flow variability and improve downstream public safety and beneficial-use protection. Federal resource agencies repeatedly identified coordinated upstream operations as an important component of flow management and public safety protection below Kerckhoff Dam. (DOI Preliminary Conditions, pp. 15–17.) Similarly, the DEIR accepts assertions that PG&E lacks sufficient inflow predictability to implement stronger ramping protections while giving limited consideration to PG&E’s ability to participate in CAISO electricity markets, which require day-ahead and real-time generation forecasting. (California Independent System Operator Corporation Tariff §§ 30–34.) The DEIR also does not fully reconcile several operational assumptions against other information within the record. For example, Big Creek No. 4 has a maximum hydraulic capacity of approximately 3,500 cfs, while documented downstream flow fluctuations below Kerckhoff Dam routinely exceed 4,000 cfs and in		

Commenter	Comment Code	Comment	Response	EIR Edits
		some cases approach or exceed 8,000 cfs. (AW EA Comments, pp. 13–14.) The DEIR does not meaningfully evaluate whether active reservoir releases under PG&E’s direct operational control are driving many of these rapid downstream stage increases. And finally, the DEIR repeatedly frames avoidance of the ROZ as an unavoidable operational requirement that constrains implementation of stronger ramping protections and more stable downstream flow management. However, the analysis largely assumes the continued existence of the ROZ itself rather than evaluating whether the condition could be mitigated, reduced, or corrected through project modifications, modernization, rehabilitation, maintenance practices, or changes to turbine and control-system configuration. As a result, the DEIR embeds the ROZ into the Project baseline and then analyzes the operational and public-safety consequences that flow from efforts to avoid operating within it, including rapid operational transitions, surge conditions, hydropeaking fluctuations, and abrupt downstream stage changes below Kerckhoff Dam. The analysis therefore focuses primarily on how Project operations must adapt to accommodate the ROZ rather than whether the underlying operational limitation itself could be reduced or fixed. The administrative record does not meaningfully evaluate whether the asserted ROZ limitations reflect temporary maintenance conditions, aging infrastructure, deferred modernization, operational preferences, turbine wear, control-system limitations, or conditions that could be improved through equipment upgrades or operational redesign. Nor does the DEIR adequately evaluate whether modifications to turbine controls, loading trajectories, sequencing protocols, or powerhouse equipment could expand operational flexibility and reduce the need for rapid flow transitions that contribute to downstream public-safety and recreation impacts. This omission is significant because CEQA requires agencies to evaluate feasible mitigation measures and operational alternatives capable of reducing significant environmental impacts. (CEQA Guidelines §§ 15126.4, 15126.6.) By treating the ROZ as an inherent and effectively immutable feature of the Project without meaningfully evaluating whether it could be reduced or eliminated, the DEIR narrows the range of operational alternatives considered and limits meaningful evaluation of potentially feasible measures capable of reducing hydropeaking impacts, improving public safety conditions, and supporting downstream beneficial uses.		

Commenter	Comment Code	Comment	Response	EIR Edits
AW, CSPA, FOR Comment Letter	AW-12	III. The DEIR Does Not Adequately Analyze the Alternatives Under CEQA, an EIR must evaluate a reasonable range of alternatives capable of reducing significant environmental impacts. (CEQA Guidelines § 15126.6.) Alternative 1 represents the most environmentally protective alternative analyzed in the DEIR because it incorporates both stronger ramping protections and pass-through of the upstream Southern California Edison Big Creek Long-Term Operating Rules (“LTOR”) flow framework. Importantly, LTOR flows are not speculative or experimental operational measures. The LTOR framework was developed to shape the timing, magnitude, and recession of spring flows in a manner that better reflects functional seasonal hydrology and supports ecological and recreational river processes upstream within the Big Creek system. (AW EA Comments, pp. 14–16.) Alternative 1 would extend aspects of those functional seasonal flow benefits through the Kerckhoff bypass reach. However, the DEIR largely evaluates LTOR implementation as a constrained operational burden rather than as part of a broader integrated flow-management framework capable of simultaneously supporting public safety, hydrologic stability, recreational beneficial uses, and downstream river function. The DEIR also does not adequately evaluate how abandonment of LTOR pass-throughs and reliance on revised use-based triggers materially reduces boating opportunities during wetter water years. The administrative record demonstrates that the original LTOR-based framework contemplated substantially more scheduled boating opportunities than the revised framework ultimately reflected in the DEIR. (AW EA Comments, pp. 14–16.) This reduction reflects a meaningful loss of flow-dependent recreational opportunity and beneficial-use protection that the DEIR does not fully quantify or analyze. The DEIR further does not provide adequate context regarding the evolution of Alternative 2 and revised federal resource agency conditions. The record demonstrates that federal and state resource agencies originally supported substantially stronger flow and ramping protections more consistent with Alternative 1. (U.S. Department of the Interior Preliminary Conditions, Sept. 24, 2024.) The subsequent revisions emerged through the Trial-Type Hearing process and settlement negotiations rather than through new scientific findings demonstrating that stronger protections were environmentally unnecessary. The DEIR should more clearly acknowledge that the underlying public safety and environmental rationale supporting stronger protections remained substantially unchanged throughout much of the proceeding	Appendix G of the DEIR independently analyzed the feasibility of passing the LTOR’s through the Kerckhoff Bypass Reach, as described in BLM’s Preliminary 4(e) Condition Number 4, while accounting for facility limitations. Implementing the LTORs was found to be infeasible, as described in Appendix G of the DEIR. The LTORs would have provided more boating day opportunities when compared to the Proposed Project or Alternative 2; however, there were no scheduled boating day opportunities under baseline conditions. Therefore, the implementation of scheduled boating days in the Proposed Project and Alternatives 1 and 2 in a new license would be an enhancement to recreation. Appendix G was developed independently and resulted in the analysis in the DEIR for both the preliminary and revised BLM 4(e) conditions related to ramping operations under Alternative 1 and 2 for potential impacts, regardless of the associated rationale. The rationale for decisions made by other parties is outside the scope of this Project.	No Change.

Commenter	Comment Code	Comment	Response	EIR Edits
AW, CSPA, FOR Comment Letter	AW-13	IV. The Recreation Analysis Does Not Fully Evaluate Impacts to Flow-Dependent Recreational Beneficial Uses The San Joaquin River Gorge is an important recreational resource, and Project operations directly influence boating opportunities, river navigability, recreational access, fishing, trail use, and overall public use of the river corridor. (DEIR, § 4.17, Recreation.) These recreational uses are specifically recognized beneficial uses under the Basin Plan. However, the DEIR does not fully evaluate how hydropeaking operations, rapid stage fluctuations, reduced boating opportunities, and operational unpredictability affect these flow-dependent recreational beneficial uses. The DEIR largely assumes that the existence of physical access routes is sufficient to support recreational use. However, the relevant question is whether the public has a reasonable opportunity to safely use flow-dependent recreational resources when Project-created boating opportunities occur. The Whitewater Boating Assessment identifies multiple distinct boating reaches whose recreational utility depends directly on flow timing, magnitude, duration, and predictability. (REC-1 Whitewater Boating Assessment (TSR-05), pp. 27–28; Supplemental Technical Study Report, p. 12.) Yet the DEIR does not meaningfully evaluate whether current access conditions, escorted-access limitations, and trail conditions allow the public to reasonably use those resources under the full range of Project-created flow conditions. These deficiencies are particularly significant with respect to Run 1 below Kerckhoff Dam. Access to this reach is effectively dependent on the J-2 Trail, yet the DEIR does not fully evaluate how escorted-access requirements and documented trail limitations constrain practical recreational use. (EA, pp. 54–55.) Outside limited scheduled recreation releases, the public lacks independent access to Run 1 even when Project operations create suitable boating conditions. The DEIR also does not adequately evaluate how Project-created flows occurring during spill events, inflow pass-throughs, or outage operations affect recreational opportunity and public access. Recreational boating opportunities occur not only during scheduled recreation releases, but also during a variety of Project operational conditions that create flow-dependent recreation opportunities within the Gorge. (REC-1 Whitewater Boating Assessment (TSR-05), pp. 21–22.)	As described in comment response AW-12 and others, for the purposes of CEQA analysis May 2023 is the analytical baseline. The Proposed Project and Alternatives do not result in physical access impacts to the San Joaquin River beyond those currently possible under baseline conditions. As described and illustrated in the environmental setting of Section 4.1.1 of the DEIR, under baseline condition PG&E generates electricity based on grid demand and operations of the Hydroelectric Project along with upstream operations have resulted in significant stage fluctuations. In regard to the amount of boating flows available please also see response to AW-12.	No change.

Commenter	Comment Code	Comment	Response	EIR Edits
		Collectively, these deficiencies limit the DEIR's ability to fully evaluate impacts to recreation-related beneficial uses protected under the Basin Plan		
AW, CSPA, FOR Comment Letter	AW-14	V. Requested Revisions and Recirculation For the reasons discussed above, American Whitewater, CSPA, and Friends of the River respectfully request that the State Water Board revise and recirculate the DEIR. At a minimum, the revised DEIR should include the following: Public Safety and Hydropeaking Analysis • More fully evaluate the magnitude, frequency, and operational causes of rapid stage fluctuations below Kerckhoff Dam, including fluctuations associated with hydropeaking operations, outage events, spill conditions, and rapid operational transitions; • Evaluate whether warning-based measures, including signage, sirens, deterrence flows, and visual cue flows, meaningfully reduce public safety risks associated with rapid downstream stage changes; • More fully evaluate whether gradual ramping protections could reduce downstream public safety risks by slowing rates of stage increase and improving the ability of river users to safely respond to changing conditions; • Evaluate public safety conditions during winter and non-spill operational periods when the San Joaquin River Gorge continues to support year-round public recreation and shoreline access; Operational Assumptions, LTOR Conditions, and Project Flexibility • Distinguish between pre-2021 and post-LTOR operational conditions when evaluating baseline hydrology, operational feasibility, hydropeaking conditions, recreation impacts, and environmental effects; • More fully evaluate whether post-LTOR operational experience demonstrates improved seasonal flow stability, coordinated operations capability, or reduced downstream	Recirculation is required only when significant new information is added to an EIR. New information is not significant unless it deprives the public of a meaningful opportunity to comment upon a substantial adverse environmental effect of the project or a feasible way to mitigate or avoid such an effect that the project proponents have declined to implement. (Cal. Code Regs., tit. 14, § 15088.5, subd. (a).) The Final EIR does not identify any new significant environmental impacts or substantial increases in the severity of environmental impacts. With respect to potential impacts to recreation beneficial uses (REC-1 and REC-2), for example, the DEIR informed the public that there are potentially significant impacts to recreation beneficial uses that could be mitigated, but PG&E declined to implement those measures so those impacts are deemed significant and unavoidable for the context of CEQA analysis. Public Safety and Hydropeaking Analysis Please refer to State Water Board response to comment PG&E-1 and PG&E-2 for discussion of how the frequency of large stage change events will be minimized as feasible. Section 4.11.1.4.5 of the DEIR discusses the most frequent cause of large flow fluctuations below Kerckhoff Dam. Section 4.11.4.8 reviews of the measures under the Proposed Project and both Alternatives and analyses how each would impact large flow fluctuations below Kerckhoff Dam. State Water Board response to bullet point two: Please refer to the analysis for Impact HYD-5 and comment PG&E-4 for how warning-based measures would reduce public safety risks from stage changes. Please refer to State Water Board response to comment AW-10 for discussion of the efficacy of deterrence and visual cues flows.	Mitigation Measure WQ-5 which resulted in the impacts to HYD-5 is being adopted and impact HYD-5 is now considered less than significant with mitigation incorporated. Recommended Measure WQ-5 is now Mitigation Measure WQ-5.

Commenter	Comment Code	Comment	Response	EIR Edits
		operational variability within the interconnected Big Creek and San Joaquin River system; • Provide additional operational information sufficient to independently evaluate Project flexibility, including hourly reservoir storage data, gate operation records, turbine loading information, unit commitment and dispatch records, and outage-related operational data; • Disclose and evaluate all operational modeling assumptions, engineering analyses, turbine studies, and technical evaluations relied upon in support of conclusions regarding operational feasibility, coordinated operations, ramping limitations, or environmental impacts; • More fully evaluate whether additional coordination with upstream Big Creek operations could reduce sub-daily flow variability and downstream hydropeaking impacts; • Reconcile operational assumptions regarding inflow unpredictability with PG&E’s demonstrated ability to forecast generation and participate in CAISO electricity markets; Rough Operating Zone (“ROZ”) Limitations and Operational Alternatives • More fully evaluate whether asserted ROZ limitations reflect maintenance conditions, aging infrastructure, operational preferences, deferred modernization, turbine wear, control-system limitations, or other conditions potentially capable of mitigation or correction; • Evaluate whether equipment replacement, turbine modernization, rehabilitation measures, operational redesign, modified loading trajectories, sequencing protocols, or control-system changes could reduce or eliminate ROZ limitations and improve operational flexibility; • Evaluate whether operational or engineering modifications could reduce the need for rapid operational transitions and downstream surge conditions associated with efforts to avoid operation within the ROZ; • Evaluate a broader range of feasible operational alternatives and mitigation measures capable of reducing hydropeaking	State Water Board response to bullet point three: Please see State Water Board response to comment PG&E-1 and PG&E-2. State Water Board response to bullet point four: Please refer to State Water Board response to comment AW-10. Operational Assumptions, LTOR Conditions, and Project Flexibility State Water Board response to bullet point one: Please refer the State Water Board response to comment AW-11. State Water Board response to bullet point two: Please refer to State Water Board response to comment AW-7 and AW-10. State Water Board response to bullet point three: Please refer to State Water Board response to comment AW-5, AW-7, and AW-9 State Water Board response to bullet point four and five: Please refer to State Water Board response to comment AW-6 and AW-9. The Modeling report discloses all operational modeling assumptions. State Water Board response to bullet point five and six: Please refer to State Water Board response to comment AW-11 for discussion of coordinated operations. Rough Operating Zone (“ROZ”) Limitations and Operational Alternatives State Water Board response to bullet point one, two, and three: Please refer the State Water Board response to comment AW-6 and AW-8. State Water Board response to bullet point four: State Water Board staff analyzed a reasonable range of Project alternatives that would avoid or substantially lessen any of the significant effects of the Proposed Project. Additionally State Water Board staff developed mitigation measures and recommended measures that were expected to reduce impacts to downstream beneficial uses. The FEIR ultimately adopted Mitigation Measure WQ-5, which reduced impact HYD-5 to less than significant with mitigation incorporated.	

Commenter	Comment Code	Comment	Response	EIR Edits
		impacts, improving public safety conditions, and protecting downstream beneficial uses; Alternative 1 and Seasonal Flow Management • Reevaluate Alternative 1 within the context of integrated seasonal flow management intended to support public safety, hydrologic stability, recreation, and downstream river function; • More fully evaluate the environmental and recreational benefits associated with pass-through implementation of the LTOR framework; • More clearly disclose and evaluate how revised use-based triggers reduce boating opportunities and flow-dependent recreational uses compared to the original LTOR-based framework; • Provide additional context regarding the evolution of Alternative 2 and revised federal resource agency conditions, including the extent to which the underlying public safety and environmental rationale supporting stronger protections remained substantially unchanged throughout the proceeding; Recreation and Beneficial Uses • More fully evaluate impacts to flow-dependent recreational beneficial uses, including boating opportunity, public access, operational predictability, fishing, shoreline recreation, and year-round public use of the San Joaquin River Gorge; • Evaluate how escorted-access requirements, trail limitations, hydropeaking fluctuations, and operational unpredictability affect the public's practical ability to use Project-created recreational flows; • Evaluate recreational opportunities associated with spill events, inflow pass-throughs, outage operations, and other non-scheduled Project-created boating conditions; • More fully analyze cumulative impacts associated with repeated hydropeaking operations, fluctuating flows, reduced recreational predictability, and long-term effects on public use and enjoyment of the Gorge;	Recommended Measure WQ-5 is now Mitigation Measure WQ-5. Alternative 1 and Seasonal Flow Management State Water Board response to bullet point one: Please refer the State Water Board response to comment PG&E-1. State Water Board response to bullet point two and three: Please refer the State Water Board response to comment AW-10 and AW-12. State Water Board response to bullet point four: Please refer to State Water Board response to comment AW-9. Recreation and Beneficial Uses State Water Board response to bullet point one: Please see State Water Board response to comment AW-13. State Water Board response to bullet point two and three: Please see State Water Board response to comment AW-12 and AW-13 State Water Board response to bullet point four: Please see State Water Board response to comment A-3, AW-5, AW-8, PG&E-1, and PG&E-4.	

Commenter	Comment Code	Comment	Response	EIR Edits
AW, CSPA, FOR Comment Letter	AW-15	The commenting organizations further request that the State Water Board extend the public comment period for the DEIR. As referenced in Section II above, the DEIR relies in part on operational assumptions and communications developed through consultation with PG&E that are not fully disclosed within the public administrative record. This critical information has only recently been provided to stakeholders through communications and materials disclosed just days before the close of the public comment period. We therefore request another 30-day comment period to accommodate evaluation of this new information.	State Water Board staff did not extend the comment period. The request for State Water Board and PG&E staff communications referenced in the DEIR was received on May 12, 2026. State Water Board staff provided the requested communications on May 20, 2026. References in the FEIR are available upon request.	No Change.
California Department of Fish and Wildlife (CDFW)	CDFW-1	After review of the DEIR for the Project FERC licensing, CDFW maintains prior comments, recommendations, or other suggestions originally provided by CDFW in the June 27, 2023 comment letter (Attachment 1) to support (1) the range of issues and alternatives addressed in the DEIR, and (2) adequately identifying and/or mitigating the Projects' significant, or potentially significant, direct and indirect impacts on fish and wildlife (biological) resources.	Please refer to CDFW -3 through CDFW 13.	No Change.
CDFW	CDFW-2	Additionally, CDFW supports the implementation of the proposed mitigation measures identified by the Lead Agency in the DEIR to reduce the significance of identified adverse impacts that may be caused by the continued operation of the Kerckhoff Project under a new FERC license and its alternatives.	Comment noted.	No Change.
CDFW	CDFW-3	Special Status Species: Given the intercounty nature of the Proposed Project, there is the potential for the Project to impact State-listed species. Records from the California Natural Diversity Database (CNDDDB) show the following special status species including CESA-listed species (CDFW 2023a,b,c; CWHR 2005) are known to occur or potentially occur within the Proposed Project area and could be impacted: the State endangered and federally proposed endangered foothill yellow-legged frog (<i>Rana boylei</i>); the State threatened California tiger salamander (<i>Ambystoma californiense</i>); the State endangered and fully protected California condor (<i>Gymnogyps californianus</i>) and bald eagle (<i>Haliaeetus leucocephalus</i>); the State fully protected golden eagle (<i>Aquila chrysaetos</i>), white-tailed kite (<i>Elanus leucurus</i>), and American peregrine falcon (<i>Falco peregrinus anatum</i>); the State endangered least Bell's vireo (<i>Vireo belli pusillus</i>) and willow flycatcher (<i>Empidonax traillii (brewsteri)</i>); the State threatened Swainson's hawk (<i>Buteo swainsoni</i>); and the following State species of special concern hardhead (<i>Mylopharodon conocephalus</i>), California roach (<i>Lavinia symmetricus</i>), hitch (<i>Lavinia exilicauda</i>), white sturgeon (<i>Acipenser transmontanus</i>), Kern brook lamprey (<i>Lampetra hubbsi</i>)	All species were considered when developing the Biological Resource sections of the EIR (Chapters 4.04 and 4.05). All commented species, aside from 3 fish species, are included within the attachment to the EIR (Appendix E-3, Table WILD 1-4). Additions to applicable resource chapters were made to include commented species that are unlikely to occur within the Proposed Project Area.	The following text has been added to the EIR: "The species in Table WILD 1-4 in Appendix E-3 designated as 'unlikely to occur' based on lack of observations and habitat within the Proposed Project Area are not included in Table 4.5-5." Section 4.4.1.4.1 has been updated with a "Special Status Fish Species with the Potential to Occur within the Project Area" Section which includes the following text: "Three special status fish species that have the potential

Commenter	Comment Code	Comment	Response	EIR Edits
		(Moyle et al. 2015), California red-legged frog (<i>Rana draytonii</i>), western pond turtle (<i>Actinemys marmorata</i>) (Thomson et al. 2016), grasshopper sparrow (<i>Ammodramus savannarum</i>), short-eared owl (<i>Asio flammeus</i>), long-eared owl (<i>Asio otus</i>), burrowing owl (<i>Athene cunicularia</i>), Northern harrier (<i>Circus cyaneus</i>), yellow-breasted chat (<i>Icteria virens</i>), loggerhead shrike (<i>Lanius ludovicianus</i>), yellow warbler (<i>Setophaga petechia</i>), and California spotted owl (<i>Strix occidentalis occidentalis</i>).		to occur in the Proposed Project Area, but have not been documented during resource surveys, are the California roach (<i>Lavinia symmetricus</i>), hitch (<i>Lavinia exilicauda</i>), and white sturgeon (<i>Acipenser transmontanus</i>). Due to a combination of lack of observations during surveys, barriers to anadromous or migratory fish upstream movement, and the ubiquity of piscivorous predators (e.g., Smallmouth Bass) in both Kerckhoff Reservoir and the PBR, these species are considered unlikely to occur within the Proposed Project Area.”
CDFW	CDFW-4	Special Status Species: The following mammals are also State species of special concern known to occur or potentially occur within the Proposed Project area: pallid bat (<i>Antrozous pallidus</i>), Townsend’s big-eared bat (<i>Corynorhinus townsendii</i>), spotted bat (<i>Euderma maculatum</i>), western mastiff bat (<i>Eumops perotis californicus</i>), and American badger (<i>Taxidea taxus</i>).	All commented species are included within the attachment to the EIR (Appendix E-3, Table WILD 1-4), and all species were considered when developing the Biological Resource sections of the EIR (Chapters 4.04 and 4.05).	Section 4.5.1.6.1, <i>Other Mammals</i> , has been updated to include the following sentence: American Badger were not observed during surveys conducted in support of relicensing.
CDFW	CDFW-5	Special Status Plants: The following special status plants occur within the Proposed Project area and could be impacted: the State endangered fleshy owl’s clover (<i>Castilleja campestris</i> var. <i>succulenta</i>), Boggs Lake hedge-hyssop (<i>Gratiola heterosepala</i>), Hartweg’s golden sunburst (<i>Pseudobahia bahiifolia</i>), and San Joaquin Valley Orcutt grass (<i>Orcuttia inaequalis</i>); the State threatened tree-anemone (<i>Carpenteria californica</i>); and the State rare Tracy’s eriastrum (<i>Eriastrum tracyi</i>). In addition, the State species of special concern redhead (<i>Aythya americana</i>) occur within the Proposed Project area. Rare and imperiled natural communities with potential to occur include Great Valley Mixed Riparian Forest and Northern Basalt Flow Vernal Pool.	State Water Board staff reviewed and considered CDFW’s comments on the NOP during the preparation of the DEIR . All commented species are included within Appendix E-3 of the Draft EIR, Table A-4 of PG&E’s 2020 Final License Application (PG&E 2020), or Table E-1 - <i>List of vascular plants, mosses, and lichen species observed in the PG&E Technical Study Report – 11 (BOT 1) Study Area</i> , as referenced in Section 4.5.1.2.1 of the DEIR. Review of available vegetation mapping and occurrence data (CODP 2026, Data Basin 2015, USFWS 2026, and BIOS Viewer, 2026) indicates that Great Valley Mixed Riparian Forest and Northern Basalt Flow Vernal Pool natural communities may occur within the broader Project Area; however, they were not identified within areas proposed for construction or ground disturbance. Any previously	The available vegetation mapping and occurrence data sources for the commented natural communities were added to Section 4.5.1.2.1 and Section 4.5.5 of Chapter 4.5 – Biological Resources - Terrestrial.

Commenter	Comment Code	Comment	Response	EIR Edits
			unidentified sensitive biological resources encountered during implementation of the Proposed Project would be addressed through applicable PM&E measures, including preconstruction surveys and avoidance procedures.	
CDFW	CDFW-6	Native Fish and Molluscs: Other native fish and mollusc species that are known to occur within and nearby the Proposed Project Boundary that have not been assigned a special status but have a high ecological and cultural value include: rainbow trout (<i>Oncorhynchus mykiss</i>), Sacramento sucker (<i>Catostomus occidentalis</i>), prickly sculpin (<i>Cottus asper</i>), threespine stickleback (<i>Gasterosteus aculeatus</i>) and the western pearlshell (<i>Margaritifera falcata</i>).	State Water Board staff reviewed and considered CDFW's comments on the NOP during the preparation of the DEIR. All species were considered when developing applicable resource sections of the EIR (Chapters 4.04, 4.05, 4.6, 4.11, 4.19).	No Change.
CDFW	CDFW-7	The primary purpose of a DEIR is to consider all potential impacts associated with the Proposed Project that would eventually tier from the EIR over time. As such, the EIR should serve primarily as a planning level DEIR and consider, in detail, the cumulative impacts of the reasonably foreseeable projects, in this case project operation and maintenance, on the environment and on the species CDFW has identified in this comment letter. CDFW recommends that proposed ongoing studies and analyses from the Revised Study Plan (PG&E 2018, 2021) be conducted and completed in and surrounding all locations for the planned continued operation and maintenance of PG&E's Kerckhoff hydroelectric project in the EIR and identify all potential plant, animal, invertebrate, and fish species that could be present. Then, for those species, CDFW recommends a robust analysis of cumulative impacts for each of those species along with avoidance, minimization, and mitigation measures that could be implemented on the Project to reduce harm. For many species, subsequent protocol-level surveys may be required during biological studies conducted in support of the future CEQA documents that will be tiered from this DEIR and, depending on the results, avoidance and minimization measures, permits, and mitigation may be required.	The State Water Board reviewed and considered this comment when developing the draft EIR. The EIR was developed, in part, based on existing information including study results conducted and completed by PG&E during FERC relicensing. Please see Sections 4.4 and 4.5 for the Proposed Project and Alternatives' potential impacts to biological resources. Additionally, please see Sections 6.3.2 and 6.3.3 for Cumulative Impacts associated with the Proposed Project and Alternatives.	No Change.

Commenter	Comment Code	Comment	Response	EIR Edits
CDFW	CDFW-8	CDFW recommends that survey-level protocols be conducted for these species as part of the biological technical studies prepared in support of the DEIR, with conclusions of those studies summarized therein and repeated as necessary prior to Project ground-disturbing activities. For foothill yellow-legged frog, focused surveys following the survey methods described in pages 16–22 of “A Standardized Protocol for Surveying Aquatic Amphibians” (Fellers and Freel 1995) is recommended; however, please note that dip-netting would constitute take as defined by Fish and Game Code section 86, so it is recommended this survey technique be avoided. For California spotted owl, CDFW recommends that focused surveys be conducted by qualified biologists familiar with California spotted owl following the protocol prepared by the United States Fish and Wildlife Service (USFWS) (USFWS 2011, revised 2012). In the subsequent EIR, CDFW advises that special-status species be addressed with appropriate avoidance and minimization measures and the above survey methods be included. Detection of any CESA-listed species or candidate warrants consultation with CDFW to discuss how to avoid take, or if avoidance is not feasible, acquisition of an Incidental Take Permit, pursuant to Fish and Game Code section 2081(b), would be necessary to comply with CESA.	Please see comment response CDFW-7.	No Change.
CDFW	CDFW-9	Project Alternatives Analysis: CDFW recommends the information and results obtained from the biological technical surveys, studies, and analyses conducted in support of the Proposed Project’s CEQA document be used to develop and modify the Proposed Project’s alternatives to avoid and minimize impacts to biological resources to the maximum extent possible. When efforts to avoid and minimize have been exhausted, remaining impacts to sensitive biological resources may need to be mitigated to reduce impacts to a less than significant level, if feasible.	Please see comment response CDFW-7. Additionally, please see Section 5 for a description of Proposed Project alternatives developed as part of the environmental analysis.	No Change.

Commenter	Comment Code	Comment	Response	EIR Edits
CDFW	CDFW-10	Cumulative Impacts: CDFW recommends that a cumulative impact analysis be conducted for all biological resources that will either be significantly or potentially significantly impacted by implementation of the Project, including those whose impacts are determined to be less than significant with mitigation incorporated or for those resources that are rare or in poor or declining health and will be impacted by the project, even if those impacts are relatively small (i.e., less than significant). CDFW recommends cumulative impacts be analyzed using an acceptable methodology to evaluate the impacts of past, present, and reasonably foreseeable future projects on resources and be focused specifically on the resource, not the Project. An appropriate resource study area identified and utilized for this analysis is advised. CDFW staff is available for consultation in support of cumulative impacts analyses as a trustee and responsible agency under CEQA and we recommend that the State Water Resources Control Board reach out to CDFW to discuss various methodologies and strategies for an analysis of this type for CDFW trustee agency resources.	Please see section EIR Section 6 for Cumulative Impact Analysis.	No Change.
CDFW	CDFW-11	CNDDDB: Please note that the CNDDDB is populated by and records voluntary submissions of species detections. As a result, species may be present in locations not depicted in the CNDDDB but where there is suitable habitat and features capable of supporting species. A lack of an occurrence record in the CNDDDB does not mean a species is not present. In order to adequately assess any potential Project-related impacts to biological resources, surveys conducted by a qualified wildlife biologist during the appropriate survey period(s) and using the appropriate protocol survey methodology are warranted in order to determine whether any special-status species are present at or near the Project area.	Please see comment response CDFW-7.	No Change.
CDFW	CDFW-12	Lake and Stream Alteration (LSA): The Project may be subject to CDFW's regulatory authority pursuant to Fish and Game Code section 1600 et seq. Fish and Game Code section 1602 requires any project proponent to notify CDFW prior to commencing any activity that may (a) substantially divert or obstruct the natural flow of any river, stream, or lake; (b) substantially change or use any material from the bed, bank, or channel of any river, stream, or lake; or (c) deposit debris, waste or other materials that could pass into any river, stream, or lake. "Any river, stream, or lake" includes those that are ephemeral or intermittent as well as those that are perennial in nature. For additional information on notification requirements, please contact our staff in the LSA Program at (559) 243-4593 or R4LSA@wildlife.ca.gov.	Comment noted.	No Change.

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CDFW	CDFW-13	Federally Listed Species: CDFW recommends consulting with the USFWS on potential impacts to federally listed species including, but not limited to, foothill yellow-legged frog. Take under the Federal Endangered Species Act (FESA) is more broadly defined than CESA; take under FESA also includes significant habitat modification or degradation that could result in death or injury to a listed species by interfering with essential behavioral patterns such as breeding, foraging, or nesting. Consultation with the USFWS in order to comply with FESA is advised well in advance of any ground-disturbing activities.	As part of the Proposed Project's Federal Energy Regulatory Commission (FERC) relicensing process, the Project is also subject to Section 7 of the Endangered Species Act as administered by the United States Fish and Wildlife Service.	No Change.
Traditional Choinumni Tribe	TCT-1	I reviewed the documents to the above said project. And this project is outside of our historical land base. Therefore we are unable to make any comment on the said project. If you have questions, please don't hesitate to call or email.	Thank you for your comment.	No Change.
San Joaquin Valley Air Pollution Control District (SJVAPCD) email communication	SJVAPCD-1	Would the Water Board allow an extension to the end of the week for us to get our comments in?	State Water Board staff did not extend the comment period.	No Change.

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SJVAPCD email communication	SJVAPCD-2	The emissions analysis done in CalEEmod indicates that the project will not exceed criteria pollutant thresholds for any construction period and during operations, without mitigation needed. As a result, I am hoping you can clarify if the indication that Impact AQ-1 is “Significant and Unavoidable” is an error, or if not maybe confirm how that is the case.	SJVAPCD’s comment is in relation to the CalEEmod (Appendix D of Draft EIR) results showing PM10 increases due to construction activities would be below SJVAPCD’s threshold. While the CalEEMOD analysis in Appendix D found the project would not exceed PM10 during construction or operations, AQ-1 found the project would result in significant and unavoidable impacts as result of localized fugitive dust emissions from construction equipment. Construction activities are primarily located around areas where recreation occurs. SJVAPCD adopts plans and established Regulation VIII – Fugitive PM10 Prohibitions with a stated goal of limiting fugitive dust emissions from construction, demolition, excavation, extraction, and other earthmoving activities. PG&E did not Propose any measures to address air quality impacts during construction activities (e.g. Vista Day Use Area) and due to federal preemption, it is unclear if PG&E will implement applicable measures. Therefore the impact has been deemed significant and unavoidable. Implementation of measures to minimize or avoid fugitive dust emissions during construction under AQ-1 would result in a less than significant impact with mitigation. However, without commitment from PG&E, implementation of Recommended Mitigation Measure AQ-1 is uncertain and would thus result in a significant and unavoidable impact.	Appendix D is updated to clarify the impact is significant and unavoidable without implementation of the AQ-1 or a comparable action.
SJVAPCD Comment Letter	SJVAPCD-3	1) <u>Construction Emissions</u> The District recommends, to reduce impacts from construction-related diesel exhaust emissions, the Project should utilize the cleanest available off-road construction equipment.	The Proposed Project is for relicensing (continued operations) of the existing Kerckhoff Hydroelectric Project. The Proposed Project does include construction activities associated with decommissioning of the Kerckhoff 1 Powerhouse, gage installation, and recreation site improvements. Section 4.3.4 includes analysis of the potential air quality impacts associated with construction activities and identifies Recommend Mitigation Measure AQ-1 to reduce potential impacts associated with diesel exhaust emissions.	No Change.
SJVAPCD Comment Letter	SJVAPCD-4	2) <u>Voluntary Emission Reduction Agreement</u> Per the DEIR, Section 4.3.4.1 (Potential Impacts Related to Air Quality) indicates that Project construction fugitive particulate matter (PM) emissions may exceed the District’s significance thresholds if Mitigation Measure AQ-1 is not implemented. The DEIR further	Comment Noted. The SJVAPCD Comment Letter was shared with PG&E on June 4, 2026. Please note, as the Proposed Project is occurring as part of a Federal Energy Regulatory Commission (FERC) proceeding, federal preemption may preclude implementation of local and state requirements. Please also see comment response SJVAPCD-3.	No Change.

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		indicates that PG&E has not committed to implementation of Mitigation Measure AQ-1. Consequently, the DEIR concludes that construction-related fugitive dust emissions would result in a Significant and Unavoidable air quality impact. Therefore, if construction fugitive PM emissions cannot be reduced to a less-than-significant level through implementation of feasible on-site mitigation measures, the District recommends that the DEIR include a discussion of the feasibility of implementing a Voluntary Emission Reduction Agreement (VERA). A VERA is a mitigation measure by which the project proponent provides pound-for-pound mitigation of emissions increases through a process that develops, funds, and implements emission reduction projects, with the District serving a role of administrator of the emissions reduction projects and verifier of the successful mitigation effort. To implement a VERA, the project proponent and the District enter into a contractual agreement in which the project proponent agrees to mitigate project specific emissions by providing funds for the District's incentives programs. The funds are disbursed by the District in the form of grants for projects that achieve emission reductions. Thus, project-related impacts on air quality can be mitigated. Types of emission reduction projects that have been funded in the past include electrification of stationary internal combustion engines (such as agricultural irrigation pumps), replacing old heavy-duty trucks with new, cleaner, more efficient heavy-duty trucks, and replacement of agricultural equipment with the latest generation technologies. In implementing a VERA, the District verifies the actual emission reductions that have been achieved as a result of completed grant contracts, monitors the emission reduction projects, and ensures the enforceability of achieved reductions. After the project is mitigated, the District certifies to the Lead Agency that the mitigation is completed, providing the Lead Agency with an enforceable mitigation measure demonstrating that project-related emissions have been mitigated. To assist the Lead Agency and project proponent in ensuring that the environmental document is compliant with CEQA, the District recommends the environmental document includes an assessment of the feasibility of implementing a VERA.		

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SJVAPCD Comment Letter	SJVAPCD-5	3) <u>District Rules and Regulations</u> The District issues permits for many types of air pollution sources, and regulates some activities that do not require permits. A project subject to District rules and regulations would reduce its impacts on air quality through compliance with the District's regulatory framework. In general, a regulation is a collection of individual rules, each of which deals with a specific topic. As an example, Regulation II (Permits) includes District Rule 2010 (Permits Required), Rule 2201 (New and Modified Stationary Source Review), Rule 2520 (Federally Mandated Operating Permits), and several other rules pertaining to District permitting requirements and processes. The list of rules below is neither exhaustive nor exclusive. Current District rules can be found online at: https://ww2.valleyair.org/rules-and-planning/current-district-rules-and-regulations. To identify other District rules or regulations that apply to future projects, or to obtain information about District permit requirements, the project proponents are strongly encouraged to contact the District's Small Business Assistance (SBA) Office at (559) 230-5888. 3a) District Rule 9510 - Indirect Source Review (ISR) The District has reviewed the information provided and determined that there is no construction of a new building, facility, or structure, or reconstruction of a building, facility, or structure for the purpose of increasing capacity or activity. Therefore, the project does not meet the definition of a "Development Project", as defined in District Rule 9510 section 3.13, and District Rule 9510 requirements and related fees do not apply to the Project. 3b) District Regulation VIII (Fugitive PM10 Prohibitions) The project proponent may be required to submit a Construction Notification Form or submit and receive approval of a Dust Control Plan prior to commencing any earthmoving activities as described in Regulation VIII, specifically Rule 8021 – Construction, Demolition, Excavation, Extraction, and Other Earthmoving Activities. Should the project result in at least 1-acre in size, the project proponent shall provide written notification to the District at least 48 hours prior to the project proponents intent to commence any earthmoving activities pursuant to District Rule 8021 (Construction, Demolition, Excavation, Extraction, and Other Earthmoving Activities). Also, should the project result in the disturbance of 5-	Comment Noted. The SJVAPCD Comment Letter was shared with PG&E on June 4, 2026. Please also see comment response SJVAPCD-4.	No Change.

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		acres or more, or will include moving, depositing, or relocating more than 2,500 cubic yards per day of bulk materials, the project proponent shall submit to the District a Dust Control Plan pursuant to District Rule 8021 (Construction, Demolition, Excavation, Extraction, and Other Earthmoving Activities). For additional information regarding the written notification or Dust Control Plan requirements, please contact District Compliance staff at (559) 230-5950. The application for both the Construction Notification and Dust Control Plan can be found online at: https://ww2.valleyair.org/media/fm3jrbsq/dcp-form.docx Information about District Regulation VIII can be found online at: https://ww2.valleyair.org/dustcontrol		
SJVAPCD Comment Letter	SJVAPCD-6	4) District Comment Letter The District recommends that a copy of the District's comments be provided to the Project proponent.	Comment Noted. The SJVAPCD Comment Letter was shared with PG&E on June 4, 2026.	No Change.
Pacific Gas and Electric Company (PG&E)	PG&E-1	A. State Water Board has included infeasible measures in its Alternative 1 and Environmentally Superior Alternative. <i>Requested Change: Please delete the proposed ramp-up measure from alternatives due to its infeasibility.</i> The State Water Board has included an infeasible ramp-up measure in its Alternative 1 and as the Environmentally Superior Alternative, which consists of Alternative 2 with the addition of the infeasible ramp-up measure from Alternative 1. As a threshold matter, the Draft EIR's designation of Alternative 2 with the addition of the (infeasible) ramp-up measure as the Environmentally Superior Alternative violates the California Environmental Quality Act (CEQA). CEQA requires that the Environmentally Superior Alternative be selected from "among the other alternatives." (CEQA Guidelines, § 15126.6(e)(2).) The Draft EIR's merging of Alternative 2 with a feature of Alternative 1 is not an alternative evaluated in the Draft EIR—and, therefore, cannot be designated the Environmentally Superior Alternative. In any event, the alternatives analysis for Alternative 1 and the "Environmentally Superior Alternative" is flawed because it includes the proposed ramp-up measure that is infeasible in that it depends on modeling assumptions that are not capable of being met under	The merging of components of different Alternatives is permissible and commonplace when completing an analysis in CEQA. If the EIR's alternatives discussion encourages informed decision making and public participation, components from different alternatives may be substituted for one another. The DEIR provided an analysis of each alternative, including analysis of individual aspects of an alternative. <i>In California Oak Foundation v. Regents of University California</i>, 188 Cal.App.4th 227, the First District Court of Appeals upheld a "mix-and-match" approach, in which components from different alternatives were substituted for one another, because such an approach was sufficient to "encourage[] informed decision-making and public participation." (<i>Id.</i> at pp. 275, 276.) The Alternative 1 ramp-up measure was found to be feasible as it is implementable subject to sufficient storage, powerhouse capacity, and advanced notification of inflows (see EIR Section 4.11.4.8.2). Additionally, as presented by PG&E during a FERC stakeholder meeting on July 7, 2022, modeling of the <i>Safety Ramp Up Flow</i> showed that Alternative 1 up-ramping could be implemented under the	No Change.

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		actual Project operations. (See CEQA Guidelines, § 15364 [“feasible” means “capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors”]; CEQA Guidelines, § 15126.6(a) [an EIR must examine a range of alternatives that are “potentially feasible”].) The ramp-up measure—a limitation on river stage increases to one foot per hour measured at Gage J-2— was previously proposed by the U.S. Fish and Wildlife Service, evaluated by PG&E, and determined to be infeasible, as discussed with stakeholders during our July 2022 meetings. The measure is infeasible under actual Project operations, including during powerhouse outages and periods of rapidly increasing inflows, especially spring inflows. Although, the Draft EIR modified the measure extensively in its modeling to make the ramp-up appear feasible, it acknowledges that feasibility during actual Project operations requires up to 5 hours advance notice of inflows from upstream non-PG&E hydroelectric projects, reliable forecasting, sufficient storage in Kerckhoff Reservoir, and available powerhouse capacity. Overall, the modeled performance of the measure relies heavily on advance notification of inflows from upstream non-PG&E projects to allow for necessary operational adjustments by the project operators. All these assumptions cannot be met under actual Project operations for the following reasons. PG&E does not receive reliable advance notification of inflows from Southern California Edison (SCE), which operates the upstream Big Creek No. 4 Powerhouse. Water released from the Big Creek No. 4 Powerhouse reaches the Project in approximately 15 minutes and typically operates under California Independent System Operator Automatic Generation Control (AGC) with flows fluctuating from 0 to 3,500 cubic feet per second (cfs). When providing this valuable grid service, SCE receives no advance notice and must rapidly adjust Big Creek No. 4 Powerhouse generation and outflows in response to the real-time grid. Since Big Creek No. 4 Powerhouse frequently operates under AGC, SCE is therefore incapable of providing sufficient advance notice of real-time changes in Big Creek No. 4 Powerhouse flow releases to meet the model’s assumptions. Attachment A shows plots of actual inflows to Kerckhoff Reservoir, which include the highly variable flows discharged from the Big	right conditions, as described previously. The inability to consistently provide ramping rates is not an indication of feasibility. To date, PG&E has not provided modeled ramp-up data to support its view that ramp-up rates are infeasible and not implementable under any conditions. The Draft EIR acknowledges that real-world conditions differ from model assumptions and as such Alternative 1 ramp-up requirements are not possible in all conditions; but, when possible, they would provide more natural flow conditions than the Proposed Project. Additionally, as the Proposed Project includes continued operations for 50 years, it is possible that during this time PG&E could provide the Alternative 1 ramping rate with more consistency if there are facility modifications and/or improved coordination between hydropower operators as part of FERC relicensing of hydropower projects in the San Joaquin system. The DEIR did not extensively modify the BLM preliminary 4(e) Condition 5 - Ramp Up for Protection of Public Safety and Aquatic Life. In PG&E’s 10/24/2024 submittal requesting a trial-type hearing in relation to BLM’s preliminary 4(e) conditions, a point of contention raised from PG&E was that it is not possible to limit Kerckhoff Dam releases to the rates of change or the magnitude of flow measured by the proposed inflow gage, as stated in the 4(e) Condition. PG&E stated the proposed inflow gage does not include all inflows into Kerckhoff Reservoir. (Disputed Issue of Material Fact No. 6). The tying of the ramp up rate to the new inflow gage in the BLM preliminary 4(e) was not carried forward in the DEIR. This was the only operationally impactful change made under Alternative 1, when compared to BLM’s preliminary 4(e) Condition 5. The Environmentally Superior Alternative provides the benefit of scheduled whitewater boating flows, along with other gradual flow recession measures, and attempts to limit large stage increases throughout the Project Bypass Reach via the 1 foot per hour ramp up measure, as feasible. Both aspects work to protect and enhance recreation beneficial uses below Kerckhoff Dam, as stated in Section 5.5 of the DEIR.	

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		Creek No. 4 Powerhouse and lows, including large spill flows, discharged from SCE's Redinger Lake located approximately 6 miles further upstream from Big Creek No. 4 Powerhouse. Figures A-1 through A-3 show both of these flows for 2023-2025, respectively. The magnitude and arrival timing of these flows combined contribute to the varying magnitude and frequency of inflows to Kerckhoff Reservoir. PG&E's proposed inflow gage could not provide the required advance notice (up to 5 hours) required by the State Water Board's model since it is located only a short distance downstream of the non-Project SCE Big Creek No. 4 Powerhouse. Overall, the Draft EIR directly acknowledges that feasibility and modeled performance of the ramp-up measure depend on advance notice of inflow timing and magnitude from upstream non-PG&E projects, as well as operator judgment regarding when to initiate the ramp-up, and further recognizes that a late start in responding to upstream flows could result in excessive spills due to the limited capacity of Kerckhoff Reservoir in its operating range. These are not minor sensitivities; they are fundamental prerequisites that do not exist in actual Project operations and therefore undermine the Draft EIR's feasibility premise. In reality, actual Project operations are subject to rapid inflow fluctuations, weather driven variability, and spill decisions regulated by reservoir protection and dam safety requirements, which operate at a minute-by-minute time scale rather than the 1-5 hours assumed in the model. Consequently, because the modeling requirements do not reflect actual Project operating conditions, model results do not represent implementable or feasible operational scenarios resulting in an alternative that PG&E cannot comply with in the real world. Accordingly, the modeling results cannot constitute substantial evidence because they rely on unsupportable assumptions—advance notification and effective forecasting. As a result, the Draft EIR's ramp-up protocol is not "feasible" as that term is used in CEQA (CEQA Guidelines § 15126.6) because it cannot be implemented successfully under actual Project operating conditions given the operational and technological dependencies described in the Draft EIR required for implementation. CEQA requires that conclusions regarding feasibility and efficacy be grounded in substantial evidence (CEQA §15384, 15064, and 15126.4) and not in analytical approaches that presume away the operational constraints governing implementation. Because Alternative 1 and the "Environmentally Superior Alternative" are infeasible, PG&E recommends that Alternative 2, the Bureau of Land		

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		Management (BLM) FPA (Federal Power Act) § 4(e) Revised Conditions, be selected as the Environmentally Superior Alternative.		
PG&E	PG&E -2	B. Ramp-up would not provide the public safety benefits claimed, even if it were feasible <i>Requested Change: Please delete the proposed ramp-up measure from alternatives due to its inability to provide public safety benefits. BLM's FPA § 4(e) Revised Condition No. 5-Deterrence Flows for Protection of Public Safety and Aquatic Life Measure provides feasible safety benefits and should be used for the environmentally superior alternative.</i> The ramp-up measure included in Alternative 1 and the “Environmentally Superior Alternative” is designed to gradually ramp-up spill flows for the protection of recreationists’ public safety. This measure goes to Alternative 1 and the “Environmentally Superior Alternative,” not the Project. Therefore, the State Water Board’s proposed ramp-up measure does not address a specific adverse impact of the Project and thus lacks a demonstrable nexus to the downstream public safety conditions the Draft EIR asserts it would improve. (CEQA Guidelines, § 15041(a) [mitigation measures must bear a sufficient nexus to an identified environmental impact of the project and be roughly proportional to that impact of the project]; CEQA Guidelines, § 15126.4(a)(4) [same].) Accordingly, there is no substantial evidence supporting the Draft EIR’s conclusion that the ramp-up measure would reduce the Project’s impacts to recreationists’ public safety. The one foot per hour ramp-up rate at Gage J-2 originally proposed by BLM in their preliminary 4(e) Condition No. 5 was withdrawn by BLM and replaced with FPA § 4(e) Revised Condition No. 5-Deterrence Flows for Protection of Public Safety and Aquatic Life. The revised Condition No. 5 does not include a ramp-up. PG&E’s 2021 stage-discharge investigation shows that ramp-up steps released at Kerckhoff Dam and observed at Gage J-2 do not propagate downstream as discrete step changes, but rather as a rapid change in river stage at downstream recreation areas (see Figure A-). Hydraulic conditions in the Project Bypass Reach result in rapid attenuation of any ramping signal. Incremental ramp-up steps lose hydraulic definition within a short distance and do not meaningfully limit the rate of stage change downstream or provide measurable public safety benefits across most of the Project Bypass Reach,	PG&E’s 2021 Stage Discharge Investigation analyzed three flow events, one of which was a rise from 48 cfs to 1,693 cfs (flow event three). When looking at Figure 3.6-4 of the study, the measured flows generally result in a two foot per hour ramp up rate at Study Site 1, which is the closest site to the J-2 Gage. PG&E did not include a stage change rating curve for Gage J-2 within this study. Using this event as an example, although a roughly two foot per hour increase resulted in a rapid increase in stage downstream, it is expected that if the stage increase at Gage J-2 is limited to one foot per hour or as close to one foot as feasible, this would result in a slower increase in stage at Study Sites 4 and 5 of the Stage Discharge Investigation, which are in the vicinity of the BLM recreation area. Additionally, under Environmentally Superior Alternative, PG&E would be subject to both the Spill Season Flow Measure (SSFM) and Planned Outage Measure, which includes visual cue flows and a ramp down to MIF, and the Alternative 1 Ramp Up Measure. Under Alternative 1, the Ramp Up Measure would only replace the ramp up components of the Spill Season Flow Measure and Planned Outage Measure. Flow event two of PG&E’ Stage Discharge Investigation (Figure 3.6-3), shows the stage increase when flow is already 500 cfs (as would be during Below Average Water Years under the Spill Season Flow Measure as amended by the BLM 4(e) (Alternative 2). The figure displays a more gradual increase in stage; and additionally, Study Site 1 receives an additional 1,500 cfs in approximately a half an hour during this event, which would be slowed with the Alternative 1 Ramp Up Measure and subsequently aid in the gradual stage increase further downstream at Study Sites 4 and 5. The Environmentally Superior Alternative includes the Spill Season Flow Measure and the Planned Outage Measure as described in BLM’s Revised 4(e) Conditions. Up ramping requirements would occur as feasible during time periods where the Proposed Project is increasing flow releases. Additionally, Recommended Mitigation Measure WQ-5 will establish siren activation protocols to warn recreators of flow	Mitigation Measure WQ-5 which resulted in the impacts to HYD-5 is being adopted and impact HYD-5 is now considered less than significant with mitigation incorporated. Recommended Measure WQ-5 is now Mitigation Measure WQ-5.

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		including the downstream BLM recreation area where public use is concentrated. Because the Draft EIR's public safety conclusions rely on an assumed preservation of the ramp-up signal that does not occur under actual hydraulic conditions, those conclusions are not supported by substantial evidence, as required under CEQA. Unlike the State Water Board's proposed ramp-up, BLM FPA § 4(e) Revised Condition No. 5-Deterrence Flows for Protection of Public Safety and Aquatic Life Measure (part of Alternative 2) could be implemented and would provide a visual deterrence to river entry and reduce accessibility to deeper channel areas during spill events of varying magnitudes. The filling of the channel bottom near the BLM recreation area would be accomplished with an initial flow of 1,000 cfs in above average water years and 500 cfs in below average water years. The effects of these flows on water surface elevations in the river cross-section compared to a flow of 43 cfs (low flow at the time of the study) are shown in Figure A-5 near the BLM footbridge. Alternative 2 would reduce channel bottom accessibility by increasing water surface elevations near BLM recreation areas by approximately 5.06 feet at 1,000 cfs, and 3.23 feet at 500 cfs near the BLM footbridge and approximately 7.36 feet and 6.11 feet upstream of the Kerckhoff 2 Powerhouse (Figure A-6), respectively. These increased river stages would provide visual cues, fill the channel bottom, deter public entry into the channel, and limit the potential for individuals to stray from the banks, especially in conjunction with posted signage and the sounding of alarm horns in the area (which are existing practice). Analyses previously shared with stakeholders indicate that PG&E's similar proposed flow management measures would reduce the frequency of critical stage changes during spills, thereby improving overall public safety conditions.	increases and communicate to recreators to exit the water or move further from channel margins. The Environmentally Superior Alternative provides scheduled flow releases, gradual down ramps, ramp ups as feasible, and improved notification to exit the river. As described in the DEIR, PG&E's Proposed Project and Alternative 2 Planned Outage Measure would result in potentially significant impacts and at the DEIR found that the combination of ramping requirements would be the Environmentally Superior Alternative for the reasons described above. Finally, the Environmental Assessment (EA)¹ for the relicensing of the Kerckhoff Hydroelectric Project released by the Federal Energy Regulatory Commission (FERC) recognizes that gradual ramping can provide a more effective indicator that hazardous river conditions are developing. FERC further recognized in the EA that warning systems sirens require active attention and understanding by river users and may be ineffective where individuals fail to hear warnings, do not understand their significance, or are otherwise inattentive to changing river conditions. For these reasons the Environmentally Superior Alternative along with Recommended Mitigation Measure WQ-5 provide the most reliable and durable solution for lessening potential impacts.	
PG&E	PG&E-3	C. Inclusion of the ramp-up measure is not consistent with CEQA Guidelines § 15126.6 <i>Requested Change: Please delete the proposed ramp-up measure from alternatives due to its lack of consistency with CEQA. BLM's FPA § 4(e) Revised Condition No. 5-Deterrence Flows for Protection of Public Safety and Aquatic Life Measure provides feasible safety benefits and should be used as the environmentally superior alternative.</i>	Please refer to the State Water Board response to comment PG&E-1 and PG&E-2. It is appropriate for a lead agency to take a cautious approach regarding potential impacts. It is also appropriate for a lead agency to consider the anticipated timeline of a project and the potential for impacts to occur years, or even decades, into the applicable timeline. When there are uncertainties regarding whether a particular impact will occur a lead agency may adopt contingent mitigation measures	No Change.

¹ eLibrary Accession No. 20251231-3001. Accessed on July 8, 2026

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		CEQA does not require consideration of alternatives that are speculative or merely theoretical. Under CEQA Guidelines § 15126.6, an EIR must evaluate a reasonable range of potentially feasible alternatives, and it need not consider alternatives that are infeasible. CEQA feasibility must be evaluated based on actual, demonstrated conditions shown in the administrative record, not on assumptions about future circumstances or third-party actions. Here, the Draft EIR acknowledges that implementation of the proposed ramp-up measure depends on advance notice of inflows from upstream projects. PG&E does not control those inflows, and the Draft EIR identifies no existing or enforceable mechanism that would require or ensure such advance notification. The record contains no evidence of any binding FERC condition or other coordination requirement that would provide PG&E with the information necessary to implement the proposed measure. The State Water Board cannot impose any such mechanism. (CEQA Guidelines, § 15040(b) [“CEQA does not grant an agency new powers independent of the powers granted to the agency by other laws.”].) While Big Creek No. 4 Powerhouse is operated under AGC, discharges from the Big Creek No. 4 Powerhouse would be varied based on real time grid conditions, so no advanced notification would be possible. Absent such evidence, the Draft EIR wrongly relies on speculation that future federal proceedings, license terms, or third-party agreements might supply this critical prerequisite. CEQA does not permit an EIR to treat such uncertainty as a basis for a feasibility determination. (CEQA Guidelines, § 15384(a) [“[a]rgument, speculation, unsubstantiated opinion or narrative, evidence which is clearly erroneous or inaccurate ... does not constitute substantial evidence”].)	and may rely on future studies to tailor mitigation measures to fit on-the-ground conditions.	
PG&E	PG&E-4	D. Proposed Mitigation Measure WQ-5 is infeasible as written and would not provide the stated public safety benefits <i>Requested Change: Please revise Mitigation Measure WQ-5 as shown in mark-up.</i> Mitigation Measure WQ-5 (WQ-5) does not reduce Impact HYD-5. Criterion HYD-5 asks if the Project conflicts with or obstructs implementation of a water quality control plan or sustainable groundwater management plan. The subsequent analysis concludes that the Project has the potential to conflict with the Sacramento River and San Joaquin River Basins (SR/SJR) Basin Plan water quality objectives through impacts related to changes in pH, turbidity, sediments, and oil and grease. The analysis also concludes that the Project would not conflict with implementation of a sustainable	Comment noted. Additionally, CEQA declares that the policy of the state is that public agencies should not approve projects that will result in significant environmental effects if there are feasible means of mitigating such effects or feasible project alternatives that would substantially lessen the significance of such effects. CEQA thus requires the analysis and public disclosure of potential impacts associated with the implementation of a project, identification of mitigation measures that would lessen or avoid significant project impacts, and, as appropriate, a reasonable range of alternatives. As the CEQA lead agency for the Proposed Project, the State Water Board has developed mitigation measures to reduce the significance of the Proposed Project and Alternative 1 and 2's potentially significant impacts and has identified the mitigation measures that would reduce	Mitigation Measure WQ-5 which resulted in the impacts to HYD-5 is being adopted and impact HYD-5 is now considered less than significant with mitigation incorporated. Recommended Measure WQ-5 is now Mitigation Measure WQ-5

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		groundwater management plan because the Project is not within a Sustainable Groundwater Management Act priority basin. As written, therefore, WQ-5 does not address impacts to pH, turbidity, sediments, or oil and grease at all, but instead focuses on measures about notifying the public about rapid stage changes, which is completely unrelated to the identified water quality impact pathways, or water quality control or groundwater management plans. As a result, WQ-5 should not be applied to Impact HYD-5. Pursuant to the terms and requirements of the current FERC license, there are existing plans that cover the public safety concerns this measure is intended to address. These plans would necessarily be carried over under the Project and FERC's relicensing, see further details below. There is, thus, no applicable impact of the Project for WQ-5 to mitigate and the impact conclusion should be changed to less than significant without mitigation. If the Draft EIR is not revised to change the impact conclusion to less than significant, any significant impact would be an impact of Alternative 1 and the "Environmentally Superior Alternative," and not the proposed Project. Consistent with guidance on the level of discussion necessary for significant impacts caused by mitigations measures, WQ-5 should, if it is included at all, be relocated entirely into the alternatives analysis for Alternative 1 and the "Environmentally Superior Alternative." (See CEQA Guidelines, § 15126.4(a)(1)(D) [if a mitigation measure identified in an EIR would itself cause a significant environmental impact distinct from the significant effects caused by the project, those impacts must be discussed in the EIR, but in less detail than the project's significant impacts].) Furthermore, the State Water Board cannot use CEQA as a vehicle to impose policy objectives unrelated to water quality. The State Water Board's authority is limited to addressing water quality impacts, as an agency can use only the legal powers otherwise available to it in mitigating a significant environmental impact of a project. (Pub. Res. Code, § 21004; CEQA Guidelines, § 15040(c); Pub. Res. Code, § 21083.1.) If not moved into the alternatives analysis, WQ-5 should still be relocated into a different section of the Draft EIR, such as the hazards and hazardous materials section, as it does not relate to water quality impacts.	significant impacts. Identification of mitigation measures pursuant to CEQA and identification of certification conditions under the State Water Board's authority to condition the Proposed Project pursuant to section 401 of the Clean Water Act are separate responsibilities that the State Water Board has in relation to the Proposed Project. ---- The State Water Board does not propose to require PG&E to implement mitigation measures that are outside of the State Water Board's authority under section 401 of the Clean Water Act. As set forth in the DEIR, potentially significant impacts that cannot be mitigated will be deemed significant and unavoidable. The discussion of mitigation measures, including recommended mitigation measures, in the EIR furthers CEQA's informational purpose and can help guide voluntary action that would contribute to CEQA's goal of preservation and enhancement of the environment (Pub. Resources Code, § 21000.) Impact HYD-5 analyzes if the project conflicts with or obstructs implementation of a water quality control plan or sustainable groundwater management plan. Water Quality Control Plans, also known as Basin Plans, include water quality objectives, as well as associated designated beneficial uses. The Central Valley Basin Plan identifies that Sources to Millerton Lake have contact recreation, canoeing and rafting, and non-contact recreation as recognized beneficial uses. As stated in the DEIR, the Proposed Project and Alternatives have the potential to result in rapid flow changes that could impact contact and non-contact beneficial uses. Recommended Mitigation Measure WQ-5 was developed in order to reduce impacts to beneficial uses to a less-than-significant level. As stated in comment PG&E-2, alarm horns in the area are an existing practice. However, the specific implementation of these horns' usage is unclear based on the information provided in the FLA submissions and the Public Safety Plan (2021). Recommended Mitigation Measure WQ-5 clarifies horn activation requirements to ensure recreation related beneficial uses identified in the Basin Plan are protected. Recommended Mitigation Measure WQ-5 is feasible, as protocols related to the measure are to be developed in consultation and permits that not all minimum requirements	

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		WQ-5 is infeasible to implement for several reasons. WQ-5 requires PG&E to activate sirens for situations that are expected to result in a stage change greater than one foot per hour, as measured at Gage J-2. As PG&E noted in its comments on the proposed one foot per hour ramp-up measure incorporated in the State Water Board's Alternative 1, predicting a one foot per hour increase at Gage J-2 in advance is largely infeasible during outages and periods of rapidly varying high inflows. Currently, PG&E sounds a warning horn when the spill gates at Kerckhoff Dam are opened to spill water or when spill is increased, based on gate position. The sounding of the horn alerts the public in the vicinity that flows are beginning to change. Because water released at Kerckhoff Dam takes approximately 15 minutes to travel from the dam to Gage J-2, an alarm based on the initial release provides a greater margin of safety for the public and PG&E personnel in the immediate vicinity of the dam and upstream of Gage J-2 rather than an alarm that sounds after the water reaches Gate J-2. Once the gate is open so that flows are sufficiently high, additional alarms are not needed near the dam. Alarm horns near the Kerckhoff 1 and Ker2 powerhouses and the BLM footbridge and associated recreation areas are subsequently sounded based on the travel time of water from the dam to the BLM footbridge. The delay is set to alert recreationists shortly before flows arrive at the BLM footbridge. The horns are sounded based on gate operations regardless of time of day. River stage tends to increase very rapidly at downstream locations in comparison to Gage J-2, due to ramp-up steps being hydraulically attenuated. Consequently, sounding an alarm horn based on multiple stage changes at Gage J-2 would provide no useful warning beyond the initial horn, because subsequent soundings would occur after the river had already reached its full increase. This would provide no additional safety benefit and could have an adverse effect on recreationalists paying attention to such alarms. Alarm horns are currently sounded near Kerckhoff Dam and the Kerckhoff 1 and Kerckhoff 2 powerhouses, covering the primary recreation areas. Requiring additional horns throughout most of the Project Bypass Reach would provide little added benefit to recreationists, could disturb landowners, and residences, could lead to habituation and ignoring of potential danger represented by the sounding of the unnecessary alarm horns, as well as potentially affecting wildlife. Also, much of the Kerckhoff Project Bypass Reach lies outside the FERC boundary, and additional horn installation	are necessary given that alternative measures provide equivalent protection, as determined with the stated agencies. Recommended Mitigation Measure WQ-5 requires PG&E consult with BLM, USFS, and the State Water Board in the development of an Instream Flow Public Safety Plan, during which the plan would develop specific triggers for siren use. The FEIR ultimately adopted recommended Mitigation Measure WQ-5, now Mitigation Measure WQ-5, which resulted in the impact HYD-5 being reduced to less than significant with mitigation incorporated.	

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		would require use of public and private (non-PG&E) lands. As proposed, the WQ-5 conditions are infeasible and there is no substantial evidence in the record that it would provide the intended safety benefits. CEQA does not support including standalone public safety mitigation measures in a Draft EIR because the scope of a CEQA document is limited to environmental impacts, defined as physical changes in the environment and their effects on people (Pub. Res. Code §21065; CEQA Guidelines §§15064, 15382). CEQA addresses public safety only where it is directly tied to a specific environmental hazard (e.g., hazardous materials or flooding) that could increase risk to people as a result of the project. Broader public safety considerations—such as controlling access, issuing warnings, or managing operational risks—fall outside CEQA’s scope and are instead governed by federal regulatory frameworks for hydropower projects. For FERC-jurisdictional projects, public safety is comprehensively addressed through license conditions and implementing regulations. Under the Federal Power Act and standard license articles, FERC requires licensees to install, operate, and maintain public safety measures such as signage, sirens, lighting, barriers, and restricted access areas to protect the public from project operations. These requirements are further codified in FERC’s regulations at 18 CFR Part 12, which obligate licensees to maintain project works in a condition of safety and implement inspection and monitoring programs necessary to protect life, health, and property (18 CFR §§12.10–12.12), as well as 18 CFR §8.34(c), which authorizes public safety controls at project facilities and recreation areas. In addition, FERC’s Engineering Guidelines provide detailed direction on warning systems, hazard communication, and access restrictions, which are enforceable through license compliance. These provisions demonstrate that FERC—not the State Water Board—is the appropriate authority to define, implement, and enforce public safety measures for hydropower operations. Accordingly, inclusion of standalone CEQA mitigation measures related solely to public safety would be duplicative, beyond the scope of the State Water Board’s authority to regulate water quality under the Clean Water Act, and inconsistent with CEQA’s requirement that mitigation address a specific identified environmental impact. As currently framed, WQ-5 does not mitigate a defined environmental impact, but instead imposes public safety requirements already governed under FERC authority.		

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		Even if WQ-5 was intended to mitigate a defined environmental impact, because whether the “mitigation” will be imposed will be determined in the FERC licensing proceedings, WQ-5 is uncertain and unenforceable. (Pub. Res. Code, § 21081.6(b); CEQA Guidelines, § 15126.4(a)(2).) Thus, if the Draft EIR is not revised to remove WQ-5 in its entirety due to a lack of associated impact or due to its lack of feasibility, to the extent the EIR concludes there is a significant impact related to safety, the impact conclusion should be significant and unavoidable rather than less than significant with mitigation.		
PG&E	PG&E-5	E. Improper reliance on and inconsistent application of mitigation measures in impact conclusions <i>Requested Change: Revise all mitigation measures to (1) ensure they are feasible, clearly defined, and directly tied to identified impacts; (2) distinguish between existing regulatory requirements/approved plans and mitigation where applicable; and (3) base all significance determinations on enforceable, committed measures consistent with CEQA</i> Several mitigation measures and alternatives presented in the Draft EIR are infeasible, overbroad, undefined, or otherwise not supported by the analysis, raising legal and practical implementation issues under CEQA. Certain measures (e.g., the ramp-up requirement, portions of WQ-3) are operationally infeasible based on demonstrated constraints, while others are not adequately tied to specific project impacts (e.g., WQ-5) and therefore raise nexus and rough proportionality concerns. (See <i>Surfside Colony v. Cal. Coastal Com.</i> (1991) 226 Cal.App.3d 1260, 1268–1272 [because agency lacked relevant evidence of an impact, it lacked substantial evidence justifying the need for an easement to offset the impact].) For example, erosion monitoring provisions appear to extend beyond Project-related disturbance to encompass natural erosion within the broader Proposed Project Area [Mitigation Measure GEO-1(GEO-1)]. Requirements for erosion and sedimentation monitoring lack defined duration and frequency, making implementation unclear [GEO-1]. Similarly, performance standards (e.g., Basin Plan turbidity objectives) are presented without sufficient flexibility or clearly defined compliance metrics, rendering them potentially impracticable. (See CEQA Guidelines, § 15126.4 [CEQA requires that an EIR discuss feasible measures that can actually minimize the project’s significant environmental effects].) As discussed in Issue G below, broadly worded provisions (e.g., dewatering and diversion	Please see State Water Boards response to comments PG&E-1 and PG&E-4 for discussion of feasibility of the Alternative 1 Ramp Up Measure and Recommended Mitigation Measure WQ-5. Mitigation Measure GEO-1 requires an Erosion and Sediment Control plan to be developed in consultation with State Water Board, BLM, USFWS, USFS, and other interested parties, consistent with the requirements of the BLM (4e) requirements. Mitigation Measure GEO-1 states the plan shall provide direction for treating erosion, controlling sedimentation, and reclaiming disturbed sites within the Proposed Project Boundary during the term of the new license. Performance metrics for water quality standards are the same as those identified in the Central Valley Basin Plan, and the mitigation measure states the plan shall ensure compliance with the SR/SJR Basin Plan and any amendments hereto. The Central Valley Basin Plan and SR/SJR Basin Plan are the same plan but represent different shorthand. The EIR did identify and focus on the significant effects of the Proposed Project on the environment. PG&E applied for new FERC License, which in Kerckhoff’s case, would be 50 years. Therefore, the State Water Board has to analyze the Proposed Project’s potential impact over the term of the new 50-year license including in relation to erosion control measures and activities that may require dewatering, diversion or in-water work activities.	Mitigation Measure WQ-5 which resulted in the impacts to HYD-5 is being adopted and impact HYD-5 is now considered less than significant with mitigation incorporated. Recommended Measure WQ-5 is now Mitigation Measure WQ-5

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		requirements) could also be interpreted to apply to routine operations not evaluated in the Draft EIR, thereby impermissibly expanding the scope of regulation beyond the analyzed Project. CEQA is fundamentally limited to analyzing (and mitigating as necessary) the environmental impacts caused by the Project. (E.g., CEQA Guidelines, § 15126.2(a) [an “EIR shall identify and focus on the significant effects of the proposed project on the environment”]. In addition, the Draft EIR includes both mitigation measures and “recommended” mitigation measures. The latter measures are recommended because they are unrelated to water quality and, therefore, cannot be imposed by the State Water Board absent commitment by PG&E. To the extent the Final EIR does not change significance conclusions to “less than significant” without mitigation (because, as explained herein, there are no applicable Project impacts to mitigate), those impact analyses that rely on recommended mitigation measures must maintain their significant and unavoidable determinations in the Final EIR. This is because whether the proposed mitigation is imposed will be determined in the FERC licensing proceedings. (Pub. Res. Code, § 21081.6(b); CEQA Guidelines, § 15126.4(a)(2).)	As Mitigation Measure WQ-3 states, for planned work that involves any instream dewatering, diversion of water, or in-water work, the Dewatering and Diversion Plan developed by PG&E and submitted to the Deputy Director shall include the following: • An overview of all in-water work that will require dewatering or diversion of water To further clarify, Mitigation Measure WQ-3 is applicable to planned activities (e.g. construction or non-routine maintenance) that require in-water work or the isolation or exposure of a work area within a surface waters channel (i.e. dewatering and diversion) to complete. Mitigation Measure AQ-1 and Mitigation Measure BIO-2 are recommended measures as they are outside of the State Water Board’s authority to require. Therefore, potential impacts from the Proposed Project will remain significant and unavoidable in relation to where Mitigation Measure AQ-1 and BIO-2 are applicable and discussed Final EIR. Refer to State Water Board response to comment PG&E-4 regarding recommended mitigation measures WQ-5 and the State Water Board’s authority to require. The FEIR ultimately included Mitigation Measure WQ-5 which resulted in the impacts to HYD-5 being considered less than significant with mitigation incorporated. Recommended Measure WQ-5 is now Mitigation Measure WQ-5 CEQA declares that the policy of the state is that public agencies should not approve projects that will result in significant environmental effects if there are feasible means of mitigating such effects or feasible project alternatives that would substantially lessen the significance of such effects. CEQA thus requires the analysis and public disclosure of potential impacts associated with the implementation of a project, identification of mitigation measures that would lessen or avoid significant project impacts, and, as appropriate, a reasonable range of alternatives. As the CEQA lead agency for the Proposed Project, the State Water Board has developed mitigation measures to reduce the significance of the Proposed Project’s potentially significant impacts, and has identified the mitigation measures that will take effect only if PG&E agrees to them – in other words, the	

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			measures the State Water Board lacks the authority to impose. Identification of mitigation measures pursuant to CEQA and identification of certification conditions under the State Water Board's authority to condition the Proposed Project pursuant to section 401 of the Clean Water Act are separate responsibilities that the State Water Board has in relation to the Proposed Project. All the mitigation measures identified in the EIR are designed to lessen or avoid impacts that will result from changes to the environmental baseline associated with the Proposed Project. Mitigation measures related to water quality are enforceable as they will be included in the certification and therefore become conditions of the new Federal Energy Regulatory Commission (FERC) license. The Draft EIR acknowledges that other identified mitigation measures cannot be imposed without agreement from PG&E. Mitigation measures that will not be imposed on PG&E cannot violate the requirements of nexus and rough proportionality. The State Water Board does not propose to require PG&E to implement mitigation measures that are outside of the State Water Board's's authority under section 401 of the Clean Water Act. As set forth in the Draft EIR, potentially significant impacts that cannot be mitigated will be deemed significant and unavoidable. CEQA is clear that a lead agency is not required to propose or analyze mitigation measures that cannot be legally imposed (e.g., Cal. Code Regs., tit. 14, § 15126.4(a)(5)), but nothing in CEQA prohibits a lead agency from identifying and describing such measures in an environmental impact report (EIR). The discussion of mitigation measures, including measures that the SWRCB cannot impose, in the EIR furthers CEQA's informational purpose and can help guide voluntary action that would contribute to CEQA's goal of preservation and enhancement of the environment (Pub. Resources Code, § 21000.)	
PG&E	PG&E-6	F. Impacts AQ-1 and BIO-2 should not be determined to be significant and unavoidable as the quantified impacts are demonstrably below the applicable significance threshold <i>Requested Change: Please remove Mitigation Measures AQ-1 and BIO-2 as they do not mitigate significant impacts.</i>	As discussed in the State Water Boards response to comment SJVAPCD-2, analysis under impact AQ-1 found the project would result in significant and unavoidable impacts as result of localized Fugitive Dust and construction equipment. Implementation of AQ-1 would decrease impacts from earth movement or haul vehicles on gravel or dirt roads to less than significant. Without commitment from PG&E,	No Change.

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		A CEQA lead agency must determine where a project may have a significant impact on the environment based on substantial evidence. (Pub. Res. Code, § 21082.2(a); CEQA Guidelines, § 15064(a), (f).) CEQA does not permit an agency to characterize an impact as significant and then rely upon mitigation measures without first adequately analyzing the basis for the impact determination itself. (See Lotus v. Department of Transportation (2014) 223 Cal.App.4th 645, 653–658.) Mitigation measures are required to avoid only identified significant impacts. (See CEQA Guidelines, § 15126.4(a)(3) [mitigation measures are not required for effects which are not found to be significant]; Surfside Colony v. Cal. Coastal Com. (1991) 226 Cal.App.3d 1260, 1268–1272 [because agency lacked relevant evidence of an impact, it lacked substantial evidence justifying the need for an easement to offset the impact].) Mitigation Measure AQ-1 should be removed, and Impact AQ-1 should not be found to be Significant and Unavoidable, because the quantified emissions are demonstrably below applicable San Joaquin Valley Air Pollution Control District (SJVAPCD) significance thresholds. Fugitive dust emissions are more appropriately addressed under Impact AQ-3 and are already governed by existing SJVAPCD regulations, which form part of the regulatory baseline and must be assumed as standard Project compliance. When these baseline requirements are properly applied and fugitive dust is evaluated under the correct impact category, there is no substantial evidence supporting a significant impact determination. As such, the conclusion of significance is unsupported, and Impact AQ-1 should be revised to Less Than Significant, eliminating the need for mitigation measure AQ-1. In addition, as discussed further in Issue E, AQ-1 duplicates requirements already imposed through existing regulatory programs without clearly acknowledging that overlap. For the same reasons, mitigation measure BIO-2 should be removed, and the impact to special-status bats should not be considered Significant and Unavoidable, because the Draft EIR does not present substantial evidence of population-level effects. While individual night-roosting bats could be disturbed during retirement activities at the Kerckhoff 1 Powerhouse, the Draft EIR fails to account for the avoidance and minimization measures already required under PG&E’s Wildlife Management Plan, which are part of the regulatory baseline and were applied in similar impact analyses elsewhere in the document. These measures—including pre-activity review by a qualified biologist, focused surveys, and implementation of site-specific avoidance protocols such as seasonal restrictions—are enforceable	implementation of Recommended Mitigation Measure AQ-1 is uncertain. PG&E mischaracterizes the impact considered with BIO-2. The analysis does not question if impacts would result in population-level effects to listed species or maternity roosts but rather has the potential to result in adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife (CDFW) or United States Fish and Wildlife Service (USFWS). Therefore, potential impacts from construction activities to a special status bat colony can still be deemed significant. In addition, measures referenced in the Wildlife Management Plan are applicable to non-routine heavy maintenance activities. The wildlife management plan does not discuss being applicable to construction activities such as those required for the retirement and modification of the K1 Powerhouse and its associated facilities. In addition, the retirement plan for the K1 Powerhouse does not include proposed best management practices for water quality or biological resources that would reduce potential significant impacts, as development will come after the FERC license has been issued. Multiple K1 facilities were found to be suitable as day or night roosts based on visual assessments, with the potential to contain special status bats referenced in comment CDFW-4 as shown in Technical Study Report 13 - Special-Status Wildlife Species (WILD 1), Table WILD 1-8. This includes the K1 Powerhouse, the North Adit to the K1 Tunnel, and the Kerckhoff 1 Intake structure. PG&E’s July 16, 2025, water quality certification application determined that the plug for the K1 tunnel will be located downstream of the location of the tap for the minimum instream flow pipe and upstream of Adit 1. The specific location will be determined during preparation of the detailed engineering design. In addition, the K1 Powerhouse and a nearby wood storage structure were identified as suitable maternity habitat (i.e., possess suitable structural and thermal qualities). While no maternity roosts were observed in the K1 Powerhouse structure, some evidence of night roosting (i.e., a small amount of guano, species unknown) was noted in the interior of the facility. The process of lining the turbine pits, closing the turbine shutoff	

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		and sufficient to reduce potential impacts. Moreover, no evidence of maternity colonies was identified at the Kerckhoff 1 Powerhouse or associated facilities, and CEQA significance thresholds for special-status species are grounded in population-level impacts, not disturbance of individual animals, common species, or speculative habitat use. As such, the Draft EIR's significance determination is unsupported by substantial evidence. Accordingly, the impact determination should be revised to Less Than Significant, eliminating the need for MM BIO-2. To the extent the State Water Board concludes—even after considering the above discussion that there are no impacts needing mitigation—that mitigation is still required to mitigate the impacts to less than significant for either Impact AQ-1 and/or Impact BIO-2, then the Final EIR must also acknowledge that the mitigation is uncertain and therefore unenforceable and disclose that the corresponding impact is significant and unavoidable. This is because whether the proposed mitigation will be imposed will be determined in the FERC licensing proceedings. (See Pub. Res. Code, § 21081.6(b); CEQA Guidelines, § 15126.4(a)(2).	valve, plugging the tailrace, and sealing penetrations for electrical connections could potentially disturb special-status bat maternity roosts, if present, or alter interior structures that may be used by roosting bats. Therefore, with the available information, there is a potential significant impact to special status bats from retirement and modification activities proposed for K1 facilities that would be mitigated to less than significant with the implementation of Recommended Mitigation Measure BIO-2. However, as stated in above in the State Water Boards response to comment PG&E-5, Recommended Mitigation Measure BIO-2, and AQ-1, are outside of the State Water Board's authority to require. Therefore, potential impacts from the Proposed Project will remain significant and unavoidable in relation to where Mitigation Measure AQ-1 and BIO-2 are applicable and discussed Final EIR.	
PG&E	PG&E-7	G. Proposed Mitigation Measure WQ-3 includes overly broad language that unintentionally regulates routine operations, expanding impacts beyond what was analyzed <i>Requested Change: Revise Mitigation Measure WQ-3 to focus its applicability to planned work within a dewatered work area below the normal operating range and the diversion of water around that work area.</i> Proposed mitigation measure WQ-3 (WQ-3) includes overly broad and vague language that unintentionally extends its applicability to routine operations such as penstock or tunnel maintenance, thereby expanding impacts beyond those analyzed in the Draft EIR. (See CEQA Guidelines, § 15126.4(a)(1)(D) [if a mitigation measure identified in an EIR would itself cause significant environmental impacts distinct from the significant effects caused by the project, those impacts must be discussed in the EIR, but in less detail than the project's significant impacts].) As currently written, the State Water Board language does not clearly identify the specific conditions that would warrant preparation of a Dewatering and Diversion Plan, creating ambiguity that could trigger the requirement for	Please refer to the State Water Board response for comment PG&E-5 regarding the clarification for what activities Mitigation Measure WQ-3 is applicable to. PG&E's March 2023 Supplement to the Final License Application does not reference acquiring a construction general permit or specific water quality monitoring programs during construction or maintenance activities in the Project Description, Section 7.3 – <i>Water Quality</i>, or Exhibit E – <i>Plans and Measures</i>. Mitigation Measure WQ-3 clarifies that for construction and maintenance activities with the potential to impact water quality standards or beneficial uses identified in the SR/SJR Basin Plan that are not subject to the Construction General Permit, or a condition of the Kerckhoff Hydroelectric Project FERC license, PG&E shall prepare and implement site-specific Water Quality Monitoring and Protection Plans. As stated previously, it is appropriate for a lead agency to take a cautious approach regarding potential impacts. It is also appropriate for a lead agency to consider the anticipated timeline of a project and the potential for impacts to occur years, or even decades, into the applicable timeline. When there are uncertainties regarding whether a particular impact will occur a lead agency may adopt contingent mitigation measures and may rely on future	No Change.

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		activities not evaluated in the impact analysis. To ensure consistency with the scope of analysis and avoid unintended regulation of standard operations, the measure should be narrowly tailored to apply only to planned work involving a diversion around a dewatered work area or work below the normal operating range (i.e., less than 978 ft msl reservoir elevation). Absent these clarifications, WQ-3 imposes requirements that exceed the impact analysis and should be revised to avoid unsupported and overly expansive application. A Dewatering and Diversion Plan is not necessary for routine or planned in-water work. In addition, WQ-3 is duplicative of existing regulatory requirements already implemented through applicable permits (e.g., Construction General Permit and associated water quality protection requirements) and license conditions. As written, the measure does not impose any additional enforceable obligations beyond these pre-existing requirements and therefore should not be treated as mitigation under CEQA. PG&E recommends deleting the portions of WQ-3 which require compliance with the State Water Board's Construction General Permit and related erosion and sediment control requirements. See Issue H for specific changes.	studies to tailor mitigation measures to fit on-the-ground conditions. Therefore, they are not inherently assumed to be a part of the Proposed Project, thus the reason for Mitigation Measure WQ-3.	
PG&E	PG&E-8	H.Aspects of Proposed Mitigation Measure WQ-3 are covered by mandatory permits and license conditions and should be considered as baseline regulatory compliance <i>Requested Change: Please eliminate the portions of Mitigation Measure WQ-3 which duplicate preexisting obligations</i> The Draft EIR characterizes certain mandatory regulatory requirements as mitigation measures rather than as components of the regulatory baseline or Project design, which creates confusion regarding the incremental effect of the Project. Requirements imposed through applicable permits, approvals, and license conditions (e.g., BLM FPA § 4(e) license conditions) are pre-existing obligations that would be implemented regardless of CEQA review or Project approval and should not be presented as mitigation measures intended to reduce Project impacts. The CEQA Guidelines requires that EIR's discussion of mitigation measures distinguish between measures proposed by the project proponent and measures that the lead agency determines could reduce significant adverse impacts if imposed as conditions of project approval. (CEQA Guidelines, § 15126.4(a).) In other words, if compliance is already required, the mitigation measure provides no incremental environmental mitigation and, therefore, is not a CEQA mitigation	Please refer to the State Water Boards response to comment PG&E-7 regarding Mitigation Measure WQ-3.	No Change.

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		measure at all. Mischaracterizing these requirements as mitigation measures obscures the distinction between baseline regulatory compliance and project-specific environmental protection measures, introduces unnecessary and potentially conflicting measures, overstates potential impacts, and duplicates existing requirements. This confuses one of the basic purposes of CEQA—to “[i]nform governmental decision makers and the public about the potential, significant environmental effects of proposed activities.” (CEQA Guidelines, § 15002(a)(1).) WQ-3 duplicates requirements already imposed through existing regulatory programs without clearly acknowledging that overlap. WQ-3 reiterates compliance obligations associated with the Construction General Permit, water quality protection planning, and dewatering requirements that are already enforceable under preexisting permits and approvals. For example, the measure requires PG&E to comply with the conditions of a Construction General Permit. The State Water Board already requires PG&E to obtain this permit if a 401 Certification is necessary. Similarly, this measure requires PG&E to prepare and implement site-specific Water Quality Monitoring and Protection Plans (WQMP Plans) for activities not subject to the Construction General Permit (e.g., less than one acre of disturbance) or FERC license conditions. This requirement is duplicative of existing erosion and sediment control and water quality protection measures that are already required under PG&E’s FERC-approved management plans and, where applicable, through Section 401 Certification conditions. Requiring preparation of separate, site-specific WQMP Plans would be duplicative, burdensome, and unnecessary, and would not yield additional environmental protection beyond what is already required. This is not mitigation. PG&E recommends that the Draft EIR be revised to clearly distinguish between regulatory compliance requirements, which should be treated as part of the regulatory baseline and thus part of the proposed Project, and mitigation measures, which are Project-specific measures the State Water Board determines could, if imposed by the State Water Board, reduce a specific impact that would occur as a result of the activities described in the project description for this Project. The Draft EIR should also be revised to remove duplicative mitigation and to ensure that mitigation is limited to measures that are incremental, enforceable, and directly tied to identified Project impacts. Furthermore, the State Water Board language is vague and does not clearly specify what condition(s) warrant a Dewatering and Diversion		

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		Plan. Language should be changed so that WQ-3 only applies to planned work where there is a diversion around a dewatered work area or the reservoir is drawn below the normal operating range at less than 978 ft. msl reservoir elevation. A Dewatering and Diversion Plan is not needed for routine or planned in-water work. PG&E requests that the following revisions be made to WQ-3, if it is retained rather than being deleted. Mitigation Measure WQ-3: Construction General Permit, WQMP, and Dewatering Plan When applicable, PG&E shall comply with the State Water Board's National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities (Construction General Permit) (State Water Board 2022), State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State (Dredge or Fill Procedures) (State Water Board 2019, 2021), and amendments thereto the aforementioned documents to protect water quality standards and beneficial uses identified in the SR/SJR Basin Plan (Central Valley Regional Water Board 2019) during construction activities. For construction and maintenance activities with the potential to impact water quality standards or beneficial uses identified in the SR/SJR Basin Plan that are not subject to the Construction General Permit, or a condition of the Kerckhoff Hydroelectric Project FERC license, PG&E shall prepare and implement site-specific Water Quality Monitoring and Protection Plans (WQMP Plans). At a minimum, the WQMP Plan shall include the following: • Description of site conditions and the proposed activity • Detailed descriptions, design drawings, and specific topographic locations of all control measures in relation to the proposed activity. • Measures to address other potential water quality impairments associated with the proposed activity. • A monitoring program to assess Proposed Project impacts to water quality, including quality assurance/quality control measures that will be implemented. • Water quality monitoring locations for each Proposed Project activity, including background monitoring locations as applicable. • A list of parameters that will be monitored, including sampling types and sampling frequency.		

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		- A reporting schedule for water quality data and the response and reporting associated with any water quality objective exceedances Prior to commencing any planned work that requires a water diversion <u>outside of normal operations around a dewatered work area</u> or in-water <u>reservoir</u> work <u>below 978 feet elevation for normal operations</u>, PG&E shall submit a Dewatering and Diversion Plan to the Deputy Director for review and consideration of approval. The Dewatering and Diversion Plan shall be submitted at least 60 days before the anticipated activity is expected to occur. The Deputy Director may require modifications as part of any approval. PG&E shall not implement any activities associated with the Dewatering and Diversion Plan that may impact water quality or beneficial uses until receipt of Deputy Director and any other required approvals. For planned work that involves <u>a water diversion outside of normal operations around a dewatered work area</u> any instream dewatering, diversion of water, or in-water <u>reservoir</u> work <u>below 978 feet elevation for normal operations</u>, PG&E shall include the following: - An overview of all in-water work that will require dewatering or diversion of water. - Timeframe(s) for required dewatering or diversion work. - Description of coffer dams or equivalent barriers that will be used to isolate the construction area from instream flows. - Description of measures, if needed, that will be implemented to avoid potential fish stranding and entrainment. - Provisions to maintain required minimum instream flows (MIFs). If temporary modification of MIFs are required, PG&E shall provide a written description of the modification, reason(s) for its necessity, measures that will be implemented to protect water quality and beneficial uses, and the proposed timeline for modification and return to the required MIFs. - Proposed monitoring and reporting related to the dewatering, diversion, and turbidity of water - Description of how, upon completion of construction activities, flow will resume with the least disturbance to the substrate, water quality, and beneficial uses as practical Planned activities shall not cause increased turbidity greater than allowable levels identified in the SR/SJR Basin Plan and amendments thereto.		

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		- Where natural turbidity is less than 1 Nephelometric Turbidity Unit (NTU), controllable factors shall not cause downstream turbidity to exceed 2 - Where natural turbidity is between 1 and 5 NTUs, increases shall not exceed 1 NTU - Where natural turbidity is between 5 and 50 NTUs, increases shall not exceed 20 percent In determining compliance with the above limits, appropriate averaging periods may be applied provided that beneficial uses will be fully protected. If turbidity exceedances are expected to result from sediment disturbance related to planned work activities despite implementation of all reasonable best management practices, PG&E shall consult with the State Water Board and Central Valley Regional Water Quality Control Board (Central Valley Regional Water Board) staff to determine an allowable zone of dilution in which turbidity in excess of the limits may be allowed		
PG&E	PG&E-9	I. As Needed, the Board Should Adopt a Statement of Overriding Considerations Even to the extent the Project has significant and unavoidable impacts, such impacts can still be “acceptable” and the Project can still be approved. (CEQA Guidelines, § 15093(a).) Accordingly, to the extent the State Water Board concludes, after considering the comments submitted herein, that any significant and unavoidable impacts remain, the Board should adopt a statement of overriding considerations based on the Project’s many benefits, including the following: - The Project is a source of greenhouse gas-free energy. As the Project is currently proposed for relicensing, the Project has an installed capacity of approximately 140 megawatts and generates, on average, approximately 441 gigawatt hours of electricity annually. This generation supports State policies to reduce greenhouse gas emissions and improve air quality. - The Project provides grid reliability and resilience benefits such as supporting load balancing, renewable integration, and contingency response. - The Project provides important socioeconomic benefits. As a longstanding source of reliable electricity, the Project supports economic activity by helping ensure a stable and dependable power supply for homes, businesses, and critical	Comment noted. Additionally, CEQA authorizes a lead agency to approve or carry out a project even if it will cause significant impacts that cannot be avoided or substantially lessened if the lead agency adopts a statement of overriding considerations that states the specific reasons for supporting its action. (Cal. Code Regs., § 15093, subd. (b).)	The State Water Resources Control Board has developed a statement of Overriding Considerations.

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		infrastructure. Continued operation of the Project contributes to the local and regional economy by supporting grid reliability, reducing outage impacts, and protecting public health and safety. The Project provides long-term public benefits through the continued operation, enhancement, and expansion of recreation facilities in the San Joaquin River watershed. Facilities—including boat launches, campgrounds, and day-use areas—provide established opportunities for boating, fishing, camping, and other outdoor recreation activities. The Project further enhances these benefits through license-required improvements and new facility development, including a new day-use area and improved public access. Collectively, these measures increase variety and improve quality of public recreational opportunities in the area, thereby supporting regional recreation demand and contributing to local economies. PG&E appreciates the opportunity to comment on the Draft EIR. If you have any questions regarding this letter, please contact PG&E's Project Manager, Jennifer Hartman, at (415) 654-3955 or via email at Jennifer.Hartman@pge.com.		
PG&E Attachment B of Comment Letter	PG&E-10	Upstream of the Kerckhoff Hydroelectric Project are two other hydroelectric projects: (1) the Big Creek No. 4 Project (FERC Project No. 2017) owned and operated by Southern California Edison (SCE); and (2) the Crane Valley Hydroelectric Project (FERC Project No. 1354), owned and operated by PG&E. [...] Kerckhoff Dam is located downstream of PG&E's Crane Valley Hydroelectric Project (Federal Energy Regulatory Commission [FERC] Project No. 1354) and Southern California Edison's (SCE) Big Creek No. 4 Hydroelectric Project (FERC Project No. 2017). [...] Compared to Kerckhoff Reservoirs total storage 2,434 acre-feet, and 692 acre-feet of operational storage, Big Creek 4 (35,033-acre-foot reservoir) and Crane Valley (45,410-acre-foot) have more capacity to detain and release larger flows. Correction. The description of hydropower development upstream of the Project is incomplete. While the paragraph	Comment noted.	Revisions in the final EIR have been made to clarify the Big Creek Hydroelectric System and to note the total storage upstream of the Kerckhoff Project.

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		above this sentence recognizes that the watershed upstream of the Kerckhoff Project is highly developed for hydropower, the description excludes most of the hydropower projects upstream, including Southern California Edison's (SCE's) Big Creek Hydroelectric System, which consists of seven interconnected developments located on the San Joaquin River and its tributaries (FERC [Federal Energy Regulatory Commission] Project Nos. 67, 120, 2017, 2085, 2086, 2174, and 2175). SCE's Big Creek Hydroelectric System has about 563,208 acre-feet of storage. Additionally, Pacific Gas & Electric's (PG&E) Crane Valley Hydroelectric Project, located on Willow Creek that flows into the San Joaquin River below SCE's Dam 7, has about 45,400 acre-feet of storage in Bass Lake behind Crane Valley Dam. In comparison, Kerckhoff Reservoir has 692 acre-feet of operational storage. The large and complex Big Creek system has a fundamental effect on the nature of the hydrology that flows to the Kerckhoff Project and the Draft EIR underestimates the amount of control those upstream projects have in affecting flows reaching Kerckhoff Reservoir. The Draft EIR also inaccurately characterizes the relative flow contributions of Crane Valley Dam and the Big Creek projects. Crane Valley Dam does not have the physical capacity to release flows comparable to those associated with the Big Creek projects. In practice, releases from Crane Valley Dam represent only a fraction of total inflow at Kerckhoff, which is driven primarily by upstream SCE Big Creek projects releases. Accordingly, PG&E recommends that the State Water Resources Control Board (State Water Board) revise the Draft EIR to accurately describe these facilities and their operational and hydrologic relationships to avoid misleading conclusions regarding flow sources and magnitude. The EIR should include all the hydroelectric projects upstream of the Kerckhoff Project that can affect inflows to the Project to more accurately depict the upstream implications on PG&E's operations.		
PG&E Attachment B of Comment Letter	PG&E-11	Alternatives must be "feasible," meaning that they can be successfully implemented to accomplish the project's overall purpose and objectives in a reasonable amount of time, considering elements including cost, existing technology, social factors, legal factors, and environmental issues (CEQA Guidelines Section 15364). Therefore, "an EIR need not consider an alternative whose effect cannot be reasonably ascertained and whose implementation is remote and	Comment noted. Please refer to State Water Board Response to comment PG&E-1.	No Changes.

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		speculative” (CEQA Guidelines Section 15126.6, Subdivision (f)(3)). Correction. The proposed ramp-up measure included in Alternative 1 is infeasible because it relies on specific advance notice from a non-PG&E upstream Project and control of upstream inflows neither of which are available nor predictable under actual operating conditions. The Alternative 1 ramp-up measure specifies it would require advance notice of up to 5 hours and perfect foresight of inflow timing and magnitude—conditions that do not exist in the real world. Actual Project operations in addition to being subject to unscheduled upstream releases are subject to rapid weather driven variability and can be subject to water management releases regulated by reservoir protection, and dam safety requirements. PG&E cannot manage by starting ramp-up earlier without actionable information. This would include future inflow information from upstream facilities, including SCE’s Big Creek No. 4 Powerhouse operating under California Independent Systems Operator (CAISO) Automatic Generation Control (AGC), which is operated in real time response to grid conditions and for which, advance notification is unavailable. AGC results in varying Big Creek No. 4 Powerhouse flows of varying magnitudes that can range between 0 and 3,500 cubic feet per second (cfs) in minutes and this occurs concurrent with varying spills and releases from SCE’s Redinger Lake. Therefore, the results of the State Water Board’s model do not reflect performance that can be obtained in actual operations and cannot deliver the modeled results. The ramp-up measure should not be considered feasible nor relied upon in identifying the environmentally superior alternative. Further details are provided in PG&E’s Issue A in the cover letter. PG&E recommends that this measure be dropped from the alternatives analysis as infeasible.		
PG&E Attachment B of Comment Letter	PG&E-12	Due to Dam No. 7 of the Big Creek 4 Project having a much larger storage capacity than Kerckhoff Dam, PG&E would review SCE’s public notification regarding whether it would be a predicted spill or non-spill year no later than May 1 each year. PG&E would then provide notification no later than May 4 each year regarding its own spill year type for the Proposed Project. This would allow the two projects’ flow operations to have common ground and still allow PG&E to operate the Proposed Project as run-of-the river, as it would ideally be passing the scheduled flows from Dam No. 7	Section 4.1.1.1 of DEIR Appendix G analyzed the operational feasibility of Alternative 1 flow measures based on inflows to the Project, including estimated LTOR flows and Big Creek No. 4 Powerhouse releases Modeling found that down ramping of spill flows (i.e., passage of LTOR flows through the Project) was operationally infeasible in many water year types and situations. Section 3.4.2.1 of the DEIR explains the intent of down ramping of spill flows measure (included in Alternative 1) not that these flows are operationally feasible in all cases.	No Changes.

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		downstream into the PBR. Correction. This statement mischaracterizes the Kerckhoff Reservoir inflows when Long-Term Operating Requirements (LTOR) flows are released from SCE’s Big Creek No. 4 Project at Dam 7 upstream of Kerckhoff Reservoir and should be deleted. There are additional inflows that would occur to Kerckhoff Reservoir concurrent with the LTOR flows released at SCE’s Dam 7. Most notably, these inflows include discharges from SCE’s Big Creek No. 4 Powerhouse, which can be as large as 3,500 cfs in addition to the LTOR flows (Attachment A includes several examples of Big Creek No. 4 Powerhouse flows, including during LTOR flows). SCE’s Big Creek No. 4 Powerhouse discharges flows immediately upstream of the Project and typically operates under CAISO AGC. When providing this valuable grid service, SCE receives no advance notice and Big Creek No. 4 Powerhouse outflows are immediately adjusted, with flows fluctuating from 0 to 3,500 cfs, in response to real-time grid conditions. Big Creek No. 4 Powerhouse frequently operates under AGC and is therefore incapable of providing meaningful advanced notice of flow releases. Furthermore, as is typical of peaking hydro units, Big Creek No. 4 Powerhouse regularly fluctuates from near minimum to maximum flow in response to real-time grid conditions. Due to the rapid large inflow changes only a short distance upstream on top of LTOR flows contribute to the infeasibility of managing such inflows, especially in the narrow range needed for boater safety and therefore, pointing out one of the reasons such flows could not be simply “passed downstream” or allow PG&E to operate as “run-of-the-river.” PG&E recommends that this measure be identified as infeasible and that statements to the effect of operating with such flows as “run of the river” be deleted.		
PG&E Attachment B of Comment Letter	PG&E-13	Optimal boating flows through the PBR would be provided within each ramp down schedule (A through D) when flows are between 2,500 and 1,600 cubic feet per second (cfs). Correction. Schedule D includes boating ranges well above the optimal boating flow of 2,000 cfs identified for Project Bypass Reach for multiple days. PG&E recommends that the statement should be revised to reflect the correct optimal boating range for the Project Bypass Reach.	PG&E’s TSR-05. Whitewater Boating Assessment (REC 1) and TSR-05a_REC1-S Whitewater Boating Flow Study Supplement (1) reviews optimal boating flows for different watercrafts. TSR-05a states kayakers felt 1,640 cfs was the minimum acceptable flow threshold for kayaks and the optimal flow threshold is approximately 2,440 cfs.	No Changes.

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			Rafters reported that the minimum acceptable flow for rafting was estimated to be approximately 2,000 cfs and the optimal threshold for rafting flows would be approximately 2,340 cfs. This is the reasoning why the 2,500 – 1,600 cfs flow range was stated in the referenced text.	
PG&E Attachment B of Comment Letter	PG&E-14	A Project Operations Model was developed by the State Water Board to assess potential modifications to Proposed Project operations and to analyze reasonable alternatives. The HEC-ResSim model provided by PG&E (PG&E 2025a) and augmented to include the CEQA 1 and 2 Alternatives, simulates reservoir operations using fixed, rule-based logic applied at set time intervals. Clarification. PG&E provided a copy of the HEC-ResSim model to the State Water Board for use in analysis. The results of the State Water Boards’s modelling indicate that some priorities or rules in the model were modified. It is unclear which additional violations of assumptions and constraints also may have been applied. Appendix G did not indicate that the model had been redeveloped for the analysis in the Draft EIR. If the model’s functionality or constraints were modified, other than specific modeling of the State Water Board’s flow measures, these changes should be disclosed in the EIR.	As stated in Appendix G, the Kerckhoff Project HEC- ResSim Model – No Action 15-minute LTOR inflow that was provided by PG&E was used. The provided model was used to simulate the implementation of Alternatives 1 and 2 in this EIR. The model was only modified in order to include the flow ramping measures under Alternative 1 and 2, which were given priority over power generation, similar to other flow measures (e.g. American Shad Spawning Flows or dry year releases for water temperature). In other words, if there were a conflict between an Alternative 1 or Alternative 2 measures and generation, the measures would have priority. All other existing priorities and rules in the model were unchanged from PG&E’s settings. rules maintained priority over the Alternative 1 and 2 conditions.	The text in the EIR was revised as follows: “A Project Operations Model was developed by PG&E in HEC-ResSim (HEC- ResSim Model – No Action 15-minute LTOR inflow) and used by the State Water Board to simulate the implementation of Alternatives 1 and 2 in this EIR and analyze the respective feasibility of each Alternatives.
PG&E Attachment B of Comment Letter	PG&E-15	<u>Impact AQ-1</u> Correction. Fugitive dust should be discussed under Impact AQ-3 rather than Impact AQ-1. In addition, regulatory baseline includes compliance with San Joaquin Valley Air Pollution Control District (SJVAPCD) fugitive dust regulations, which govern construction-related particulate matter (PM) emissions and must be treated as part of the regulatory setting and project description. Even without the discussion of fugitive dust, Impact AQ-1 is concluded to be Significant and Unavoidable despite modeled emissions being below SJVAPCD threshold. Therefore, PG&E recommends that Impact AQ-1 should be Less than Significant. PG&E also recommends reorganizing fugitive dust under Impact AQ-3 and applying existing SJVAPCD regulatory requirements would eliminate the basis for significant impacts, avoid unsupported conclusions, and remove the need for unnecessary mitigation (i.e., Mitigation Measure AQ-1). Further details are	No new information has been provided to discuss the potential impacts from fugitive dust and associated construction activities under AQ-3, as opposed to AQ-1. PG&E did not Propose any measures to address air quality impacts during construction activities (e.g. Vista Day Use Area) and due to federal preemption, it is unclear if PG&E will implement applicable measures. Therefore the impact has been deemed significant and unavoidable. Please refer to State water Board Response to comments PG&E-6 and SJVAPCD-2 for discussion of final impact call in relation to Impact AQ-1.	No Changes.

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		provided in PG&E's Issue F in the cover letter.		
PG&E Attachment B of Comment Letter	PG&E-16	<u>Impact AQ-3</u> Correction. The Draft EIR does not identify the specific pollutants of concern under Impact AQ-3. PG&E recommends that the analysis explicitly identify diesel particulate matter (DPM) and fugitive dust (PM₁₀/PM_{2.5}) as the relevant air contaminants associated with construction and operational activities. The EIR should also incorporate applicable SJVAPCD fugitive dust control regulations as part of the regulatory baseline, as these requirements govern construction-related particulate emissions and are enforceable independent of California Environmental Quality Act (CEQA) mitigation. Furthermore, PG&E recommends that the EIR should acknowledge that DPM emissions are localized and decrease substantially with distance from the source. Given the distance between Project activities and sensitive receptors, the analysis should evaluate whether exposure levels would be negligible and support a no impact or less-than-significant impact conclusion, rather than leaving the determination unsupported.	Impact AQ-3 analysis states that as shown in Table 4.3-5 and Table 4.3-6, the estimated construction and operation emissions are below the thresholds of significance, which includes the requested air quality parameters. Please refer to State Water Board response to comment PG&E-7 for discussion of regulatory baseline in relation to Mitigation Measure WQ-3, which is also applicable to Recommended Mitigation Measure AQ-1. The final impact call for Impact AQ-3 states there would be no impact.	No Changes.
PG&E Attachment B of Comment Letter	PG&E-17	Since the Big Creek 4 Project implements the same LTOR upstream and those inflows feed into Kerckhoff Reservoir, the intent of this alternative is to pass the recreating benefits and supplemental aquatic resource benefits from flow releases provided below SCE's Redinger Dam (Big Creek 4 Project) through the PBR of the Proposed Project. Please see Comment 3 for the requested correction.	Please refer to the State Water Board response to comment PG&E-12.	No Changes.
PG&E Attachment B of Comment Letter	PG&E-18	Implementation of the Stranding Protection Down Ramp Measure could result in changes to Kerckhoff Reservoir water surface elevation relative to the Proposed Project. However, any fluctuations would remain within the normal operating range of 980.0 feet to 984.5 feet msl under implementation of this measure. By implementing down ramping in a manner more consistent with the natural hydrograph in river systems draining the western slope of the Sierra Nevada, and minimizing fluctuations to water surface elevation in the reservoir such that they remain within the normal operating range, there would be a Less than Significant Impact as a result of operations specific to the Stranding Protection Down Ramp Measure under Alternative 1 for potential impact BIO-1. Clarification. The State Water Board's Stranding Protection Down Ramp Measure (Section 3.4.2.1.4) does not provide additional stranding protection over PG&E's Spill Season Flow Measure, End-	Comment noted. The referenced language analyzing Alternative 1 is not stating the Stranding Protection Down Ramp Measure is more consistent with the natural hydrograph than the Spill Season Flow Measure, simply that the measure is more consistent with the natural hydrograph as compared to baseline conditions.	No Change.

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		of-Spill Flow Recession and Whitewater Flow Releases Measure, and the Subsequent Spill Ramp Down Measure. The State Water Board’s proposal to incorporate multiple days between ramp down steps is not supported by the available data. The flow steps proposed in PG&E flow management measures are based on studies conducted by SCE in the Horseshoe Bend of the San Joaquin River immediately upstream of the Kerckhoff Hydroelectric Project, which contains similar channel types and physical habitats but also includes stream confluence areas more prone to stranding than other habitats and not present in the Kerckhoff Project Bypass Reach. The results of the stranding study indicated that very young fish (especially larvae) had the potential to become stranded or trapped after flows were decreased (please also see Final License Application [FLA] Section 8.4 [PG&E 2023]). Flow reductions for the Project are made through discrete step changes to each new target flow, each followed by a waiting period that allows water along the channel margins to recede and transport aquatic organisms to the new lower water level. The study findings show that margin recession occurs within hours of each step change. Once water levels stabilize, aquatic organisms that remain isolated in pools, potholes, or exposed substrates do not benefit from extending the interval before subsequent flow reductions are made. Accordingly, the ramp down intervals proposed by PG&E and required by Bureau of Land Management’s (BLM) FPA (Federal Power Act) § 4(e) Revised Condition 4 align with the study findings and provide the necessary ecological protection. Extending these waiting periods would offer little to no additional benefit while imposing substantial operational costs.		
PG&E Attachment B of Comment Letter	PG&E-19	Construction associated with the new inflow gage has the potential to affect riparian habitat. While it is currently unclear what the exact size of the construction footprint would be, it is assumed that both the direct loss of habitat from the installation of permanent structures as well as the temporary loss of habitat due to construction activities in the area (e.g., hauling of equipment, increased foot traffic, equipment staging) would result in potentially significant impacts to riparian habitat. The specific plans for construction would require approval via the regulatory permitting processes described in Section 4.4.4.1. [...] Construction Impact Determination for Riparian Habitat <i>Impact Analysis without Mitigation</i> Therefore, there would be a Potentially Significant Impact as a	Available information indicates that riparian vegetation may occur within portions of the area identified for the inflow gage, and the extent of temporary or permanent disturbance cannot be determined at this time. Although PG&E Vegetation Management and Pest Control Plan includes floristic surveys and avoidance measures for sensitive biological resources, the final construction footprint and effectiveness of such measures in avoiding impacts to riparian habitat are currently unknown. Therefore, the EIR concluded that potentially significant impacts to riparian habitat could occur in the absence of mitigation, and the potentially significant impact determination for BIO-2 remains appropriate. Mitigation	No Change

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		result of construction activities under the Proposed Project for potential impact BIO-2, primarily due to direct and indirect impacts associated with the construction of the inflow gage. Impact Analysis with Mitigation To reduce the potentially significant impact, Mitigation Measure BIO-3 would require the restoration of land impacted by construction of the inflow gage to baseline conditions and compensation for any permanent loss of waters of the United States. Therefore, there would be a Less than Significant Impact with Mitigation Incorporated on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by CDFW or USFWS. Correction. The State Water Board states that the exact size and location of the gage location is unknown, however, the conclusion is that there will be a significant impact to riparian vegetation with the construction of the gage due to an assumption that there will be both direct loss of riparian habitat from installation of the structure and temporary loss from hauling of equipment, increased foot traffic, and equipment staging. PG&E states in Section 4.2.2 that the approximate location of the new gage is shown in Map 4-4. The polygon shown on this map encompasses possible locations of the gage; it does not represent the entire disturbance area that would be impacted by construction and from which any vegetation that is present would be removed or potentially disturbed. In the imagery from the time of the Supplemental FLA filing and recent imagery, riparian vegetation is scattered within the polygon (PG&E 2023)¹. The conclusion that there will be a significant impact assumes (1) there is riparian vegetation at the construction area at the time of construction; and (2) that it will be permanently removed. Both of these assumptions are unknown at this time and could change before construction. PG&E's proposed Vegetation Management and Pest Control Plan requires floristic surveys in any areas where planned non-routine ground-disturbing activities would occur that would identify riparian resources prior to construction (Section 6.1 Floristic Surveys), prepare necessary permits and other regulatory requirements, and identify measures to avoid effects on sensitive resources, if needed (PG&E 2023)². In addition, the impact determination for riparian habitat does not account for avoidance and minimization measures to limit potential impacts to riparian vegetation during construction included in PG&E's Vegetation Management and Pest Control Plan. With	Measure BIO-3 is retained to ensure restoration of temporary disturbances and compensation for any permanent loss of riparian habitat or other jurisdictional aquatic resources, reducing impacts to a less-than-significant level.	

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		implementation of PG&E's Vegetation Management and Pest Control Plan potential effects on riparian vegetation would be minimal at the location of the new gage. Accordingly, PG&E recommends that the EIR revise the impact determination to reflect the uncertainty of site conditions and the effectiveness of required avoidance and minimization measures, which would reduce potential impacts to Less Than Significant.		
PG&E Attachment B of Comment Letter	PG&E-20	Table 4.17-5 Whitewater Boating Runs in the Kerckhoff Hydroelectric Project Clarification. The Draft EIR relies on American Whitewater data to characterize flow conditions; however, these data do not reflect the results of more recent and project-specific relicensing flow studies. PG&E's relicensing analyses define Run 1 and Run 2 as Class V whitewater runs, with a minimum acceptable flow of approximately 1,650 cubic feet per second (cfs) (PG&E 2023)¹. While PG&E acknowledges that the table in the Draft EIR accurately presents American Whitewater data as cited, these data are not representative of the conditions evaluated through the relicensing process. PG&E recommends that the EIR clarify the distinction between these data sources and, where appropriate, prioritize or incorporate the relicensing study results to ensure the analysis reflects the most relevant and current project-specific information.	The text in the Final EIR was revised to reflect the studies conducted by PG&E instead of the data from American Whitewater, since PG&E's data better reflects the real conditions within the bypass reach.	Text and a new table (Table 4.17-6) was added to the Final EIR to further characterize the boating flows within the PBR based on the focus studies and text in the Supplemental FLA (PG&E 2023).
PG&E Attachment B of Comment Letter	PG&E-21	Run 1 is boatable at a wide range of flows, from 700 cfs to 6,000 cfs (American Whitewater 2020a) Clarification. The Draft EIR states that Run 1 is boatable over a range of 700 to 6,000 cfs based on American Whitewater data. While this accurately reflects the cited source, it is not consistent with project-specific findings from PG&E's relicensing flow studies. Input from those studies did not indicate that boaters are willing to boat Run 1 or Run 2 at flows as low as 700 cfs or as high as 6,000 cfs. PG&E's analyses identified a narrower functional range, with approximately 2,000 cfs representing the upper bound of suitable boating conditions. Although the broader range used in the Draft EIR would imply more boating opportunity days, it is not supported by site-specific evidence. PG&E recommends that the EIR clarify the distinction between data sources and incorporate relicensing study results where appropriate.	Text in the Final EIR was revised to clarify that PG&E's analyses found that approximately 2,000 cfs is the upper limit for suitable boating flows.	Revisions on Whitewater Boating Runs under Section 4.17.1.4.1 includes the following: Table 4.17-5 Indicates by whitewater boating run the length, location, class, boatable flow range, and average gradient of whitewater boating runs in the Kerckhoff Hydroelectric PBR based on American Whitewater data. The following sentence was added: American Whitewater finds that Run 1 is boatable at a wide range of flows, from

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				700 cfs to 6,000 cfs (American Whitewater 2020a), while PG&E studies found the suitable boating conditions were capped at 2,000 cfs (Table 4.17-6). Table 4.17-5 title was updated to: "American Whitewater Baseline Data on Whitewater Boating Runs in the Kerckhoff Hydroelectric Project Reaches" Additionally, Table 4.17-6 "Preferred Boating Flows within the Kerckhoff PBR based on Focus Studies" was added and the following text was added above this table: "Additionally, PG&E conducted a focus group session and interviews with whitewater enthusiasts, kayakers, and/or rafters to further assess whitewater boating activities and observations associated with these runs (PG&E 2023). These studies further refined acceptable boating flows within the reaches and are described in Table 4.17 6. Since Run 3 is located downstream of the powerhouse, flows are either provided through the K2 powerhouse or the bypass reach. Often, Run 3 is inundated by Millerton Lake during spill events during the spring and early summer."

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PG&E Attachment B of Comment Letter	PG&E-22	This run is rated as a Class IV+ with an average gradient of 55 feet per mile (American Whitewater 2020b).[...] The boatable flow range for Run 2 is typically the same as for Run 1 (700 cfs to 6,000 cfs) (American Whitewater 2020b). Correction. PG&E completed the whitewater boating flow study on June 6, 2021, and the results were shared and discussed with stakeholders. The <i>Whitewater Boating Assessment (REC 1-S) Whitewater Flow Study Supplemental Report (TSR-05a)</i> was subsequently filed with FERC (Accession Number 20210903-5190). The study concluded that under current access conditions, there are no Class III or Class IV reaches that can be boated as standalone runs. Instead, both Run 1 and Run 2 are rated Class V, with a minimum acceptable flow of 1,650 cfs (PG&E 2021)³. Accordingly, PG&E recommends that the State Water Board correct the text in the EIR to reflect the relicensing study results that both whitewater runs, Run 1 and Run 2, in the Project Bypass Reach are Class V runs.	The text in the Final EIR was revised to clarify the studies conducted by PG&E instead of the data from American Whitewater.	Text on Run 2 under Section 4.17.1.4.1 was revised to state: This run is rated as a Class V with an average gradient of 55 feet per mile (PG&E 2021b) and is typically boated in conjunction with Run 1. Additionally, the text was revised to state: Run 1 has boatable flows between 1,500 cfs to 3,000 cfs and is rated Class V (Table 4.17 6; PG&E 2023). Approximately 2,000 cfs is an optimal flow for the rapids of Run 1 for whitewater or rafting (Table 4.17 6; PG&E 2023). A slightly lower flow would make boating easier in this run, but too much lower could decrease the level of enjoyment for boaters. The minimal acceptable flow is considered 1,650 cfs based on PG&E’s <i>The Whitewater Boating Assessment (REC 1-S) Whitewater Flow Study Supplemental Report (TSR-05a)</i> (PG&E 2021b).
PG&E Attachment B of Comment Letter	PG&E-23	Still, the decommissioning of the K1 Powerhouse is anticipated to result in Significant and Unavoidable impacts to special-status bats. [...] PG&E shall ensure the following for activity related to the retirement of the K1 Powerhouse, K1 Tunnel plug, and associated facilities: • If feasible, work should be scheduled between September 1 and April 30 to avoid the bat maternity season • If work is conducted during the bat maternity season (May 1 to August 31), a preconstruction survey for special-	As described in the EIR, construction of the Vista Day Use Area and associated access road would occur primarily in previously disturbed areas and is unlikely to affect bat roosting habitat. Similarly, tree trimming and removal associated with widening the J-2 Stream Gage access trail would be limited in extent, and substantial suitable roosting habitat would remain available within the surrounding landscape. In contrast, the K1 Powerhouse, K1 Tunnel, and associated facilities may provide unique artificial roosting habitat for special-status bats that would be permanently removed during facility retirement.	No Change

Commenter	Comment Code	Comment	Response	EIR Edits
		status bat habitat shall be conducted by a qualified biologist (e.g., who is experienced in the identification of special-status bat habitat) in advance of any construction activity to identify signs of potential bat use (e.g., large cavities or crevices in rocks). The survey shall be conducted no more than 14 days prior to activity commencement with pre-determined buffer zones as determined by the qualified biologist. - If special-status roosting bats or active roosts are identified, the qualified biologist shall develop and implement avoidance and minimization measures to prevent disturbance. Such measures may include establishment of no-disturbance buffers, seasonal work restrictions, phased exclusion consistent with accepted wildlife handling guidelines, and/or monitoring during construction. Avoidance and minimization measures shall be implemented prior to and during construction activities, as applicable - Special status and roosting bats shall be allowed to escape the K1 Tunnel prior to sealing the tunnel Correction. While individual night-roosting special-status bats could be disturbed by activities associated with the retirement of the Kerckhoff 1 Powerhouse, the Draft EIR fails to acknowledge the protection measures already included in PG&E's Wildlife Management Plan for special-status bats, as was done for analysis of construction activities associated with the Vista Day Use Area and J-2 Stream Gage Access Trail Improvements. Furthermore, no evidence of maternity colonies was found in the K1 Powerhouse and associated facilities. As a result, PG&E requests reconsideration of the Draft EIR's impact determination related to special-status bats. CEQA significance thresholds for special-status species focus on population-level effects, rather than impacts to individual animals or speculative use of potentially suitable habitat. As presented, the Draft EIR's conclusion appears overly conservative and not supported by evidence of population-level impacts. The Draft EIR also proposes Mitigation Measure BIO-2 for protection of roosting bats; however, this measure is duplicative of existing, enforceable avoidance and minimization measures contained in PG&E's Wildlife Management Plan (PG&E 2023)⁴. These measures already require pre-activity review by a qualified biologist, surveys where appropriate, and	PG&E's Wildlife Management Plan includes avoidance and minimization measures for special-status bats, including preconstruction surveys and implementation of species-specific avoidance measures where bat roosts are identified. However, these measures are described in the context of Non-Routine Heavy Maintenance Activities and do not clearly demonstrate their applicability to the one time retirement of the K1 Powerhouse, K1 Tunnel plug, and associated facilities. Although maternity colonies have not been documented within the K1 facilities, available information does not conclusively demonstrate that special-status bats are absent or that the facilities are not used for roosting and will be absent during the time in which K1 facilities are retired. Retirement of the K1 Powerhouse, K1 Tunnel, and associated facilities therefore has the potential to result in the permanent loss of roosting habitat for special-status bats. Mitigation Measure BIO-2 is not duplicative of the Wildlife Management Plan. BIO-2 establishes project-specific requirements applicable to retirement of the K1 Powerhouse, K1 Tunnel plug, and associated facilities, including seasonal work restrictions, preconstruction surveys, avoidance buffers, and provisions to allow roosting bats to leave the K1 Tunnel prior to closure. These requirements ensure that potential impacts to special-status bats are addressed consistently during implementation of the Proposed Project. As discussed in response to comment PG&E-6, the impact analysis is based on the CEQA significant threshold addressing substantial adverse effects, either directly or through habitat modifications, on species identified as candidate, sensitive, or special-status in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife (CDFW) or United States Fish and Wildlife Service (USFWS). The analysis is not solely dependent on demonstrating population-level impacts or the presence of maternity colonies. Permanent loss or modification of roosting habitat used by special-status bats may constitute a significant impact under this threshold. While Mitigation Measure BIO-2 would reduce the potential for direct impacts to individual bats and active roosts, retirement of the K1 Powerhouse, K1 tunnel, and associated	

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		implementation of site-specific avoidance measures (including seasonal restrictions) if roosting bats are present. In addition, PG&E has previously noted that measures unrelated to water quality may fall outside the scope of the State Water Board's authority under Section 401 of the Clean Water Act. Accordingly, PG&E recommends that the impact determination be revised to Less Than Significant and that Mitigation Measure BIO-2 be removed as duplicative and unnecessary. Further details are provided in PG&E's Issue E in the cover letter.	facilities would result in the permanent loss of potentially suitable roosting habitat. Although detailed retirement plans have not yet been developed, available information does not demonstrate that impacts to roosting habitat can be fully avoided or minimized. As a result, the specific avoidance, minimization, and resource protection measures that would be implemented during facility retirement are not currently known and cannot be relied upon in the impact analysis. Because the extent of bat use is uncertain and replacement of the habitat function provided by these facilities cannot be assured, State Water Board staff conclude that the significance determination remains appropriate.	
PG&E Attachment B of Comment Letter	PG&E-24	Mitigation Measure WQ-3: Construction General Permit, WQMP, and Dewatering Plans When applicable, PG&E shall comply with the State Water Board's National Pollutant Discharge Elimination System (NPDES) <i>General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities</i> (Construction General Permit) <i>State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State</i> (Dredge or Fill Procedures) (State Water Board 2019, 2021), and amendments thereto the aforementioned documents to protect water quality standards and beneficial uses identified in the SR/SJR Basin Plan (Central Valley Regional Water Board 2019) during construction activities. Correction. PG&E recommends deletion of the portions of Mitigation Measure WQ-3: Construction General Permit, WQMP [Water Quality Monitoring and Protection], and Dewatering Plans that require compliance with the State Water Board's Construction General Permit and related erosion and sediment control requirements. Compliance with the Construction General Permit is a preexisting regulatory requirement that would be implemented, as applicable, through the State Water Board's Section 401 Water Quality Certification and associated permit conditions. As such, it is not appropriately characterized as mitigation under CEQA. Including compliance with an existing permit requirement as a mitigation measure is duplicative and unnecessary because it does not impose any additional enforceable obligation beyond those already required by the State Water Board. PG&E therefore recommends that the EIR remove references to Construction General Permit compliance and related erosion and sediment control requirements from Mitigation Measure WQ-3 and instead address these requirements in the Regulatory Setting and	Please refer to the State Water Boards response to comment PG&E-7 and PG&E-8.	No Changes.

Commenter	Comment Code	Comment	Response	EIR Edits
		Project Description as applicable regulatory compliance obligations. Further details are provided in PG&E's Issue G in the cover letter.		
PG&E Attachment B of Comment Letter	PG&E-25	For construction and maintenance activities with the potential to impact water quality standards or beneficial uses identified in the SR/SJR Basin Plan that are not subject to the Construction General Permit, or a condition of the Kerckhoff Hydroelectric Project FERC license, PG&E shall prepare and implement site-specific Water Quality Monitoring and Protection Plans (WQMP Plans). At a minimum, the WQMP Plan shall include the following: Correction. PG&E recommends deleting the requirement to prepare and implement site-specific WQMP Plans for activities not subject to the Construction General Permit or FERC license conditions. As drafted, this requirement is duplicative of existing erosion and sediment control and water quality protection measures that are already required under PG&E's FERC-approved management plans and, where applicable, through Section 401 Water Quality Certification conditions. PG&E notes that construction and maintenance activities that do not require Construction General Permit coverage (e.g., less than one acre of disturbance) are nonetheless subject to established erosion and sediment control requirements under existing plans and standard practices. These requirements are designed to avoid or minimize water quality impacts and are implemented as enforceable conditions of the FERC license. If such activities have been reviewed and determined not to require Construction General Permit coverage, that determination reflects a finding that the activities would not result in significant impacts to water quality that would necessitate additional mitigation. Requiring preparation of separate, site-specific WQMP Plans for these activities would therefore be duplicative, burdensome, and unnecessary, and would not yield additional environmental protection beyond what is already required. In addition, because there are no significant impacts from these minor activities, the State Water Board lacks authority to impose additional mitigation under CEQA. Accordingly, PG&E recommends that the EIR delete this requirement.	Please refer to the State Water Boards response to comment PG&E-5, PG&E-7, and PG&E-8.	No Changes.

Commenter	Comment Code	Comment	Response	EIR Edits
PG&E Attachment B of Comment Letter	PG&E-26	Prior to commencing any planned work that requires a water diversion or in-water work, PG&E shall submit a Dewatering and Diversion Plan to the Deputy Director for review and consideration of approval. Correction. PG&E recommends deleting the requirement to prepare and implement a Dewatering and Diversion Plan to the Deputy Director. Mitigation Measure WQ-3 is duplicative of existing regulatory requirements already implemented through applicable permits (e.g., Construction General Permit and associated water quality protection requirements) and license conditions. As written, the measure does not impose any additional enforceable obligations beyond these pre-existing requirements and therefore should not be treated as mitigation under CEQA. Accordingly, PG&E recommends that the EIR delete this requirement. However, if this requirement is retained, PG&E requests revising the requirement. The State Water Board language is vague and does not clearly specify what condition(s) warrant a Dewatering and Diversion Plan. Language should be changed so that WQ-3 only applies to planned work where there is a diversion around a dewatered work area or the reservoir is drawn below the normal operating range at less than 978 ft. msl reservoir elevation. A Dewatering and Diversion Plan is not needed for routine or planned in-water work. PG&E recommends the following revision: “Prior to commencing any planned work that requires a water diversion <u>outside of normal operations around a dewatered work area</u> or in-water <u>reservoir</u> work <u>below 978 feet elevation</u>, PG&E shall submit a Dewatering and Diversion Plan to the Deputy Director for review and consideration of approval.”	Please refer to the State Water Board response for comment PG&E-5 and PG&E-7.	No Changes.

Commenter	Comment Code	Comment	Response	EIR Edits
PG&E Attachment B of Comment Letter	PG&E-27	Potential impacts to the environment (e.g., soil contamination, impaired water quality) would be minimized through implementation of the HMBPs. However, the potential remains for a significant impact if an accidental release of hazardous materials to the environment were to occur. Correction. Mitigation Measure WQ-3 duplicates existing regulatory requirements, including the Construction General Permit, WQMP Plan, and dewatering requirements (please see Comments 15, 16 and 17), and therefore does not constitute mitigation under CEQA. Its inclusion creates redundancy and confusion regarding baseline regulatory compliance. In addition, the Draft EIR's reliance on Mitigation Measure WQ-3 to support Impact HM-2 is inappropriate, as potential spill-related impacts are already addressed through existing regulatory frameworks governing spill prevention, response, and reporting, including the federal Clean Water Act (e.g., Spill Prevention, Control, and Countermeasure [SPCC] requirements under 40 CFR Part 112), the Porter-Cologne Water Quality Control Act, the California Hazardous Materials Release Response Plans and Inventory Law, applicable provisions of Titles 22 and 23 of the California Code of Regulations, National Pollutant Discharge Elimination System (NPDES) permitting requirements (including the Construction General Permit), FERC license conditions and associated management plans, and state emergency response and reporting requirements administered by the California Governor's Office of Emergency Services. Accordingly, Impact HM-2 should be revised to Less Than Significant, and Mitigation Measure WQ-3 should not be applied.	Please refer to the State Water Board response for comment PG&E-5.	No Changes.
PG&E Attachment B of Comment Letter	PG&E-28	PG&E would implement the POM year-round when K2 Powerhouse is required to be taken offline Correction. This measure would only apply to planned outages at any time of year. PG&E recommends the following revision: "PG&E would implement the POM year-round <u>when a planned outage is to take place and</u> K2 Powerhouse is required to be taken offline".	Comment noted.	Text was revised in the Final EIR based on PG&E's correction to state: PG&E would implement the POM year-round <u>when a planned outage is to take place and</u> K2 Powerhouse is required to be taken offline.
PG&E	PG&E-29	Recommended Mitigation Measure WQ-5 would require PG&E to develop protocols for activating the sirens for situations <u>where a larger stage change than one foot per hour, as measured at Gage J-2, is expected</u> and has the potential to impact recreators or whitewater boaters.	Please refer to the State Water Boards response to comment PG&E-4.	No Changes.

Commenter	Comment Code	Comment	Response	EIR Edits
Attachment B of Comment Letter		Correction. Mitigation Measure WQ-5 is infeasible and impractical to implement for several reasons, which are summarized in Issue D in the cover letter. There should be no requirement to sound alarm horns based on a ramp-up rate.PG&E recommends deleting WQ-5.F		
PG&E Attachment B of Comment Letter	PG&E-30	Comment from PG&E noted information they believe was unnecessarily included to describe potential features of TCL/TCR-1 and suggested removal of specific aspects of these resources.	Comment noted.	Text was removed in the Final EIR.
PG&E Attachment B of Comment Letter	PG&E-31	An EIR is not required to consider alternatives which are infeasible. Please see Comment 2 for the requested change.	Please refer to the State Water Boards response to comment PG&E-1.	No Changes.
PG&E Attachment B of Comment Letter	PG&E-32	The ramp up in the PBR cannot exceed a maximum of 1 foot per hour (or less) at Gage J-2 between minimum instream flow (MIF) and 4,000 cfs, provided there is sufficient storage and powerhouse capacity to meet this requirement. Based on the modeling conducted in Appendix G Project Operations Model – CEQA Alternatives 1 and 2, Section 4.0, this measure would be feasible during normal operations only if PG&E operators were given advanced notification of incoming flows. The feasibility of this measure is dependent on forecasted inflow information, sufficient storage, and powerhouse capacity. The proposed measure is infeasible. Please see Issue A in PG&E's cover letter for the requested change.	Please refer to the State Water Boards response to comment PG&E-1.	No Changes.
PG&E Attachment B of Comment Letter	PG&E-33	CEQA does not require the lead agency to select the environmentally superior alternative if it would not accomplish the basic project objectives [...] Implementation of Alternative 2, plus the Alternative 1 Ramp Up Measure, would meet all three objectives of the Proposed Project. [...] This would be accomplished by limiting, when feasible, rapid stage changes caused by sudden flow fluctuations within the Project Bypass Reach. Correction. The ramp-up proposal is poorly aligned with State Water Board Proposed Project Objective 3. It is infeasible and	Please refer to the State Water Boards response to comment PG&E-1 and PG&E-2.	No Changes.

Commenter	Comment Code	Comment	Response	EIR Edits
		even if it was, it would not achieve objective 3. The proposed one-foot-per-hour ramp-up rate at Gage J-2 is poorly aligned with downstream public safety conditions and would not meaningfully reduce the effects of high-flow releases. PG&E's 2021 stage-discharge investigation quantified water-travel (lag) times and showed that discrete ramping steps measured at Gage J-2 are not preserved downstream (PG&E 2023)⁵. While incremental ramp-up steps may be distinguishable near Kerckhoff Dam, these signals dissipate within a short distance and lose hydraulic definition across most of the Project Bypass Reach, resulting in rapid changes in flow and stage at downstream locations. The proposed ramp-up would not provide effective public benefit across the Project Bypass Reach including downstream locations where most public use occurs. Therefore, the measure is ineffective and does not meet State Water Board Proposed Project objective 3. Please see Issue A in PG&E's cover letter for the requested change.		
PG&E Attachment B of Comment Letter	PG&E-34	However, since implementation of Recommended Mitigation Measure WQ-5 is not clear and has not been agreed upon by PG&E, impacts would remain significant and unavoidable. Please see Issue D in PG&E's cover letter for the requested change.	Please refer to the State Water Boards response to comment PG&E-4.	No Changes.
PG&E Attachment B of Comment Letter	PG&E-35	However, these flow dips occurred frequently throughout the LTOR dataset. They are characterized by drops in flow data, sometimes as much as 2,000 cfs or more over a 15-minute time step. The cause of this anomaly is unknown, but it is likely either measurement error or an artifact of the modeling software used to compute the LTOR flows. It is highly unlikely that upstream projects release flows in this way Correction. There are many valid reasons the dataset shows fluctuating inflows. Peaking hydro plants, like the SCE Big Creek No. 4 Powerhouse just upstream of Kerckhoff Reservoir, regularly cycle from minimum to maximum flow in a matter of minutes. Furthermore, the Big Creek No. 4 Powerhouse typically operates under CAISO AGC, resulting in rapid flow changes as the powerhouse adjusts to real-time grid conditions. The dataset was based on historical data for a time where upstream Project operated under a different license without ramp down requirements. Recent flow data filed with FERC by SCE showing Big Creek No. 4 operations during the release of LTOR flows	Comment noted.	Recommended revision was made in Appendix G.

Commenter	Comment Code	Comment	Response	EIR Edits
		(Attachment A) clearly shows this variability. The overlaying of LTOR flows to the inflow dataset was done with stakeholder engagement and is not the source of the fluctuating inflow. Comparing with and without LTOR flow datasets shows that there are no sudden fluctuations caused by the addition. The only differences are the gradual annual ramp down flows per the SCE LTOR flow requirements. No restrictions of operations on Big Creek No. 4 Powerhouse would occur when the LTORs are implemented. This is clearly shown in Attachment A. PG&E recommends deleting “The cause of this anomaly is unknown, but it is likely either measurement error or an artifact of the modeling software used to compute the LTOR flows. It is highly unlikely that upstream projects release flows in this way”.		
PG&E Attachment B of Comment Letter	PG&E-36	The ramp up was imposed 42 times in the period of record over all WYs. Correction. This seems unrealistically low. There appears to be a problem with the calculation of the number of times ramp-up would be imposed. Triggering conditions based on the actual rating curve for J-2 indicate that the total indicated could be exceeded during a single outage, such as occurred in 2007. The modeled rating curve for Gage J-2 differs from the more detailed PG&E rating curve in representing the river stage at lower flows where there is the most stage change with flow. This can result in underestimating the limitations to complying with stage change requirements with flow changes at lower flows in a varying spill environment. PG&E recommends that this statement be deleted from inclusion in the EIR.	The DEIR analyzed the feasibility of the Alternative 1 Ramp Up Measure, thus analyzing what components of the systems operation result in the measure being feasible or infeasible. The DIER did not attempt to model every instance where the Alternative 1 Ramp Up Measure could be applied over the 15 year period of record. The fundamental conclusion of the modeling effort remains unchanged. The Alternative 1 Ramp Up Measure feasibility is, in part, subject to advanced notification of the magnitude and timing of forecasted inflows from upstream projects. However, this statement was removed to avoid giving the impression the ramp up would have only been used 42 times in the 15-year period of record. Section 4.1.2 in Appendix G – Project Operation Model – CEQA Alternative 1 & 2.	Statement was removed in Appendix G to avoid giving the impression the ramp up would have only been used 42 times in the 15-year period of record.
PG&E Attachment B of Comment Letter	PG&E-37	Figure 4-19 WY 2003 POM Initial Release Protocol. As there is initially very little inflow, the reservoir immediately drops to the lower end of the reservoirs normal operating range (980.0 feet above msl). It only begins to recover once inflow increases to 3,500 cfs around 10 a.m. As there is typically no or very little inflow prior to the planned outage spill, pulling back the spill flow to 3:30 a.m. produces a very similar result for all other WYs where the POM Initial Release Protocol was applied. Correction. The State Water Board’s model incorrectly indicates that PG&E would not be able to implement the Planned Outage	PG&E’s Planned Outage Measure Initial Release Protocol releases initial spill associated with the outage prior to 3:30 a.m. as measured at Gage J-2, subject to sufficient water availability. The protocol does not define what sufficient inflow is in terms of cfs. The model as provided by PG&E had an existing reservoir guide curve, that was not modified in the DEIR modeling effort, which causes the model to prioritize reservoir fill over continued spill. Therefore, spill could not be maintained in the	No Changes.

Commenter	Comment Code	Comment	Response	EIR Edits
		Measure (POM) and thereby inaccurately assesses Alternative 2. This measure was analyzed by PG&E and found to be feasible. The State Water Board's model prioritizes re-filling the reservoir even though inflows exceed flow release requirements. In this example inflow is sufficient to maintain 500 cfs but the model does not do so. It also bears stating that during a planned outage the K2 Powerhouse is not in operation and therefore, reservoir levels can be managed to levels outside the normal operating levels. These inaccuracies should be corrected in the text so that the State Water Board's model results are not used to indicate an inaccurate representation of the successful implementation of the POM.	model and led to large secondary spills later in the day when higher inflows arrived.	
PG&E Attachment B of Comment Letter	PG&E-38	All applications produce a similar effect as shown with the WY 2003 example, but with varying stage increase rates on the secondary flow spike, most of which occur during daytime hours. There are five study sites in the PBR, where rating curves have been developed. There is significant interest in minimizing rates of rise throughout the PBR for spill events like this. Clarification. Please see comment above. PG&E finds that the example of a modeling failure to be mischaracterized, as inflows are more than sufficient to implement requirements, which would eliminate stage change in the most critical public safety ranges.	Please refer to the State Water Boards response to comment PG&E-37.	No Changes.
PG&E Attachment B of Comment Letter	PG&E-39	with the important caveat of the dam operator having to have advanced notification of the magnitude and timing of incoming flows. Clarification. PG&E clarifies that advance notification of the magnitude and timing of incoming flows is not information available to project operators and cannot be compelled. Water released from the upstream Big Creek No. 4 Powerhouse reaches the Project in approximately 15 minutes. Big Creek No. 4 Powerhouse typically operates under CAISO AGC with flows fluctuating from 0 to 3,500 cfs. When providing this valuable grid service, SCE receives no advance notice and must rapidly adjust Big Creek No. 4 Powerhouse outflows in response to the real-time grid. Big Creek No. 4 Powerhouse frequently operates under AGC and SCE is therefore incapable of providing sufficient advance notice of real-time changes in Big Creek No. 4 Powerhouse flow releases. Further details are provided in Issue A in the cover letter.	Please refer to the State Water Boards response to comment PG&E-1.	No Changes.
PG&E	PG&E-40	This measure failed to fulfill the intention of avoiding excessive stage increases in the PBR due to the resulting secondary spike in flow that occurs during daylight hours.	To clarify, this comment is in relation to the discussion regarding the modeling efforts and results of the Planned Outage Measures Initial Release Protocol. Please refer to Chapter 4.11.4.8 for discussion of potential impacts to	No Changes.

Commenter	Comment Code	Comment	Response	EIR Edits
Attachment B of Comment Letter		Clarification. The measure successfully eliminates stage change in the most sensitive public safety range and provides visual cues to recreationalists. The deterrence flow alters channel conditions from low velocity, shallow water to a higher velocity, deeper riverine environment, thereby increasing hydraulic conditions that not only support effective deterrence but help to exclude recreationalists from the center of the channel. Under Alternative 2, the requirements of BLM's FPA § 4(e) Revised Condition 5 would provide safety benefits to recreationalists in the vicinity of the BLM footbridge, where much of the streamside recreation occurs. These measures would reduce accessibility to deeper channel areas and discourage wading during spill events of varying magnitudes. The filling of the channel bottom near the BLM recreation areas with an initial flow of 1,000 cfs in above average water years and 500 cfs flow for below average water years compared to a flow of 43 cfs are shown in Figures A-5 and A-6. Alternative 2 would reduce channel bottom accessibility by increasing water surface elevations near BLM recreation areas by approximately 5.06 feet at 1,000 cfs, and 3.23 feet at 500 cfs upstream of the BLM footbridge and approximately 7.36 feet and 6.11 feet upstream of the Kerckhoff 2 Powerhouse at 1,000 and 500 cfs, respectively. These increased stages would fill the channel bottom, provide a visual cue to deter public entry into the channel, and limit the potential for individuals to stray from the banks.	recreation beneficial uses from Proposed flow measures and the State Water Boards response to comment PG&E-2.	
PG&E Attachment B of Comment Letter	PG&E-41	4.6 Flow Dips Common throughout the period of record are periodic and short-duration flow dips on the inflows to Kerckhoff Reservoir as discussed in Section 2.2. Figure 4-24 shows a few examples of flow dips during June 2005, but these flow dips are present frequently and throughout the period of record. It is unclear what the causes of the flow dips are, but during the model simulation, spill at Kerckhoff Dam is halted and ramped back up to match the flow spikes to attempt to maintain guide curve. This may just be a model artifact, and in reality, an operator may be able to mitigate these spikes by maintaining spill during the brief dip in inflows, causing the reservoir to draw down slightly to make up the difference in flows. Please see Comment 26 above.	Comment noted.	Recommended revision was made in Appendix G.
PG&E Attachment B of Comment Letter	PG&E-42	The Alternative 1 Ramp-up Measure works very well across the board. It was successful 97.6 percent of the time Correction. With perfect up-to-5-hour foresight by PG&E of operations of SCE's Big Creek No. 4 Powerhouse including when it is operating under AGC, and in violation of PG&E's operational	Please refer to the State Water Boards response to comment PG&E-1 and PG&E 36.	No Changes.

Commenter	Comment Code	Comment	Response	EIR Edits
		constraints, the State Water Board’s model simulates that the Alternative 1 Ramp-up Measure may work. However, implementation of this measure is infeasible. Please see PG&E’s Issue A in the cover letter and Comment 2 above.		
PG&E Attachment B of Comment Letter	PG&E-43	Alternative 1 Ramp Up Measure (stage-limited ramp up) is highly effective, operationally feasible, and does not create reservoir or powerhouse conflicts. However, operators at Kerckhoff Dam would need advanced notification from upstream projects of the timing and amount of incoming flows (typically one to five hours) in order to effectively implement ramp up by beginning ramp up prior inflows arriving. Correction. The proposed ramp-up measure included in Alternative 1 is infeasible. Please see PG&E’s Issues A and B in the cover letter and Comment 2 above.	Please refer to the State Water Boards response to comment PG&E-1.	No Changes.
PG&E Attachment B of Comment Letter	PG&E-44	Non-spill year boating flows remain highly constrained by limited inflows and rarely achieved their intended purpose of providing consistent boating flows for recreationists. Correction. This statement is not accurate for PG&E’s Proposed Project or under Alternative 2 based on BLM FPA § 4(e) Revised Condition 4 and should be corrected. The scheduling of non-spill year boating flow is based on the required advanced notification of scheduling of SCE’s non-spill year LTOR releases. Modeling of properly scheduled non-spill year flows was consistently achieved in PG&E’s modeling. In 2021, a critically dry WY [water year], PG&E successfully made a similar whitewater release on this basis. However, the State Water Board’s modeling of its LTOR alternative attempted to simulate non-spill whitewater releases during <u>every</u> weekend between May 15 and June 15, which may have resulted in the statement that the non-spill year boating flows were rarely achieved. In addition, based on PG&E’s analysis revised BLM FPA § 4(e) Revised Condition 4 can be successfully implemented 100% of the time providing both whitewater boating flows and ramp down without violating operating constraints or infeasible requirements. PG&E recommends deleting the incorrect conclusion: Non-spill year boating flows remain highly constrained by limited inflows and rarely achieved their intended purpose of providing consistent boating flows for recreationists.	This is discussing non-spill year boating flows under Alternative 1, not the End-of-Spill Flow Recession Measure under Alternative 2 or the Proposed Project.	No Changes.

Commenter	Comment Code	Comment	Response	EIR Edits
PG&E Attachment B of Comment Letter	PG&E-45	POM Initial Release Protocol could not be properly implemented without sustained inflows to the reservoir and consistently lowered to reservoir without adequate inflows. Once inflows picked up later in the day, Kerckhoff Dam would be forced into spill once Kerckhoff Reservoir reached capacity and without the Project being able to divert through the K2 Powerhouse. This caused secondary flow spikes that created large stage increases in the PBR. The stage increase amount was dependent on the amount of inflow from upstream hydroelectric projects [...] Alternative 2 Ramping Conditions POM Initial Release Protocol 0% success rate. Correction. This conclusion about PG&E's Planned Outage Measure is incorrect and should be corrected. As proposed by PG&E, there would be sufficient volume to ramp-up the initial release based on ramping up from MIF to 500 cfs from a full reservoir. This would use a maximum of 574 acre-feet from storage. This is less than the available storage available within the normal operating range. With higher inflows, less storage would be needed. In addition, the State Water Board appears to incorrectly conflate peaking flows originating from SCE's Big Creek No. 4 Powerhouse that are discharged to Kerckhoff Reservoir with Kerckhoff operations, despite the fact that the Project was on outage. Under PG&E's Planned Outage Measure and BLM FPA § 4(e) Revised Condition 5, the Kerckhoff Project would operate to reduce the magnitude of the flow fluctuations originating at SCE's Big Creek No. 4 Powerhouse. PG&E recommends deleting the incorrect conclusion: POM Initial Release Protocol could not be properly implemented without sustained inflows to the reservoir and consistently lowered to reservoir without adequate inflows. Once inflows picked up later in the day, Kerckhoff Dam would be forced into spill. . .	Please refer to the State Water Boards response to comment PG&E-37.	No Changes.
PG&E Attachment B of Comment Letter	PG&E-46	This caused secondary flow spikes that created large stage increases in the PBR. The stage increase amount was dependent on the amount of inflow from upstream hydroelectric projects Clarification. Peaking of the Big Creek No. 4 Powerhouse results in peaks in inflow and spills below Kerckhoff Dam. During planned outages, K2 Powerhouse is not available to divert flow. If the	Comment noted. Please refer to the State Water Boards response to comment PG&E-37.	No Changes.

Commenter	Comment Code	Comment	Response	EIR Edits
		amount of inflow to Kerckhoff Reservoir exceeds the storage available after filling, the reservoir will spill. Under PG&E's Planned Outage Measure and BLM FPA § 4(e) Revised Condition 5, the Kerckhoff Project would operate to reduce the magnitude of the flow fluctuations below Kerckhoff Dam that originate at Big Creek No. 4 Powerhouse. This would result in reducing undesirable flow conditions and the flow releases would deter or exclude recreationalists from entering the streambed at times of unpredictable spill originating upstream of the Project.		
PG&E Attachment B of Comment Letter	PG&E-47	Overall, the evaluated measures could be implemented within the existing operational framework. However, several measures create operational side effects—primarily the encroachment toward the K2 Powerhouse's minimum operating reservoir elevation and powerhouse over-cycling—that would require real-time operator judgment to manage safely and effectively. Correction. The conclusion is incorrect and should be corrected. The measure is infeasible because it requires up to 5 hours of advanced notice of inflow changes from SCE's Big Creek No. 4 Powerhouse, which frequently operates under AGC and is therefore incapable of providing sufficient advance notice of flow releases, and would violate PG&E's operational constraints. With perfect foresight and violation of constraints the State Water Board's model appears to work. However, it is infeasible for implementation. PG&E recommends that the EIR reflect PG&E's Issue A in the cover letter and Comment 2 above.	Please refer to the State Water Boards response to comment PG&E-1.	No Changes.
PG&E Attachment B of Comment Letter	PG&E-48	Alternative 1 Ramp Up Clarification. The findings that there would be a success rate of 97.6% when implementing the State Water Board's Alternative 1 Ramp-up is a misrepresentation of the feasibility of the State Water Board proposed measure. As presented by State Water Board this measure does not correspond to BLM preliminary FPA § 4(e) Condition 5. The BLM measure specified that exceedances from the required ramping rates shall not exceed the rates of change or the magnitude of the inflow (MIF) as measured at the 'San Joaquin River Above Kerckhoff Reservoir' gage. Based on BLM Condition's language, the measure also would prohibit "pre-releases" in anticipation of spill. Most importantly, the State Water Board's model needs up to 5 hours of advanced notice of inflow magnitude and timing from the upstream SCE Big Creek Project in order to implement	The following Department of the Interior Comments, Recommendations, Preliminary Terms and Conditions, and Preliminary Fishway Prescriptions on the Federal Energy Regulatory Commission Ready for Environmental Analysis Notice for the Kerckhoff Hydroelectric Project condition, specifically BLM Preliminary 4(e) Condition 5 language was removed based on PG&E's Request for Trial Type Hearing and disputed issues of materials facts letter (FERC accession No. 20241024-5199) that requested the following language be removed: "required ramping rates shall not exceed the rates of change or the magnitude of the inflow (MIF) as measured at the 'San Joaquin River Above Kerckhoff Reservoir' gage"	No Changes.

Commenter	Comment Code	Comment	Response	EIR Edits
		a successful ramp-up. This is infeasible. The proposed inflow gage would only provide approximately 15 minutes advanced notice, which would be insufficient to successfully implement this measure. SCE's upstream Big Creek No. 4 Powerhouse is frequently operated under AGC and flows are highly variable and change without notice. During the winter-spring period, such a measure could not be complied with on a regular basis, especially when flows require Kerckhoff Dam to go into and out of spill. Please see PG&E's Issue A in the cover letter and Comment 2 above. This measure would be infeasible and as such, should not be included in the alternatives to be analyzed and cannot be used as a mitigation measure.	Please refer to the State Water Boards response to comment PG&E-1.	
PG&E Attachment B of Comment Letter	PG&E-49	To fulfill the stage limit component of Alternative 1 Ramp Up Measure, a rating curve is required to establish a relationship between stage and flow. A rating curve was developed using historic gage data provided at Gage J-2 (USGS Gage No. 11246700) and is presented in Figure 3-1. Clarification. The modeled rating curve differs from the more detailed PG&E rating curve in representing the river stage at lower flows where there is the most stage change with flow. This can result in underestimating the limitations to complying with stage change requirements with flow changes at lower flows in a varying spill environment.	Comment Noted. PG&E did not provide the PG&E rating curve as a part of the requested model. The rating curve for gage J-2 was developed based off of publicly available information on the on the USGS Water Data for the Nation website" and thusly would be more likely used by the recreating public.	No Changes.
PG&E Attachment B of Comment Letter	PG&E-50	Therefore, while the spill is able to successfully complete Schedule D here, it is only able to do so under an unfeasible powerhouse operation. It is more likely that an operator would keep the K2 flows below the ROZ for the duration or at least a portion of the duration of the Schedule D ramp down, which would cause the reservoir to rise to guide curve, consequently prompting another spill event (possibly multiple additional spill events). Clarification. This statement is speculative and not based on any factual or implementable information. The measure is infeasible and cannot be reliably complied with.	Comment noted.	Text now reads in Appendix G: Therefore, while the spill is able to successfully complete Schedule D here, it is only able to do so under an unfeasible powerhouse operation. It is more likely that an operator would keep the K2 flows below the ROZ for the duration or at least a portion of the duration of the Schedule D ramp down, which would cause the reservoir to rise to guide curve, consequently prompting another spill event (possibly multiple additional spill events).

Commenter	Comment Code	Comment	Response	EIR Edits
PG&E Attachment C of Comment Letter	PG&E-51	Key issues raised during the public involvement and scoping processes include: [...] Potential ongoing impacts associated with Proposed Project operations to tribal cultural resources and tribal member access for mussel harvest Clarification. The mussel harvest is included in the Historic Properties Management Plan (HPMP) (Pacific Gas and Electric Company [PG&E] 2021)¹. The HPMP, specifically Section 5.4 and Table 5-1, outlines Tribal resource site-specific treatment measures including: • Annual meeting to discuss vegetation management, recreation developments, and Tribal access for use of this area for ceremonies, gathering (including mussel harvest), and other traditional activities associated with Traditional Cultural Landscape (TCL) 1, Tsobotebau. • Project-specific: consultation regarding management of Kerckhoff Reservoir dispersed recreation. • Flag-and-avoid protection and use of barriers to protect elements within landscape, as needed. These measures in coordination with the Aquatic Resources Management Plan (PG&E 2023)² will reduce potentially significant impacts to less than significant for California Environmental Quality Act (CEQA) and to no adverse effect under Section 106 of the National Historic Preservation Act (NHPA).	This section in the Executive Summary outlines potential issues that were raised during the public involvement and scoping processes. Since this was a potential issue raised during that process, this sentence has not been revised. However, a footnote was added to indicate to the reader that this potential impact is addressed in PG&E HPMP.	A footnote indicating that potential impacts to access for food and material gathering is addressed in PG&E's Historic Properties Management Plan (HPMP).
PG&E Attachment C of Comment Letter	PG&E-52	Four stationary and two movable gate hoists located on a track above the gates are used to control the gates. Correction. PG&E recommends the following text revision: "Four stationary and two one movable-gate hoists located on a track above the gates are used to control the gates."	Comment noted.	The recommended corrections were made in Final EIR.
PG&E Attachment C of Comment Letter	PG&E-53	The Kerckhoff Hydroelectric Project is operated to provide the required MIFs, flows to protect American shad, and flows to maintain water temperatures for the protection of smallmouth bass (<i>Micropterus dolomieu</i>), as described in Article 45 of the Kerckhoff Hydroelectric Project license, as amended by the April 22, 1993 Order Establishing Permanent Flow Release Regime (FERC 1993): [...]	Comment noted.	The recommended corrections were made in Final EIR.

Commenter	Comment Code	Comment	Response	EIR Edits
		Under the Proposed Project, PG&E would continue to provide the required MIFs as described in Article 45 of the Kerckhoff Hydroelectric Project license, as amended by the April 22, 1993 Order Establishing Permanent Flow Release Regime (FERC 1993), but amended to split the American shad spawning flows into another condition. Correction. The April 22, 1993, Order Establishing Permanent Flow Release Regime (FERC 1993)³ did not amend Article 45 of the license. The American shad flows were established based on a requirement in Article 44: “The Licensee shall, within three years after the date of issuance of this license, file for approval a revised Exhibit S ... (2) a comprehensive plan for the mitigation and enhancement of striped bass and American shad stocks in the San Joaquin River, taking into account any adverse effects on those species from construction and operation of the project.” PG&E recommends the following text revisions: • “The Kerckhoff Hydroelectric Project is operated to provide the required MIFs, flows to protect American shad, and flows to maintain water temperatures for the protection of smallmouth bass (<i>Micropterus dolomieu</i>), as described in Article 45 of the Kerckhoff Hydroelectric Project license, as amended by and the April 22, 1993 Order Establishing Permanent Flow Release Regime (FERC 1993):” “Under the Proposed Project, PG&E would continue to provide the required MIFs as described in Article 45 of the Kerckhoff Hydroelectric Project license as amended by the April 22, 1993 Order Establishing Permanent Flow Release Regime (FERC 1993) but amended to split the American shad spawning flows into another condition.”		
PG&E Attachment C of Comment Letter	PG&E-54	The K1 Powerhouse and Switchyard and proposed Vista Day Use Area are or would be visible from the BLM-owned Ya-Gub-Weh-Tuh Trail across from the SJR [...] The K1 Powerhouse and Switchyard are visible from the BLM-owned Ya-Gub-Weh-Tuh Trail across from the SJR [...] Portions of the Proposed Project on BLM-owned land [...] KVA 4 is the BLM-owned Ya-Gub-Weh-Tuh Trail opposite the SJR	Comment noted.	Recommended corrections were made 14 times in Final EIR text.

Commenter	Comment Code	Comment	Response	EIR Edits
		Clarification. The Bureau of Land Management (BLM), United States Forest Service (USFS), and Bureau of Reclamation (BOR) do not own lands, but rather manage or administer them. PG&E recommends changing “owned” throughout the document to “managed” or similar: “... the BLM-owned <u>managed</u> Ya-Gub-Weh-Tuh Trail opposite the SJR.”		
PG&E Attachment C of Comment Letter	PG&E-55	The measure is designed to provide the public with visual cues of water conditions when there is spill from Kerckhoff Dam. Clarification. The Spill Season Flow Measure benefits safety of recreationalists in two ways. First, it substantially reduces the number of instances during spill periods when flows drop to Minimum Instream Flow (MIF). This decreases the opportunities for recreationalists to enter the channel during spill periods. This was discussed in Section 8.10.4.1 <i>River and Shoreline Recreation</i> of the 2023 Final License Application (FLA) (PG&E 2023)⁴. Second, by implementing the Spill Season Flow Measure, flows are slowly ramped down from 500 cubic feet per second (cfs), maintaining up to 2 feet of additional water depth in the channel compared to MIF at Gage J-2 and thereby discouraging recreational access to deeper channel areas and reducing exposure to high flows away from the river banks and escape routes.	Comment noted. This language is stated in PG&E’s March 2023 Supplement to the FLA. Please refer to State Water Boards response to comment PG&E-2 for the discussion of impacts to recreation beneficial uses from proposed flow measures intended to deter use.	The recommended clarification added to the final EIR.
PG&E Attachment C of Comment Letter	PG&E-56	Under CEQA, special-status plants are also defined as those species identified by the CNPS California Rare Plant Rank (CRPR) rating system: • 1A (Plants presumed extirpated in California and either rare or extinct elsewhere) • 1B (Plants rare, threatened, or endangered in California and elsewhere) • 2A (Plants presumed extirpated in California but common elsewhere) • 2B (Plants rare, threatened, or endangered in California but common elsewhere) • 3 (Review List: plants about which more information is needed) • 4 (Watch List: plants of limited distribution) Correction. The Draft Environmental Impact Report (Draft EIR)’s identification of special-status plant species is inconsistent with the FLA. Specifically, the Draft EIR includes California Rare Plant Rank (CRPR) Lists 3 and 4 species, which are not typically included as	Comment noted. The CEQA lead agency has discretion in development of environmental analysis.	No changes.

Commenter	Comment Code	Comment	Response	EIR Edits
		special-status plants in CEQA documents. California Native Plant Society (CNPS) explicitly states that special-status plants with a CRPR of 1A or 1B “meet the definition of Rare or Endangered under CEQA Guidelines §15125(c) and/or §15380,” and impacts must be analyzed. CRPR 2 taxa (rare in California but more common elsewhere) are typically treated the same in CEQA practice. Lists 3 and 4 do not typically meet the definition of “rare or endangered.” PG&E’s FLA and Vegetation Management and Pest Control Plan (PG&E 2023)⁵ also adhere to this definition. As a result, the Draft EIR identifies 45 special-status plant species (Section 4.5.1.4, page 4.5-14), compared to 41 species identified in the FLA. This expanded list also leads to the inclusion of Hall’s Wyethia and King’s River monkeyflower as special-status species, whereas these species were not identified as such in the FLA. PG&E recommends that the Draft EIR be updated to reflect the accurate definition of special status plants under CEQA.		
PG&E Attachment C of Comment Letter	PG&E-57	The study area is identical to the APE for the NHPA Section 106 process, defined as the area where the Proposed Project could directly or indirectly cause alterations in the use or character of a historic resource. Clarification. PG&E’s study area for cultural resources included the area within 1.6 kilometers (1 mile) of the Federal Energy Regulatory Commission (FERC) Project Boundary and any Project facility that currently lies outside the FERC Project Boundary. This study area was the basis for research used to develop contextual and background information. To clarify the difference between PG&E’s study area and the EIR’s study area, PG&E recommends the following text revision: “The EIR study area is identical to the APE for the NHPA Section 106 process, defined as the area where the Proposed Project could directly or indirectly cause alterations in the use or character of a historic resource.”	Comment noted, the EIR study area was the same as the study area used in the cultural resources report. As such, the EIR was revised to the appropriate definition.	The Final EIR was edited to appropriately define PG&E's study area and the EIR study area.
PG&E Attachment C of Comment Letter	PG&E-58	A total of 24 sites are within the APE. Two sites are contributing elements to the SJRGA; 14 sites are recommended as contributing elements to Traditional Cultural Landscape (TCL); 6 sites are recommended ineligible; and 2 sites are unevaluated. Two archaeological sites remain unevaluated and will be assumed eligible until determined otherwise.	Comment Noted.	The recommended correction was made in the Final EIR and Table 4.6.-2 was updated to reflect these new numbers.

Commenter	Comment Code	Comment	Response	EIR Edits
		Table 4.6-2: Archaeological Resources Identified within the Study Area Correction. Following the State Historic Preservation Office (SHPO) concurrence, the resource totals were updated in the 2021 HPMP filed on June 10. PG&E recommends replacing the text with the following: <u>“A total of 24 sites (previously recorded and newly identified) are located in the APE. Of the previously recorded sites, 3 had been determined eligible for the NRHP and 3 had been determined not eligible for the NRHP. A total of 10 sites are either individually eligible or contributing to the TCL 1 District. The remaining 8 sites, 6 of which are submerged under Kerckhoff Reservoir, are unevaluated. In letters dated November 13, 2020, and May 28, 2021, the California SHPO concurred with PG&E’s recommendations.”</u>		
PG&E Attachment C of Comment Letter	PG&E-59	Table 4.11-26: Flow Release Regime during American Shad Spawning Season Footnote: ⁴⁰ When the reservoir elevation is at or above 545 feet msl, the Applicant shall release from the K2 Powerhouse 1,200 cfs from 10 p.m. to 2 a.m. and 775 cfs during the remaining hours, or 400 cfs from the K1 Powerhouse. Correction. The table misinterprets the proposed American Shad Spawning Season Flow Release Regime Measure. Footnote 40 incorrectly references the Kerckhoff 1 (K1) Powerhouse; it should reference Kerckhoff Dam. PG&E recommends that Table 4.11-26 and footnote 40 be corrected to state: “The Licensee shall release from the Kerckhoff 2 (K2) Powerhouse 775 cfs from 2200 to 0200 hours and 400 cfs during the remaining hours; or 400 cfs or more from Kerckhoff Dam for all hours when not releasing from the K2 Powerhouse when the Millerton Lake elevation is below 545 feet above mean sea level. When the Millerton Lake elevation is at or above 545 feet above mean sea level, the Licensee shall release from the K2 Powerhouse 1,200 cfs from 2200 to 0200 hours and 775 cfs during the remaining hours; or 400 cfs or more for all hours from <u>Kerckhoff Dam when not releasing from the K2 Powerhouse.</u>”	Comment Noted.	Recommended correction was made in Table 4.11-26 and in the footnote.

Commenter	Comment Code	Comment	Response	EIR Edits
PG&E Attachment C of Comment Letter	PG&E-60	At least 13 potential ethnobotanically sensitive areas or concentrations of culturally important plants are located within the study area and were identified; these areas are described in detail in CUL 2. Of the 13 areas, 7 are located within TCL 1, Tsobotebau, and are found near or in archaeological sites. It appears that seven ethnobotanical areas are located within or adjacent to TCL 2. One ethnobotanically sensitive area is found in both TCL 1 and TCL 2. Some of these concentrations were identified by Native American members, but others were identified by botanists and not confirmed by the Native American members of the CRWG. These areas are considered TCRs. Correction. Thirteen potential ethnobotanically sensitive areas or concentrations of culturally important plants are located within the Area of Potential Effects (APE). Only two of these have been confirmed with Tribal consultants making them Tribal Cultural Resources (TCRs). The remaining 11 have been identified by botanists and are not confirmed TCRs. This is an important distinction because under Assembly Bill 52 (AB 52) TCRs can only be identified by tribes, not by non-tribal botanists. PG&E recommends the following text revisions: “...Some of these concentrations were identified by Native American members, but others were identified by botanists and not confirmed by the Native American members of the CRWG. <u>These areas-Only those two concentrations confirmed by the tribe</u> are considered TCRs.”	Comment Noted.	The recommended correction was made in the Final EIR.
PG&E Attachment B of Comment Letter	PG&E-61	4.19.3.5.3 Traditional Cultural Landscape 1/ Tribal Cultural Property /Tribal Cultural Resource 1, Tsobotebau Correction. TCL 1 Tsobotebau is a district, it was not identified as a Traditional Cultural Property. PG&E recommends removing “Tribal Cultural Property” from the Section 4.19.3.5.3 heading: “4.19.3.5.3 Traditional Cultural Landscape 1/Tribal Cultural Property /Tribal Cultural Resource 1, Tsobotebau”	Comment Noted.	The recommended correction was made in the Final EIR.
PG&E Attachment B of Comment Letter	PG&E-62	Maps Correction. All Appendix A-3 maps are obsolete. PG&E recommends updating these figures with the most current series provided in PG&E’s response to the 2023 FERC Additional Information Request (AIR)	Comment noted, thank you for providing the Accession Number.	The recommended correction was made in Appendix A.

Commenter	Comment Code	Comment	Response	EIR Edits
		[Accession number 20230818-5028] (PG&E 2023) ⁶ . Specifically, Maps A3-1, A3-2a-o, A3-3 and A3-4 are superseded by maps 4.1, 4.1a-0, 4.3 and 4.4, respectively.		

PG&E Footnote References

Cover Letter:

1. FERC 2025, Environmental Assessment For Hydropower License Kerckhoff Hydroelectric Project FERC Project No. 96-048 California. Appendix J, page J-2.
2. Katzel, M.K. and W.S. Lifton. 2021. Technical Memorandum. Kerckhoff Hydroelectric Project Stage-Discharge Investigation. Prepared for PG&E. Cardno Sacramento, CA.
3. PG&E. 2023. Kerckhoff Hydroelectric Project, FERC Project No. 96 Final License Application Revised March 2023. Section 8.10.

Attachment B:

1. PG&E. 2023. Kerckhoff Hydroelectric Project Second Supplemental Information Filing in Support of Final Application for New License.
2. PG&E. 2023. Kerckhoff Hydroelectric Project Second Supplemental Information Filing in Support of Final Application for New License, Attachment C, Vol 3, SD-A. Vegetation Management and Pest Control Plan.
3. PG&E. 2021. Whitewater Boating Assessment (REC 1-S) Whitewater Flow Study Supplemental Report (TSR-05a).
4. PG&E. 2023. Kerckhoff Hydroelectric Project Second Supplemental Information Filing in Support of Final Application for New License, Attachment C, Vol 3, SD-A. Wildlife Management Plan.
5. PG&E. 2023. Kerckhoff Hydroelectric Project Second Supplemental Information Filing in Support of Final Application for New License, Attachment C, Vol 3, Section 7.2, Appendix C. Technical Memorandum: Kerckhoff Hydroelectric Project Stage-Discharge Investigation.

Attachment C

1. PG&E. 2021. Historic Properties Management Plan, Kerckhoff Hydroelectric Project (FERC Project No. 96). Filed on June 10, 2021 (Accession numbers 20210610-5133 and 20210610-5134).
2. PG&E. 2023. Kerckhoff Hydroelectric Project Second Supplemental Information Filing in Support of Final Application for New License, Attachment C, Vol 3, SD-A. Aquatic Resources Plan.
3. FERC. 1993. Order Establishing Permanent Flow Release Regime.
4. PG&E. 2023. Kerckhoff Hydroelectric Project Second Supplemental Information Filing in Support of Final Application for New License.
5. PG&E. 2023. Kerckhoff Hydroelectric Project Second Supplemental Information Filing in Support of Final Application for New License, Attachment C, Vol 3, SD-A. Vegetation Management and Pest Control Plan.
6. PG&E. 2023. Pacific Gas and Electric Company submits Response to FERC's July 6, 2023, Additional Information Request re the Application for License for the Kerckhoff Hydroelectric Project under P-96.