Rush Creek Project, FERC Project No. 1389

DEC 1 - Full Decommissioning Study (Phase I)
Draft Technical Study Report

August 2024

Southern California Edison Company
Regulatory Support Services
2244 Walnut Grove Ave. Rosemead, CA 91770

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List of Acronyms

ac-ft	acre-feet
BMP	Best Management Practice
CFR	Code of Federal Regulations
cfs	cubic feet per second
FERC	Federal Energy Regulatory Commission
Forest Service	United States Forest Service
HDPE/PVC	high-density polyethylene/polyvinyl chloride
kW	kilowatt
NPS	National Park Service
lb.	pound
PMF	probable maximum flood
Project or Proposed Project	Rush Creek Project
RT	round trip
SCE	Southern California Edison Company
SR-158	State Route 158
SUP	Special Use Permit
SWPPP	Stormwater Pollution Prevention Plan
US-395	United States Route 395

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1.0 INTRODUCTION

The following provides the results of Phase I of the Full Decommissioning Study required by Federal Energy Regulatory Commission (FERC) in the Study Plan Determination (FERC 2022). The specific activities to be completed as part of the Full Decommissioning Study (Phase I and Phase II) are defined in Southern California Edison Company's (SCE) 2023 Initial Study Report Meeting Summary (November 21, 2023). This Phase I report includes the following information:

- Description of Project Alternatives and Feasibility (Appendix A)
- Estimate of Costs for Each Alternative (Appendix B)
- Description of Possible Flow and Water Level Changes Under Each Alternative (Appendix C)
- Description of Study Approach to Characterize Sediment in Project Lakes (Appendix D)

Following distribution of the Phase I Study Report, SCE conducted a meeting on April 30, 2024, in June Lake to provide an overview of the approach and results from Phase I of the Full Decommissioning Study and to solicit stakeholder feedback. This TSR reflects input from stakeholders and responds to comments received. Phase II study activities will be completed in 2024 and include the following:

- Analysis of socioeconomic effects associated with any changes in flow and water levels (including potential for flooding) will be incorporated into the Draft License Application (September 2024).
- Detailed resource-specific analysis and reporting on the potential physical and environmental benefits and concerns associated with each decommissioning option will be included in the Final License Application (January 2025) once all the FERC-approved field studies, modeling, and technical reports are completed.
- Characterization of the types and quantities of any accumulated sediment that would be released from behind each dam, including the presence of any known contaminants that could be released downstream.
    - Collection and analysis of sediment data in Waugh Lake, Gem Lake, and Agnew Lake will be implemented in the summer/fall of 2024.
    - Characterization of lakebed topography, sediment, and presence of any known containments at Waugh Lake will occur when the reservoir is drained, which typically occurs in late August to September depending on runoff conditions and whether the low-level outlet is free of obstructions.

  - Laboratory results for identification of potential containments in the sediment are expected to be available in October/November 2024. Sediment transport modeling results are expected to be available in December 2024.

- A summary of study results will be included in the Phase II Study Report that will be distributed to Tribes, resource agencies, and interested stakeholders in the Final License Application (January 2025).

APPENDIX A
Project Alternatives and Feasibility

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1.0 PROJECT ALTERNATIVES AND FEASIBILITY

1.1 INTRODUCTION

This section describes the alternatives for the disposition of facilities at Rush Meadows Dam, Agnew Dam, and Gem Dam evaluated in the relicensing proceeding for Southern California Edison Company's (SCE) Rush Creek Project (Project or Proposed Project) (Federal Energy Regulatory Commission [FERC] Project No. 1389). Refer to Map 1 for the location of the Project and associated land jurisdiction.

Two Project alternatives have been identified to bookend the analysis for disposition of Rush Meadows and Agnew dams, namely:

- Full dam removal
- Partial dam removal (SCE's preferred alternative)

Under each relicensing alternative, hydroelectric operations at Rush Meadows and Agnew dams will be discontinued, and these facilities will be removed from the FERC license once all license conditions and regulatory requirements of FERC and other resource agencies are met.

Three Project alternatives are being evaluated at Gem Dam, namely:

- Retrofitting the dam to meet seismic restrictions under a probable maximum flood (PMF) event with a new spillway and reduced dam height (SCE's preferred alternative).
- Full dam removal
- Partial dam removal

Under the retrofitting alternative, hydroelectric operations at Gem Dam and Rush Creek Powerhouse will continue under FERC jurisdiction consistent with conditions identified in a new FERC license. The Gem Dam retrofitting alternative was developed at a conceptual engineering level of design including structural modeling.

Under the full and partial dam removal alternatives, hydroelectric operations at Gem Dam and Rush Creek Powerhouse will be discontinued, and these facilities will be removed from the FERC license once all license conditions and regulatory requirements of FERC and other resource agencies are met (i.e., full decommissioning of the Project).

Provided below is a description of each alternative (based on conceptual engineering level of design) for the disposition of Rush Meadows Dam, Agnew Dam, and Gem Dam. Refer to the LAND 1 – Aesthetics Technical Study Report for visual renderings of partial and full dam removal. Final engineering design will be provided to FERC and DSOD for review and approval prior to implementation.

1.2 ACTIVITIES COMMON AMONG ALTERNATIVES

Although the Project alternatives for Rush Meadows, Agnew, and Gem dams vary in their locations, objectives, specific construction activities, timing, and duration, the general activities common among all the alternatives include (1) establishment of June Mountain Ski Area Parking Lot as the Base of Operations; (2) establishment of the construction area; (3) general construction activities; (4) disposition of other Project facilities; and (5) outreach activities. Each of these common activities are described below.

Project-specific information on the construction area, worker housing, transport of personnel, construction activities, and restoration activities is discussed in detail for each Proposed Project alternative in Sections 1.3 through 1.5.

1.2.1 June Mountain Ski Area Parking Lot (Base of Operations)

Pending issuance of a Special Use Permit (SUP) from the United States Forest Service (Forest Service), the Base of Operations for all alternatives will be established at the June Mountain Ski Area Parking Lot (Map 1), or other suitable location if identified later. The June Mountain Ski Area Parking Lot was selected as the Base of Operations for the following reasons: (1) its proximity to the construction sites, (2) it has appropriate access and space available, (3) it does not require any modification or upgrades, and (4) it has been successfully used by SCE to support previous Project maintenance activities. The following activities are associated with the Base of Operations.

The Base of Operations will be established at the beginning of each construction season and will include the following:

- Project Management Facilities, including
  - An office trailer powered by a generator (up to 25 kilowatts [kW]) will be installed for SCE project management and construction oversight personnel.
  - An office trailer powered by a generator (up to 25-kW) will be installed for the contractor's construction personnel.
- Helicopter Landing Site
  - K-rail barriers will be used to control access to the helicopter landing site.
  - Helicopter fuel storage tanks and appropriate secondary containment and fire prevention/response equipment will be located adjacent to the landing site.
- Supporting Construction Equipment
  - Table 1 provides a preliminary list of construction equipment that will be located at the Base of Operations.

- Staging Area
  - The staging area will be used to store construction equipment and materials.
  - Several storage containers will be used to secure smaller construction materials and equipment.
- Stockpile Area
  - The stockpile area will be used to temporarily store material removed from the construction sites prior to transport to an appropriate disposal site.
  - Specific locations within the stockpile area will be designated to temporarily store material based on its characteristics (i.e., hazardous/non-hazardous) and ultimate disposal location.
  - Debris boxes may be used to contain small waste material, as appropriate.
- Designated General Parking Area
  - The general parking area will be used by project managers, construction personnel, subcontractors, and other support personnel. Construction equipment will be parked at a designated location within the staging area.
- Sanitary Facilities
  - Sanitary facilities (i.e., port-a-johns) will be provided commensurate with the number of personnel using the site.
  - A local contractor will clean and maintain the sanitary facilities.
- Security
  - A security kiosk and entrance gate will be installed at the entrance to the Base of Operations.
  - Security personnel will be on-site 24 hours per day to control site access during the construction season.
- Fire Suppression Equipment
  - Fire prevention will be implemented consistent with a Project-specific Fire Prevention/Protection Plan and will include, but is not limited to, staging of the following equipment at the Base of Operations to expeditiously extinguish any fire resulting from Project activities:
    - Fire box with enough tools to outfit the average number of workers on the site;

  - Type 6 fire engines with minimum of 300 gallons of water; and
  - Water tender with at least 50 feet of hose and a nozzle.

1.2.1.1 Transport of Personnel, Equipment, and Material

The Base of Operations will function as the transportation hub for construction activities, including (1) arrival and departure of personnel to the job site; (2) receiving center for arrival and departure of construction equipment and material from the contractors and supply companies; (3) transport of equipment and material to/from the dam construction areas; and (4) receipt and loading of debris/material removed from the dam construction areas for transport to an appropriate disposal site. The following describes these transportation-related activities:

- Personnel, Equipment, and Material Access

The Base of Operations is located directly off State Route 158 (SR-158; also known as the June Lake Loop). Personnel will arrive/depart via SR-158 using either the northern or southern route of the loop road. SR-158 intersects United States Route 395 (US-395), the primary travel route into the region.

- Construction equipment and vehicles hauling material will arrive/depart via SR-158 using the northern route of the loop road to avoid traffic through the community of June Lake.
- Construction Area Access
  - Specific information regarding access to the construction area from the Base of Operations is unique to each Proposed Project alternative and is provided in Sections 1.3 through 1.5. The following access to/from the construction areas is common to each alternative.
    - During mobilization and demobilization, heavy equipment will be transported to/from the construction areas using a Skycrane helicopter (lift capacity of approximately 11,000 pounds [lbs.]).
    - During the construction season, equipment and material will be transported to/from the construction areas, as needed, using sling loads attached to either A-Star helicopter (lift capacity of approximately 2,500 lbs.), or modified Black Hawk helicopters (lift capacity of approximately 6,000 lbs.).
- Construction debris will be transported from the construction areas using sling loads attached to a helicopter to the Base of Operations for stockpiling prior to transport to an appropriate disposal site.

- Transport of Disposal Material
    - Transport of material (debris) from the Base of Operations to an appropriate disposal site that is common among alternatives consists of the following:
        - Non-hazardous construction debris stockpiled at the Base of Operations will be transported to the Pumice Valley Landfill or another disposal site on a daily/weekly basis. To travel to the Pumice Valley Landfill, haul trucks will leave the Base of Operations and travel east on SR-158 for approximately 12 miles to the northern intersection with US-395. The haul trucks will continue south on US-395 for approximately 0.5 mile, then east on Mono Lake Basin Road for approximately 2 miles, and then turn left onto Dross Road traveling 0.5 mile to the landfill.
        - Hazardous waste will be hauled by truck, consistent with state and federal regulations, for disposal at an appropriate hazardous waste disposal site (i.e., Ridgecrest, California; Los Angeles, California; or Beatty, Nevada).
        - California Department of Transportation and county authorizations will be obtained, as necessary, for road use.
- Transport of Personnel
    - Workers will be transported to/from the construction areas using the Agnew Tram (located near the Rush Creek Powerhouse) and/or using mules originating from the Frontier Pack Station (located near Silver Lake) via the Rush Creek Trail (Map 1). Following completion of construction, the Rush Creek Trail will be restored to pre-construction conditions.

1.2.1.2 Demobilization/Winterization

Demobilization/winterization of the Base of Operations will be completed at the end of each construction season according to the following procedures:

- All construction equipment and materials, fuel tanks, trailers, sanitation facilities, secondary containment features, kiosks, signage, and K-rails will be removed from the site.
- The site will be restored to conditions that allow for winter ski operations consistent with requirements of the Forest Service SUP.

1.2.2 Construction Area

For each Project alternative, a construction area will be established at the beginning of each construction season, including the following:

- Medical Kiosk
  - An emergency medical technician(s) and support equipment will be present in the construction area during construction hours.
- Work Area
  - Construction activities associated with the dam removal/retrofitting will occur within designated work areas located upstream and downstream of Project dams. All work, staging, and stockpile areas will be flagged prior to initiation of construction activities.
- Staging Areas
  - SCE will designate the following staging area(s) for each alternative:
    - A staging area located near the dam that may consist of:
      - One or more wood decks will be erected to provide a flat and stable surface for generators, compressors, fuel, spill prevention kits, and toolboxes. The decks will include secondary containment areas.
        - Diesel fuel tanks will be flown in, as needed, and stored in designated secondary containment areas.
        - Additional areas, as necessary, to store equipment and material.
    - A mule team staging area(s) located near the dam to facilitate transport of personnel, if appropriate.
  - The work area may also be used to stage equipment and material, as needed, during construction activities.
- Stockpile Areas
  - All hazardous material encountered during dam removal/retrofitting will be temporarily stockpiled within the construction/work area prior to transport off-site.
  - If appropriate, material from the disposition of Agnew Dam suitable for use in the retrofitting of Gem Dam will be stockpiled for future use within the construction/work area of Agnew Dam or Gem Dam outside the wilderness boundary.

  - All other material/debris will be temporarily stockpiled in designated areas prior to being transported off-site.

- Sanitation Facilities

  - Port-a-johns will be transported by helicopter to the construction area. The number of sanitation facilities will be commensurate with the number of personnel on-site. The port-a-johns will be replaced once per week. Secondary containment will be placed under the port-a-johns to contain any potential spills.

1.2.2.1 Demobilization/Winterization

Demobilization/winterization of the construction area will be completed at the end of each construction season according to the following general procedures:

- Remove the temporary cofferdam (super sacks/sandbags), dewatering pipes, and pumps (if present) from the active lakebed and transport to a staging area.

  - The super sacks and pipes will be covered, contained, and stored over the winter consistent with Forest Service guidance developed during the relicensing proceeding.

- Install temporary erosion control features in the construction area to stabilize soil, where necessary.

- Consolidate, cover, contain, and store construction and Best Management Practice (BMP) materials for the following year, as needed, at a staging area, consistent with Forest Service guidance to be developed during the relicensing proceeding.

- Winterize the work, staging, and stockpile areas in accordance with requirements of the Project-specific Stormwater Pollution Prevention Plan (SWPPP).

- Use helicopters to remove all construction equipment, fuel tanks, sanitary facilities, and secondary containment features from the construction area and transport to the Base of Operations.

- Use mules to remove personnel equipment, supplies, and trash from the construction area.

1.2.3 General Construction Activities

The following sections describe the general construction activities associated with dam removal/retrofitting that will be implemented for each Project alternative. A detailed description of site-specific construction activities associated with dam removal at Rush Meadows and Agnew dams is provided for each alternative in Sections 3.3 and 3.4, respectively. Refer to Section 3.5 for a description of construction activities associated

with the Gem Dam alternatives, including dam retrofitting, full dam removal, and partial dam removal.

After establishment of the Base of Operations and construction area, the following construction activities will be implemented:

- Remove any hazardous material identified during on-site investigations completed during pre-construction activities, if applicable.
    - Hazardous material will be removed and contained consistent with federal and state regulations.
    - The material may be temporarily stockpiled on-site in a designated location prior to transport by helicopter to the designated hazardous waste stockpile area at the Base of Operations.
- Install a cofferdam and water bypass system to dewater the work area upstream of the dam, as appropriate.[1]

Excavate sediment to expose the face of the dam, as necessary, to complete dam removal/retrofitting.

- Excavation will be limited to locations with dry soils.
- Clean sediment will be stockpiled on-site for later use during restoration activities, as applicable.
- Remove/trim the geomembrane liner along the upstream face of the dam, as necessary, to complete dam removal/retrofitting.
- Complete Project-specific construction activities associated with dam removal/ retrofitting using modern mechanical equipment.
- Transport material (debris) from the construction area to the Base of Operations.

[1] Currently, the installation of cofferdam(s) is proposed for the Rush Meadows Dam, Agnew Dam, and Gem Dam removal alternatives. Retrofitting of Gem Dam is proposed to be primarily conducted from a barge in a partially filled reservoir (see Section 1.5 for more detail).

1.2.4 Disposition of Other Project Facilities

1.2.4.1 Removal

Concurrent with dam removal/retrofitting construction activities, existing Project facilities deemed unnecessary for continued operation and maintenance of the Project will be demolished and removed as follows:

- Temporary scaffolding may be erected to support demolition of buildings (e.g., removal of roofing).
- If present, concrete foundations/pads will be broken into manageable pieces using either pneumatic hand tools or a hoe ram mounted on a small excavator.
- All debris will be placed into bags and transported by helicopter with a sling load to the Base of Operations stockpile area.
- Debris will be transported to the Pumice Valley Landfill or another appropriate disposal site.

1.2.4.2 Retention

Concurrent with dam removal/retrofitting construction activities, other Project facilities deemed necessary for continued operation and maintenance of the Project will be retained and rehabilitated, as appropriate.

Refer to Table 2 for a list of existing Project facilities designated for removal or retention associated with each of the Project alternatives.

1.2.5 Outreach Activities

The following outreach activities will be implemented for each Project alternative:

- Prior to initiation of construction SCE will:
  - Coordinate with the Forest Service and the National Park Service (NPS), as appropriate, regarding procedures for: (1) notifying the public regarding Project activities; (2) issuing future wilderness permits to backcountry recreationists; and (3) evaluating/implementing trail closures and/or camping restrictions during construction.
    - Affected trails may include Rush Creek Trail, Clark Lakes Trail, Spooky Meadows Trail, and Weber Lake Trail (Map 1). Trails may be closed for the duration of construction (June 1 to October 31).

  - The Rush Creek Trail terminates at its junction with the Pacific Crest Trail/John Muir Trail, which is located approximately 1.2 miles southwest of Rush Meadows Dam (Map 1); therefore, notifications to hikers along the trail may be required.

  - Following determination of the need for trail or camping restrictions/closures, the Forest Service may issue a future Forest Order pursuant to 16 United States Code 551 and 36 Code of Federal Regulations (CFR) 261.50(a) and (b).

- Prior to initiation of construction SCE will:

  - Conduct a town hall meeting at June Lake to provide an overview of the upcoming Project activities/schedule for residents, business owners, local government officials, sheriff's department, resource agencies, Tribes, and members of the public. The meeting will provide an opportunity for stakeholders to ask questions and voice concerns.

- Prior to initiation of construction/restoration activities, SCE will:

  - Conduct a town hall meeting at June Lake (as described above).

  - Coordinate with the Forest Service and NPS regarding communicating any trail or area closures associated with the Project to the public, including:

    - Preparation of fliers, if necessary, for distribution at Forest Service visitor centers (e.g., Bishop, Mono Lake, Lone Pine, and Mammoth).

    - Posting of fliers, Forest Service Order(s), and associated maps at pertinent trailheads, Forest Service visitor centers (e.g., Bishop, Mono Lake, Lone Pine, and Mammoth), and the Forest Service website.

  - Coordinate with Forest Service air operations regarding helicopter flights and proposed flight paths.

1.2.6 Avoidance/Protection Measures and Best Management Practices

- SCE will implement avoidance/protection measures and Best Management Practices (BMPs) during construction associated with each alternative. Refer to Section 5, Appendix 5-B for a list of proposed measures and BMPs.

- Following FERC's issuance of a License Order and development of site-specific engineering designs, SCE will review the measures with resource agencies for adequacy in protecting resources. If additional site-specific construction measures are necessary, or existing measures require modification, they will be developed/modified in consultation with resource agencies.

1.2.7 Construction Sequencing

Construction activities would follow a phased approach over several years, as noted below:

- Phase 1: Development of Final Engineering Plans
- Phase 2: Permitting/Agency Coordination and Approval of the Engineering Design by FERC and California Division of Safety of Dams
- Phase 3: Implementation/Construction
- Phase 4: Restoration and Implementation of License Conditions

Construction activities would be completed sequentially (not concurrently). Refer to Subsection 1.3.3.2 (Rush Meadows Dam), 1.4.3.3 (Agnew Dam), 1.5.4.1 (Gem Dam) for the duration of construction under each alternative. The construction season would extend from approximately June 1 to October 31, depending on weather and snow conditions.

1.3 PROJECT-SPECIFIC APPROACH FOR DISPOSITION OF RUSH MEADOWS DAM

Pursuant to 18 CFR § 5.18(b)(4), this section describes the Project-specific approach for the disposition of Rush Meadows Dam, including the two alternatives:

- Full dam removal involving:
  - Demolition of the entire dam with all concrete and other debris transported via helicopter to the Base of Operations for disposal at an approved site (approximately 3,400 cubic yards).
- Partial dam removal involving:
  - Construction of a notch in the center of the Rush Meadows Dam, sized to pass the PMF (approximately 6,500 cubic feet per second [cfs]), without water impoundment.
    - The notch will be approximately 140 feet wide at an elevation of 9,378 +/- feet.
  - Removal of the top 15 feet of the remaining dam sections.

- Reuse of the demolished concrete (approximately 2,300 cubic yards) as fill material with preliminary slopes of 1.5H:1V on the upstream and downstream sides of the remaining left and right sections of the dam to provide stabilizing support.
  - Minimal import of new fill materials or export of demolished concrete will be required.

Figure 1 shows the concept design for partial dam removal, subject to modifications in final design to reflect refined hydraulic calculations, topographic information, and structural engineering.

General construction activities that are common among alternatives are described in Sections 1.2. The following section provides a detailed description of the construction area, transport of personnel, and Project-specific construction activities.

1.3.1 Rush Meadows Dam Construction Area

The construction area will encompass areas upstream and downstream of Rush Meadows Dam (Map 2). The following detailed Project-specific information augments the general discussion of the establishment of the construction area and associated activities provided in Section 1.2. Each of these Project-specific features/activities are described below:

- Construction Area
  - Construction activities associated with full and partial dam removal will occur within a work area located upstream and downstream of Rush Meadows Dam.
  - Temporary bridges will be established adjacent to the dam to facilitate personnel and equipment transport across the Rush Creek channel, as appropriate.
- Staging Areas
  - One staging area will be established in the dry reservoir bed on the right bank near the dam (looking downstream) for construction storage, fuel storage, portable restrooms, construction offices, equipment staging, and laydown area.
  - Mule team staging areas will be located on the granite outcropping near Rush Creek Trail just south of the spillway and at the existing Frontier Pack Station Camp.
- Stockpile Areas
  - Hazardous materials will be stockpiled in the staging area located within the dry reservoir bed.

- Material used to stabilize the abutments (partial removal option only) will be stockpiled within the work area downstream of the dam.

- Material to be transported off-site will be stored at the debris stockpile area located within the staging area.

- Worker Housing Area

  - Worker housing will be established approximately 0.25 mile from Rush Meadows Dam at the existing Frontier Pack Station Camp (currently operated by Frontier Pack Station under an existing SUP issued by the Forest Service). The camp will be maintained consistent with all SUP conditions. The camp will provide housing, kitchen facilities, and shower and restroom facilities for the workers.

    - An alternative approach would be to provide worker housing on the right bank of the reservoir just upstream of the dam using pre-manufactured containers. On-site facilities have the advantage of a more contained construction site and more secure cover from severe weather events over the entirety of the construction season.

  - Food, camping, personal supplies, and garbage will be transported primarily by pack mules and, when necessary, by helicopter. Food and garbage will be stored in bear-proof containers.

  - Sanitary facilities (i.e., port-a-johns) will be transported by helicopter to the camp. The number of facilities will be commensurate with the number of personnel at the camp. The port-a-johns will be replaced once per week. Secondary containment will be placed under the port-a-johns to contain any potential spills.

  - Shower stations will be established consistent with the Frontier Pack Station SUP. Showers will have warm water heated by 1- to 5-gallon refillable propane tanks. Similar shower units are currently in use by the Frontier Pack Station in the wilderness area.

  - Following construction, the worker housing area facilities (including temporary housing and sanitation facilities) will be removed, and the site will be restored to pre-construction conditions.

1.3.2 Rush Meadows Dam Transport of Personnel

Transport of personnel to/from the construction area (including the worker housing area) is described below.

- Tram Access
  - Workers will use the Agnew Tram[2] located near Rush Creek Powerhouse for transportation to/from Agnew Dam They will then board a barge/boat to cross Agnew Lake (if reservoir levels allow) or walk the Rush Creek Trail to the Upper Agnew Lake Boat Dock where they will board the Gem Tram.[3] The Gem Tram terminates at Gem Dam. The workers will then travel on foot or by mule along Rush Creek Trail to/from the construction area/worker housing area.
- Mule Access
  - Workers may also be transported by mule between the Frontier Pack Station (located near Silver Lake) and the construction area via the Rush Creek Trail.

1.3.3 Rush Meadows Dam Project-Specific Construction Activities

After establishment of the work, staging, stockpile, and worker housing areas, the following Project-specific construction activities will be conducted. Refer to Section 1.2.3 for a description of general construction activities. This section also identifies the duration of construction, volume of material, and helicopter and truck trips for each alternative.

1.3.3.1 Rush Meadows Dam Construction Activities

<u>Common Activities among Alternatives</u>

The following construction activities are common to the Rush Meadows Dam alternatives (full and partial dam removal):

- Remove the geomembrane liner covering the upstream face of the dam and properly dispose of off-site.
- Install and operate the reservoir dewatering and bypass system:
  - In the late fall/winter prior to each construction season, the low-level outlets (one 24-inch circular outlet and one 30-inch square outlet at Rush Meadows Dam) will be fully opened to reduce impoundment of water in Waugh Lake.

[2] Agnew Tram will be repaired prior to dam retrofit/removal activities.

[3] Gem Tram was damaged during high flows in 2017 and a portion of the tram was washed out. Prior to dam retrofit/removal activities, the tram will be repaired.

- If inflow during the runoff season exceeds the capacity of the low-level outlets, water will be impounded in the reservoir, potentially up to the bottom of the spillway.

- Work in the reservoir and on the upstream side of the dam will be initiated only after the reservoir is drained and the entire volume of the inflow can be passed through the low-level outlet, allowing the reservoir bed to dry.

- Once the water is at minimum pool at the invert elevation of the low-level outlet, high-density polyethylene/polyvinyl chloride (HDPE/PVC) piping will be inserted through the low-level outlet, extending approximately 100 to 200 feet upstream and downstream of the dam.

- A small cofferdam consisting of super sacks and/or sandbags will be constructed at the upstream end of the pipe to direct water from the reservoir, past the work area (dam), to Rush Creek.

- Small portable pumps may be placed between the cofferdam and Rush Meadows Dam to remove any water from low spots or capture leakage water to maintain a dry work area. The water will be pumped to a settling basin located in the dry lakebed. “Clean” water will then be pumped into the low-level outlet pipe.

- Construct temporary bridges over Rush Creek to provide full access upstream and downstream of the dam.

Full Dam Removal Activities

- Using modern equipment, a new opening at the base of the dam near the thalweg will be created to manage inflow and protect against job-site flooding.

- Scaffolding and modern mechanical equipment will be used to cut sections of the concrete dam into small, manageable blocks using self-contained hydraulic wire saws powered by generators.[4]

  - The blocks will be temporarily placed at the base of the dam.

  - A mini-excavator mounted with a hydraulic hoe will collect each felled concrete block and break it into smaller pieces that are of proper size for helicopter transport. Confinement bags will be used, as necessary, to secure the concrete blocks and/or construction debris.

  - Helicopters will transport the concrete blocks and other construction debris to a stockpile area at the Base of Operations.

[4] Slurry water generated by the cutting process will be vacuumed into double contained, sealed barrels and flown off-site for disposal.

Partial Dam Removal Activities

- Using modern equipment, a new opening at the base of the dam near the thalweg will be created to manage inflow and protect against job-site flooding.
- Dam demolition will be performed as follows:
  - Scaffolding and modern mechanical equipment will be used to cut sections of the concrete dam into small, manageable blocks using self-contained hydraulic wire saws powered by generators. [4]
  - A medium-sized excavator on the downstream side of the dam will load the debris into dump trucks (3-cubic-yard capacity).
  - The first material will be used to create access along the downstream side of the dam (the access route will be removed after Project completion).
  - The remaining demolished concrete will be used as fill material with preliminary slopes of 1.5H:1V on the upstream and downstream sides of the remaining left and right abutments of the dam to provide stabilizing support.
- Minimal import of new fill materials or export of demolished concrete will be required.

1.3.3.2 Construction Duration

The duration of construction for each Project alternative is:

- Full dam removal—two construction seasons
- Partial dam removal—one construction season

The duration of construction may change based on final engineering design. The construction season will extend annually from approximately June 1 to October 31, depending on weather and snow conditions. Construction activities will be implemented 10 hours per day, beginning no earlier than 7:00 a.m. (depending on activity and location), Monday through Saturday. A maximum of 8 to 12 workers will be at the construction area on each scheduled workday.

1.3.3.3 Volume of Material, Helicopter Trips, and Truck Trips

Table 3 provides an overview of construction activities associated with each Rush Meadows Dam alternative.

Table 4 provides an estimate of helicopter and truck trips (round trips [RT]) for each Rush Meadows Dam alternative by construction season and month. The total number of helicopter and truck trips may be modified following completion of engineering design and development of a detailed construction schedule.

1.3.3.4 Construction Equipment

Table 5 provides a preliminary list of the type and quantity of construction equipment necessary to support full and partial dam removal (including other associated Project facilities) at the Base of Operations and the construction area. The final list of the type and quantity of construction equipment may be modified following completion of engineering design and development of a detailed construction schedule.

1.3.4 Rush Meadows Dam Project-Specific Restoration Activities

Conceptual restoration plans will be developed in collaboration with stakeholders during the relicensing process for inclusion in the Final License Application. The conceptual restoration plans will include:

- Stabilization of areas upstream and downstream of the former dam site, as appropriate, to prevent erosion.
- Restoration of the Rush Meadows Dam work area, staging area, campsite, and areas where Project-support facilities were removed.
- Revegetation and stabilization of sediment in the former lakebed, as necessary.
- Reestablishment/stabilization of Rush Creek with the lakebed, as necessary.

Project-specific restoration activities will be initiated the year following completion of full/partial dam removal construction activities. Restoration activities would occur over a single season and would include implementation of measures to protect environmental and cultural resources potentially present. Following implementation of the restoration plan, a 5-year monitoring period would be implemented to evaluate the success of the restoration effort. If it is determined that the restoration does not meet the established success criteria (included in the restoration plan), SCE will modify and implement additional restoration actions, developed in consultation with resource agencies, to improve restoration success to meet the criteria.

1.4 PROJECT-SPECIFIC APPROACH FOR DISPOSITION OF AGNEW DAM

Pursuant to 18 CFR § 5.18(b)(4), this section describes the Project-specific approach for disposition of Agnew Dam including two alternatives:

- Full dam removal involving:
  - Demolition of the entire dam with all concrete and other debris transported via helicopter to the Base of Operations for disposal at an approved site (approximately 2,200 cubic yards).

- Partial dam removal involving:
  - Demolishing the center three arches of Agnew Dam to pass the PMF (approximately 8,400 cfs) without any water impoundment.
    - The new opening will be approximately 120 feet wide at an estimated water surface elevation of 8,474 +/- feet.
  - Reusing the demolished concrete (approximately 1,500 cubic yards) as fill material with preliminary slopes of 1.5H:1V on the inside of the remaining arches to provide stabilizing support.

Figure 2 shows the concept design for partial dam removal, subject to modifications in final design to reflect refined hydraulic calculations, topographic information, and structural engineering.

General construction activities that are common among alternatives are described in Sections 1.2. The following section provides a detailed description of the construction area, transport of personnel, and Project-specific construction activities.

1.4.1 Agnew Dam Construction Area

The construction area will encompass areas adjacent to Agnew Dam (Map 3). The following detailed Project-specific information augments the general discussion for establishment of the construction area and associated activities provided in Section 1.2. Each of these Project-specific features/activities are described below:

- Construction Area
  - Construction activities associated with full and partial dam removal will occur within a work area located upstream and downstream of Agnew Dam.
  - Temporary bridge(s) will be established adjacent to the dam to facilitate personnel and equipment transport across the reservoir and downstream channel, as appropriate. A temporary bridge over Rush Creek downstream of the dam will be installed to provide access along the full length of the dam during the construction period.
- Staging Areas
  - Two staging areas will be established in the dry reservoir bed (elevation 8,474 feet) on the left and right bank near the dam for construction storage, fuel storage, portable restrooms, construction offices, equipment staging, and laydown areas.

- Stockpile Areas
    - Hazardous materials will be stockpiled in the staging areas located within the dry reservoir bed upstream of the dam.
    - Material used to stabilize the remaining abutments (partial removal option only) will be stockpiled within the work area downstream of the dam.
    - Material to be transported off-site will be stored at the debris stockpile area located within the staging areas.
- Worker Housing Area
    - The existing Agnew Cabin downstream of the dam will be used to accommodate up to two people and provide kitchen and bathroom facilities and/or emergency shelter for workers.
    - Primary worker housing will be located at hotels in the vicinity of the Project.
    - Food, personal supplies, and garbage will be transported primarily via the tram and/or pack mules. Food and garbage will be stored in bear-proof containers.
    - Sanitary facilities (i.e., port-a-johns) will be transported by helicopter to the construction site. The number of facilities will be commensurate with the number of personnel on-site. The port-a-johns will be replaced once per week. Secondary containment will be placed under the port-a-johns to contain any potential spills.
    - Following construction, the worker housing area facilities (including temporary housing and sanitation facilities) will be removed, and the site will be restored to pre-construction condition.
- Helicopter Landing Site
    - A temporary helicopter landing site will be established in the staging area upstream of Agnew Dam (Map 3).

1.4.2 Agnew Dam Transport of Personnel

Workers will be transported to/from the construction area using the Agnew Tram (located near the Rush Creek Powerhouse) and/or using mules originating from the Frontier Pack Station (located near Silver Lake) via the Rush Creek Trail (Map 3).

1.4.3 Agnew Dam Project-specific Construction Activities

After establishment of the work, staging, stockpile areas, the following Project-specific construction activities will be conducted. Refer to Section 1.2.3 for a description of general construction activities. This section also identifies the duration of construction, volume of material, and helicopter and truck trips for each alternative.

1.4.3.1 Agnew Dam Construction Activities Common Activities among Alternatives

The following describes construction activities common to the Agnew Dam alternatives (full and partial dam removal):

- Remove the geomembrane liner covering the upstream face of the dam and properly dispose of off-site.
- Reduce water levels in the reservoir to the elevation of the natural lake:
  - In the late fall/winter/spring prior to the construction season, the 30-inch low-level outlet will be fully opened to manage water levels in Agnew Lake.
  - If inflow during the runoff season exceeds the capacity of the low-level outlet, water will be impounded in the reservoir, potentially up to the bottom of the notches in Arches No. 5 and No. 6.
  - Work in the reservoir and on the upstream side of the dam will only be initiated once the reservoir is drained and the entire volume of the inflow can be passed through the low-level outlet, allowing the reservoir bed to dry.
  - Inflow to Agnew Lake will be managed using storage in Gem Lake and controlling outflow from Gem Dam.
- Install cofferdam and water bypass system:
  - Once water is at minimum pool at the invert elevation of the low-level outlet, HDPE/PVC piping will be inserted through the low-level outlet and extend to the upstream cofferdam.
  - A cofferdam consisting of super sacks and/or sandbags will be constructed at the upstream end of the pipe to direct clean water from the reservoir, past the construction area (dam).
  - Small portable pumps may be placed between the cofferdam and Agnew Dam to remove any water from low spots or capture leakage water to maintain a dry work area. The water will be pumped to a settling basin located in the dry lakebed. “Clean” water will then be pumped into the low-level outlet pipe.

- Temporary bridge(s) will be constructed over Rush Creek to provide access to both sides of the dam.

Full Dam Removal Activities

- Scaffolding and mechanical equipment will be used to cut sections of the concrete dam into small, manageable blocks using self-contained hydraulic wire saws powered generators.[5]
    - The blocks will be temporarily placed at the base of the dam.
    - A mini-excavator mounted with a hydraulic hoe will collect each felled concrete block and break it into smaller pieces that are of proper size for helicopter transport. Confinement bags will be used, as necessary, to secure the concrete blocks and/or construction debris.
- Helicopters will transport the concrete blocks and all other construction debris to either:
    - The stockpile area at the Base of Operations for hauling to an approved disposal site, or
    - The stockpile area within the construction area at Agnew Dam or near Gem Dam, outside the wilderness boundary, for future recycling as part of Gem Dam retrofitting (Section 3.5). All stockpiled material designated for future recycling will be contained and stored consistent with Forest Service guidance.
        - Determination of the suitability of material for recycling will be based on historical borings (2010) and examination/testing by the contractor in coordination with a materials testing/geotechnical engineer and structural engineer during dam removal construction activities.

Partial Dam Removal Activities

- Dam demolition will be performed as follows:
    - Scaffolding and modern mechanical equipment will be used to remove Arches No. 4 to No. 6 from the dry reservoir bed. The concrete dam will be cut into small, manageable blocks using self-contained hydraulic wire saws powered by generators[5].
    - A medium-sized excavator on the downstream side of the dam will load the debris into dump trucks (3-cubic-yard capacity).

[5] Slurry water generated by the cutting process will be vacuumed into double contained, sealed barrels and flown off-site for disposal.

  - The first material will be used to create access along the downstream side of the dam (the access route will be removed after Project completion).

  - The remaining demolished concrete will be used as fill material with preliminary slopes of 1.5H:1V on the upstream and downstream sides of the remaining left and right abutments of the dam to provide stabilizing support.

- Minimal import of new fill materials or export of demolished concrete will be required.

1.4.3.2 Flowline Removal Activities

Concurrent with full or partial dam removal construction activities, the Agnew Dam Flowline will be removed from service as follows:

- Aboveground sections of the flowline will be cut into manageable pieces and transported to the Base of Operations using helicopters.

- Underground sections of the flowline will remain in place with any exposed opening capped in concrete.

- Anchor blocks will be demolished similar to a building foundation and the gabion baskets will be disassembled.

- All debris will be placed into bags and flown out by helicopter via sling load to the Base of Operations stockpile area.

- The area will be backfilled, returned to its natural grade, and stabilized to prevent erosion.

1.4.3.3 Construction Duration

The duration of construction for each Proposed Project alternative is:

- Full dam removal—two construction seasons

- Partial dam removal—one construction season

The duration of construction may change based on final engineering design. The construction season will extend annually from approximately June 1 to October 31, depending on weather and snow conditions. Construction activities will be implemented 10 hours per day, beginning no earlier than 7:00 a.m., Monday through Saturday. A maximum of 8 to 12 workers will be at the construction area on each scheduled workday.

1.4.3.4 Volume of Material, Helicopter Trips, and Truck Trips

Table 6 provides an overview of construction activities associated with each Agnew Dam alternative.

Table 7 provides an estimate of helicopter and truck trips (RT) for each Agnew Dam alternative by construction season and month. The total number of helicopter and truck trips may be modified following completion of engineering design and development of a detailed construction schedule.

1.4.3.5 Construction Equipment

Table 8 provides a preliminary list of the type and quantity of construction equipment necessary to support full and partial dam removal (including other associated Project facilities) at the Base of Operations and the construction area. The final list of the type and quantity of construction equipment may be modified following completion of engineering design and development of a detailed construction schedule.

1.4.4 Agnew Dam Project-Specific Restoration Activities

Conceptual restoration plans will be developed in collaboration with stakeholders during the relicensing process for inclusion in the Final License Application. The conceptual restoration plan will include:

- Stabilization of areas upstream and downstream of the former dam site, as appropriate, to prevent erosion.
- Restoration of the Agnew Dam work area, staging area, and areas where Project-support facilities were removed (i.e., flowline).
- Revegetation and stabilization of sediment in the former lakebed, as necessary.
- Reestablishment/stabilization of Rush Creek with the lakebed, as necessary.

Project-specific restoration activities will be initiated the year following completion of full/partial dam removal construction activities. Restoration activities would occur over a single season and would include implementation of measures to protect environmental and cultural resources potentially present. Following implementation of the restoration plan, a 5-year monitoring period would be implemented to evaluate the success of the restoration effort. If it is determined that the restoration does not meet the established success criteria (included in the restoration plan), SCE will modify and implement additional restoration actions, developed in consultation with resource agencies, to improve restoration success to meet the criteria.

1.5 PROJECT-SPECIFIC APPROACH FOR DISPOSITION OF GEM DAM

Pursuant to 18 CFR § 5.18(b)(4), this section describes the Project-specific approach for disposition of Gem Dam including three alternatives:

- Retrofitting of Gem Dam to meet the following goals:
  - Ensure structural performance/integrity—minimal damage during and after a large magnitude earthquake (>5,000-year event), such that no repair is expected to be required.
  - Maintain hydraulic performance—spillway capacity capable of passing the PMF discharge without overtopping the dam.
- Full dam removal involving:
  - Demolition of the entire dam with all concrete and other debris transported via helicopter to the Base of Operations for disposal at an approved site (approximately 22,700 cubic yards).
- Partial dam removal involving:
  - Construction of a notch in Gem Dam, sized to pass the PMF (approximately 8,700 cfs), without water impoundment**.**
    - The notch will be approximately 240 feet wide at an average elevation of 8,980 feet.
  - Reuse of the demolished concrete (approximately 18,200 cubic yards) as fill material with preliminary slopes of 2H:1V to 1.5H:1V on the upstream and downstream sides of the remaining left and right sections of the dam (abutments) to provide stabilizing support.
    - Minimal import of new fill materials or export of demolished concrete will be required.

Table 9 compares dam and reservoir characteristics under the original dam specification (existing project/seismic restrictions) and proposed retrofitting project. Reservoir storage under the retrofitting alternative will be at the seismic restricted capacity of 10,752 acre- feet (ac-ft).

Figure 3 shows the concept design for dam retrofit, subject to minor modifications in final design to reflect refined hydraulic calculations, topographic information, and more detailed structural modeling and engineering.

Figure 4 shows the concept design for partial dam removal, subject to modifications in final design to reflect refined hydraulic calculations, topographic information, and structural engineering.

General construction activities that are common among alternatives are described in Sections 1.2. The following section provides a detailed description of the construction area, transport of personnel, and Project-specific construction activities for the three alternatives.

1.5.1 Gem Dam Construction Area

The construction area will encompass areas located upstream and downstream of Gem Dam. Map 4a identifies the work area associated with dam retrofitting. Map 4b identifies the work area associated with full and partial dam removal. The work areas differ between the alternatives because dam retrofitting is proposed to be completed with the reservoir partially filled while full and partial dam activities are proposed to be completed in a dry lakebed (reservoir drawdown to approximate elevation of 8,970 feet elevation). The following detailed Project-specific information augments the general discussion for establishment of the construction area and associated activities provided in Section 1.2. Each of these Project-specific features/activities are described below:

- Construction Area
    - Construction activities associated with the three alternatives will occur within a work area located adjacent to the dam.
    - Temporary bridge(s) will be established upstream (dam removal alternatives only) and downstream of the dam to facilitate personnel and equipment transport across the stream channel during dam removal activities.
- Staging Areas
    - Staging area will be established in the dry reservoir bed for construction storage, fuel storage, portable restrooms, construction offices, equipment staging, and temporary docking facilities for the barge (Map 4a and Map 4b).
- Stockpile Areas
    - Hazardous materials will be stockpiled in the staging area located within the dry reservoir bed upstream of the dam.
    - Material used in retrofitting Gem Dam or stabilizing the remaining dam abutment (partial dam removal alternative only) will be stockpiled within the work area downstream of the dam.
    - Material to be transported off-site will be stored at the debris stockpile area located in the staging area.
- Worker Housing Area
    - Worker housing will be established at: (1) the existing Gem Bunkhouse (to be renovated prior to construction; capacity 12 to 15 workers); (2) the existing Gem

Valve House and Cabin (capacity of 6 workers); and (3) Agnew Cabin, if necessary (capacity of 2 workers). Additional housing units will be established near the construction area, if necessary.

- The existing Gem Cookhouse will be used to provide meals to the crew (to be renovated prior to construction). The existing kitchen facilities are expected to be adequate, but an additional kitchen container unit may be provided near the construction area, if needed.

- Food, camping, personal supplies, and garbage will be transported primarily by pack mules and/or tram. Food and garbage will be stored in bear-proof containers.

- Additional sanitary facilities (i.e., port-a-johns) will be transported by helicopter to the construction area. The number of facilities will be commensurate with the number of personnel on the job site. The port-a-johns will be replaced once per week. Secondary containment will be placed under the port-a-johns to contain any potential spills.

- A mule staging area will be established near the construction area.

- Following construction, the worker housing area facilities (including temporary housing and sanitation facilities) will be removed, and the site will be restored to pre-construction condition.

1.5.2 Gem Dam Transport of Personnel

Transport of personnel to/from the construction area is described below.

- Tram Access

  - Workers will use the Agnew Tram located near Rush Creek Powerhouse for transportation to/from Agnew Dam[6]. They will then board a barge/boat to cross Agnew Lake (if reservoir levels allow) or walk the Rush Creek Trail to the Upper Agnew Lake Boat Dock where they will board the Gem Tram.7 The Gem Tram terminates at Gem Dam

- Mule Access

  - Workers may also be transported by mule between the Frontier Pack Station (located near Silver Lake) and the construction area via the Rush Creek Trail.

6 Agnew Tram will be repaired prior to dam retrofit/removal activities.

7 Gem Tram was damaged during high flows in 2017 and a portion of the tram was washed out. Prior to dam retrofit/removal activities, the tram will be repaired.

1.5.3 Gem Dam Project-specific Construction Activities

After establishment of the work, staging, and stockpile areas, the following Project-specific construction activities will be conducted. Refer to Section 1.2.3 for a description of general construction activities. This section also identifies the duration of construction, volume of material, and helicopter and truck trips for each alternative at Gem Dam.

1.5.3.1 Gem Dam Construction Retrofitting Activities

SCE is not considering fully retrofitting Gem Dam to its original specifications and storage capacity. The preferred retrofitting alternative for Gem Dam to be evaluated in the Rush Creek relicensing includes the following:

- Removal of the upper portions of Arches No. 10 to No. 14 to develop a new ungated ogee spillway with a crest elevation corresponding to the top of the existing gravity infill section, elevation 9,027.5 feet (consistent with current seismic restrictions).
    - The spill capacity will be equal to or greater than the estimated PMF (8,700 cfs).
    - Removal of approximately the top 22 feet of the remaining dam arches, Arches No. 1 to No. 9 and No. 15, leaving an estimated 1.5 feet of freeboard to prevent overtopping during a PMF event.
- Removal of approximately the downstream 10 feet of the vertical piers between Arches No. 1 to No. 9 to reduce concrete stresses in large seismic events.
- Use of the demolished concrete from construction as fill in Arches No. 1 to No. 7 and No. 9 to No. 14 to support the new spillway and remaining arches (Arch No. 8 is left unfilled due to the presence of the low-level outlet). No demolished concrete will be exported for disposal.

The following describes construction activities for retrofitting Gem Dam.

- Construction/retrofitting activities will occur primarily from upstream of the dam using a floating barge in a drawn-down reservoir with implementation of appropriate BMPs.
- The reservoir will be drawn down to an elevation of approximately 9,000 feet.
    - The reservoir water level during construction will be adjusted by controlling releases from the 36-inch dam low-level outlet, 36-inch bypass valve, and power tunnel intake (48-inch pipe) at Gem Lake Dam and by adjusting Waugh Lake storage and outflow from Rush Meadows Dam.

- A floating barge equipped with a large excavator will be used to access the face of the dam for removal/adjustment of the existing geomembrane liner[8] and for modification/retrofitting of the dam.
    - Construction will be completed using access primarily from the reservoir side to minimize the potential for large pieces of demolished concrete material to fall into the drawn-down reservoir.
    - A catchment system along the upstream edge of the dam will be used to capture material before it enters the reservoir.
- The demolished concrete from construction of the new spillway, lowering of the remaining dam arches, and trimming of the vertical piers (approximately 10,200 cubic yards) will be used as infill to Arches No. 10 to No. 14 to support the downstream chute of the new spillway.[9] Recycled material available from Agnew Dam will also be used as infill to Arches No. 10 to No. 14.[10]
    - The demolished concrete fill in Arches No. 10 to No. 14 will be compacted to a stable slope of approximately 1.5H:1V with a top layer of new reinforced concrete that will protect the fill material from scour and erosion during spill.
    - The concrete layer is expected to be formed into steps to improve energy dissipation of spill flow.

1.5.3.2 Common Activities Among the Gem Dam Removal Activities

The following construction activities are common to the Gem Dam removal alternatives (full and partial dam removal):

- Remove the geomembrane liner covering the upstream face of the dam and properly dispose of off-site.
- Install and operate a reservoir dewatering and bypass system:
    - In the late fall/winter prior to each construction season, the low-level outlet at Arch No. 8 (36-inch-diameter low-level outlet, 36-inch bypass value) and power tunnel intake (48-inch pipe) at Gem Lake Dam will be fully opened to reduce impoundment of water in Gem Lake.

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8 The existing geomembrane liner covering the upstream face of the dam will be modified during construction to accommodate the new dam face shape.

9 A small portion of the demolished material will initially be used as base material for a construction access route along the rough rock surface downstream of the dam. This material will be removed near the end of construction and used as infill to Arches No. 10 to No. 14 to support the downstream chute of the new spillway.

10 Suitable material from the disposition of Agnew Dam (full removal alternative only) will also be used as fill in Arches No. 10 to No. 14 to support the downstream chute of the new spillway.

- If inflow during the runoff season exceeds the capacity of the low-level outlet, water will be impounded in the reservoir, potentially up to the bottom of the spillway.

- Work in the reservoir and on the upstream side of the dam will be initiated only after the reservoir is drained and the entire volume of the inflow can be passed through the low-level outlet, allowing the reservoir bed to dry.

- Once the water is at minimum pool at the invert elevation of the low-level outlet, HDPE/PVC piping will be inserted through the low-level outlet, extending approximately 100 to 200 feet upstream and downstream of the dam.

- A small cofferdam consisting of super sacks and/or sandbags will be constructed at the upstream end of the pipe to direct water from the reservoir, past the work area (dam), to Rush Creek.

- Small portable pumps may be placed between the cofferdam and Gem Dam to remove any water from low spots or capture leakage water to maintain a dry work area. The water will be pumped to a settling basin located in the dry lakebed. “Clean” water will then be pumped into the low-level outlet pipe.

- Construct temporary bridges over Rush Creek upstream and downstream of the dam) to provide full access during construction.

Full Dam Removal Activities

- Using modern equipment, a new opening at the base of the dam near the thalweg will be created to manage inflow and protect against job-site flooding.

- Scaffolding and modern mechanical equipment will be used to cut sections of the concrete dam into small, manageable blocks using self-contained hydraulic wire saws powered by generators.[11]

  - Blocks will be temporarily placed at the base of the dam.

  - A mini-excavator mounted with a hydraulic hoe will collect each felled concrete block and break it into smaller pieces that are of proper size for helicopter transport. Confinement bags will be used, as necessary, to secure the concrete blocks and/or construction debris.

  - Helicopters will transport the concrete blocks and other construction debris to a stockpile area at the Base of Operations.

[11] Slurry water generated by the cutting process will be vacuumed into double contained, sealed barrels and flown off-site for disposal.

Partial Dam Removal Activities

- Using modern equipment, a new opening at the base of the dam near the thalweg will be created to manage inflow and protect against job-site flooding.
- Dam demolition will be performed as follows:
  - Scaffolding and modern mechanical equipment will be used to cut sections of the concrete dam into small, manageable blocks using self-contained hydraulic wire saws powered by generators.[12]
  - A medium-sized excavator on the downstream side of the dam will load the debris into dump trucks (3-cubic-yard capacity).
  - The first material will be used to create an access along the downstream side of the dam (the access route will be removed after Project completion).
  - The remaining demolished concrete will be used as fill material with preliminary slopes of 2H:1V to 1.5H:1V on the upstream and downstream sides of the remaining left and right abutments of the dam to provide stabilizing support.
- Minimal import of new fill materials or export of demolished concrete will be required.

1.5.4 Removal of Ancillary Facilities

Under the full and partial dam removal alternatives, hydroelectric operations at Gem Dam and Rush Creek Powerhouse will be discontinued, and facilities identified for retention under the Gem Dam retrofit alternative would be removed. Refer to Table 2 for facilities to be removed under the Gem Dam full and partial dam removal alternatives. A brief description of facility removal is provided below by area—Rush Meadows Dam Area, Gem Dam Area, Agnew Dam Area, and Rush Creek Powerhouse Area.

Rush Meadows Dam Area Facilities:

- Remove Rush Creek stream gage downstream of Rush Meadows Dam.
- Dismantle and salvage suitable equipment and gage components.
  - Demolish and remove gage facilities, bundle and/or include with other demolition debris to be flown out by helicopter.

Gem Dam Area Facilities:

- Remove flowline (Gem Dam to Agnew Junction) consistent with the approach described above in Section 1.4.3.2.
- Remove Rush Creek stream gage downstream of Gem Dam. Dismantle and salvage suitable equipment and gage components.
  - Demolish and remove gage facility, bundle and/or include with other demolition debris to be flown out by helicopter.
- Remove Project communication lines.
  - Lines will be dropped to the ground, cut into sections, and bundled for removal. Material will be flown out by helicopter.
  - Poles and/or towers will be felled, cut into pieces, and flown out by helicopter to the base of operations.
  - Remaining pole and/or tower footings will be removed and placed in debris bags. The holes will be backfilled with native materials on site.
- Remove Gem tram and hoist systems, carts, housing for tram winches, tow cables, and power supply. Bundle all material to be flown out by helicopter.
  - Removal of tram carts, winch cable line, and communication line conduits.
  - Disassemble tram steel rails, rollers, wood ties and ancillary components.
  - Dismantle tram winch, anchors, tow cables, power supply systems, and housing buildings.
- Project access trails would be removed, and the area will be restored to natural conditions.
- Remove Gem Dam/Lake Ancillary and Support facilities including facilities such as bunkhouse, cookhouse, outhouse, storage shed, weather station, lake dock and motor barge, equipment sheds, footbridges, overhead hoist system, communication equipment, and solar facility will be removed consistent with the approach described in Section 1.2.4.1.

Agnew Dam Area facilities:

- Remove flowline (Agnew Dam to Agnew Junction) consistent with approach described above in Section 1.4.3.2
- Remove Rush Creek flume and stream gage (downstream of Agnew Dam and reservoir gage).

  - Dismantle and salvage suitable equipment and gage components.
  - Demolish and remove gage facility, bundle and/or include with other demolition debris to be flown out by helicopter.
- Remove Project power and communication lines.
  - Removal will be completed consistent with the approach described above.
  - Removal of Agnew tram and hoist systems, carts, and housing will be completed consistent with the approach described above for the Gem tram.
- Project access trails will be removed, and the area will be restored to natural conditions.
- Remove Agnew Dam/Lake Ancillary and Support facilities including facilities such as cabin, boathouses, lake docks and motor barge, weather station, and Agnew flume facility consistent with the approach described above in Section 1.2.4.1.

Rush Creek Powerhouse Area facilities:

- Above ground sections of the penstock will be cut into manageable pieces and transported to the Base of Operations.
- Underground sections of the penstock will remain in place with any exposed opening capped in concrete.
- Anchor blocks will be demolished similar to a building foundation and the gabion baskets will be disassembled.
- Leave Rush Creek Powerhouse in place. Remove any hazardous material such as oils, grease, fuels, and applicable storage containers.

1.5.4.1 Construction Duration

The duration of construction associated with three Gem Dam alternatives are as follows:

- Dam retrofitting—three construction seasons
- Full Dam Removal – six construction seasons
- Partial Dam Removal – five construction seasons

The duration of construction may change based on final engineering design. The construction season will extend annually from approximately June 1 to October 31, depending on weather and snow conditions. Construction activities will be implemented 10 hours per day, beginning no earlier than 7:00 a.m., Monday through Saturday. A maximum of 12 to 18 workers will be at the construction area on each scheduled workday.

1.5.4.2 Volume of Material, Helicopter Trips, and Truck Trips

Table 10 provides an overview of construction activities associated with the three Gem Dam alternatives.

Table 11 provides an estimate of helicopter and truck trips (RT) for the three Gem Dam alternatives by construction season and month. The total number of helicopter and truck trips may be modified following completion of engineering design and development of a detailed construction schedule.

1.5.4.3 Construction Equipment

Table 12 provides a preliminary list of the type and quantity of construction equipment necessary for three Gem Dam alternatives. The final list of the type and quantity of construction equipment may be modified following completion of engineering design and development of a detailed construction schedule.

1.5.5 Gem Dam Project-Specific Restoration Activities

Conceptual restoration plans will be developed in collaboration with stakeholders during the relicensing process for inclusion in the Final License Application. The conceptual restoration plan will include:

- Restoration of the Gem Dam work area, staging area, and areas where Project-support facilities were removed.
- Revegetation and stabilization of sediment in the former inundation zone, as necessary.
- Reestablishment/stabilization of Rush Creek within the former inundation zone, as necessary.

Project-specific restoration activities will be initiated the year following completion of the retrofitting construction activities. Restoration activities would occur over a single season and would include implementation of measures to protect environmental and cultural resources potentially present. Following implementation of the restoration plan, a 5-year monitoring period would be implemented to evaluate the success of the restoration effort. If it is determined that the restoration does not meet the established success criteria (included in the restoration plan), SCE will modify and implement additional restoration actions, developed in consultation with resource agencies, to improve restoration success to meet the criteria.

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TABLES

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Table 1. Preliminary List of Construction Equipment at the June Mountain Ski Area Parking Lot

Equipment Description
Skycrane Helicopter, Heavy Lift (11,000-lb. load capacity)
Modified Black Hawk Helicopters, Moderate Lift (6,000-lb. load capacity)
A-Star 350, Light Lift Helicopter (2,500-lb. load capacity)
Helicopter Fuel Storage Tanks (including secondary containment)
K-rail Barriers (control access to landing sites)
20-foot Cargo Van
Office Trailers (one for SCE project management and one for contractor construction personnel)
25-kW Generators (two total—one for each office trailer)
Telehandler Forklift
Concrete Flight Buckets
Storage Containers
Debris Boxes
Concrete Waste Bin
10-wheel Dump Truck
Water Tender (including minimum of 50 feet of hose)
Street Sweeper
Cat 313 Excavator
Cat 950 Loader
Sanitary Facilities (port-a-johns)
Security Kiosk
Fire Suppression Equipment and Fire Box
Type 6 Fire Engine (minimum 300-gallon capacity)

Notes: kW = kilowatt
lb. = pound
SCE = Southern California Edison Company

Table 2. Disposition of Project Facilities

Project Facility		Retrofitting of Gem Dam Removal of Rush Meadows and Agnew Dams (partial/full)		Full Decommissioning Removal of Gem, Rush Meadows, and Agnew Dams (partial/full)	
		Remove	Retain	Remove	Retain
Rush Meadows Dam Area					
Dam	Rush Meadows Dam	X		X	
Reservoir	Waugh Lake	X		X	
Valve House	Rush Meadows Dam Valve House	X		X	
Stream Gage	Rush Creek below Rush Meadows (Waugh Lake) (USGS No. 10287262; SCE No. 359r)		X	X	
Reservoir Gage	Waugh Lake (USGS No. 10287260; SCE No. 359)	X		X	
Trail	Rush Meadows Dam Access Trail	X		X	
Rush Meadows Dam/Waugh Lake Ancillary and Support Facilities	Rush Meadows Dam Equipment Shed	X		X	
	Rush Meadows Dam Gage House	X		X	
	Rush Meadows Dam Solar Facility	X		X	
Gem Dam Area					
Dam	Gem Dam		X	X	
Reservoir/Natural Lake(s)	Gem Lake		X		X
Flowline	Gem Dam to Agnew Junction Flowline		X	X	
Valve House	Gem Valve House and Cabin		X	X	
	Gem Dam Arch 8 Valve House		X	X	
	Gem Flowline Valve House		X	X	
Stream Gage	Rush Creek below Gem Lake (USGS No. 10287281; SCE No. 352r)		X	X	
Reservoir Gage	Gem Lake (USGS No. 10287280; SCE No. 352)		X	X	

Project Facility		Retrofitting of Gem Dam Removal of Rush Meadows and Agnew Dams (partial/full)		Full Decommissioning Removal of Gem, Rush Meadows, and Agnew Dams (partial/full)	
		Remove	Retain	Remove	Retain
Communication Lines	Communication Line from Rush Creek Powerhouse to Gem Lake Dam		X	X	
	Communication Line from Gem Valve House to Arch 8 Valve House		X	X	
	Communication Line from Gem Tram Hoist House to Gem Valve House		X	X	
Trams and Hoist Houses	Gem Tram		X	X	
	Gem Tram Hoist House		X	X	
	Gem Tram Lower/Upper Landing		X	X	
Trails	Lower Gem Dam Access Trail		X	X	
	Gem Dam Arch 8 Access Trail		X	X	
	Upper Gem Dam Access Trail		X	X	
Gem Dam/Lake Ancillary and Support Facilities	Gem Lake Dock		X	X	
	Gem Lake Motor Barge		X	X	
	Gem Bunkhouse		X	X	
	Gem Outhouse		X	X	
	Gem Cookhouse		X	X	
	Gem Dam Compressor Shed		X	X	
	Gem Dam Storage Shed		X	X	
	Gem Dam Overhead Hoist House for Dam Length		X	X	
	Gem Dam Overhead Hoist House		X	X	
	Gem Fish Release Footbridge		X	X	
	Gem Tram Landing Footbridge		X	X	
	Gem Tram Bridge		X	X	
	Gem Weather Station		X	X	
	Gem Satellite Dish		X	X	
	Gem Solar Facility		X	X	
	Gem Valve House Tunnel		X	X	

Project Facility		Retrofitting of Gem Dam Removal of Rush Meadows and Agnew Dams (partial/full)		Full Decommissioning Removal of Gem, Rush Meadows, and Agnew Dams (partial/full)	
		Remove	Retain	Remove	Retain
Agnew Dam Area					
Dam	Agnew Dam	X		X	
Reservoir/Natural Lake	Agnew Lake		X (natural lake)		X (natural lake)
Flowline	Agnew Dam to Agnew Junction Flowline	X		X	
Valve House	Agnew Junction (Valve House and Stand Pipe)		X	X	
	Agnew Dam Valve House	X		X	
Stream Gage	Rush Creek below Agnew Lake (USGS No. 10287289; SCE No. 357)		X	X	
Reservoir Gage	Agnew Lake (USGS No. 10287285; SCE No. 351)	X		X	
Power Lines	4 kV Agnew Distribution Line		X	X	
	4 kV Agnew Dam Tap Line	X		X	
	4 kV Upper Agnew Boat Dock Tap Line		X	X	
Communication Line	Communication Line from Agnew Hoist House to Agnew Boathouse		X	X	
Trams and Hoist Houses	Agnew Tram		X	X	
	Agnew Tram Hoist House		X	X	
	Agnew Tram Landing		X	X	
Trail	Agnew Stream Gage Access Trail		X	X	
Agnew Dam/Lake Ancillary and Support Facilities	Lower Agnew Lake Boathouse/Dock		X	X	
	Upper Agnew Lake Boathouse/Dock		X	X	
	Agnew Lake Motor Barge		X	X	
	Agnew Cabin		X	X	
	Agnew Weather Station	X		X	
	Agnew Flume (downstream of Agnew Dam)		X	X	

Project Facility		Retrofitting of Gem Dam Removal of Rush Meadows and Agnew Dams (partial/full)		Full Decommissioning Removal of Gem, Rush Meadows, and Agnew Dams (partial/full)	
		Remove	Retain	Remove	Retain
Rush Creek Powerhouse Area					
Penstocks	Agnew Junction to Rush Creek Powerhouse Penstock (No. 1)		X	X	
	Agnew Junction to Rush Creek Powerhouse Penstock (No. 2)		X	X	
Powerhouse	Rush Creek Powerhouse		X		X
Gage	Rush Creek Powerhouse (USGS No. 10287300; SCE No. 367)		X	X	
Power Line	2.4 kV Switchyard to Powerhouse Distribution Line		X	X	
Powerhouse Ancillary and Support Facilities	Rush Creek Powerhouse Complex Access Road		X	X	
	Cottages (2)		X	X	
	Garages (4)		X	X	
	Warehouse and Dock		X	X	
	Machine Shop		X	X	
	Pump House		X	X	
	Woodsheds (2)		X	X	
	Helicopter Landing Site		X	X	
	Tank (propane)		X	X	
	Bridge over Powerhouse Tailrace		X	X	
	Bridge over Rush Creek		X	X	

Notes: kV= kilovolt
SCE = Southern California Edison
USGS = United States Geological Survey

Table 3. Overview of Construction Activities Associated with the Rush Meadows Dam Alternatives

Activity	Full Dam Removal	Partial Dam Removal
Number of Construction Seasons	2	1
On-site Use of Demolition Material (cy)	0	2,286
Export of Demolition Material (cy)	3,351	0
Import of Stabilizing Material (cy)	0	55
Helicopter Trips (RT)	1,426	150
• Heavy Lift	1,308	94
• Light Lift	118	56
Truck Trips (RT)	776	261
• Construction	419	245
• Disposal	357	16
Mule Trips (RT)	837	554

Notes: cy = cubic yard
RT = round trip

Table 4. Estimated Helicopter and Truck Trips Associated with the Rush Meadows Dam Alternatives by Construction Season and Month

Activity	Helicopter Trips[1,2]			Truck Trips[3,4]		
	Total Trips (RT)	Trips/ Construction Season	Trips/ Month	Total Trips (RT)	Trips/ Construction Season	Trips/ Month
Full Dam Removal						
Total	1,426	713	142.6	776	388	77.6
Partial Dam Removal						
Total	150	150	30	261	261	52.2

Notes: RT = round trip

[1] Helicopter trip calculations include construction operations only. Trips associated with restoration are not included.

[2] Helicopter trip calculations are based on estimated weight (pounds) of material.

[3] Truck trip calculations include construction operations only. Trips associated with restoration are not included.

[4] Truck trip calculations are based on estimated weight (pounds) of material.

Table 5. Preliminary List of Construction Equipment Associated with the Rush Meadows Dam Alternatives

Equipment Type	Example Make/Model	Quantity (No.)
Excavator, Large	CAT 340F	1
Excavator, Medium	CAT 330	1
Excavator, Mini	CAT 306	1
Tracked Dump	Panther T6	2
Mobile Crane	Grove 30 Ton	1
Concrete Batch Plant	EZ 1-1	1
Stabilizing Material Pump	Warrior 500	1
Water Pump	Honda WB2.0XT	1
Fuel Tank Trailer	Lee DT 975	1
Potable Water Tank	Norwesco 44115	1
Welder	Miller Bobcat 200	1
Container	job office	1
Container	tool unit	2
Work Platform	—	4
Temporary Bridge	40-foot shipping length	2

Table 6. Overview of Construction Activities Associated with the Agnew Dam Alternatives

	Full Dam Removal	Partial Dam Removal
Number of Construction Seasons	2	1
On-site Use of Demolition Material (cy)	0	1,515
Export of Demolition Material (cy)	2,243	0
Import of Stabilizing Material (cy)	0	35
Helicopter Trips (RT)	988	110
Heavy Lift	942	75
Light Lift	46	35
Truck Trips (RT)	334	76
Construction	95	63
Disposal	239	13
Mule Trips (RT)	0	0

Notes: cy = cubic yard
RT = round trip

Table 7. Estimated Helicopter and Truck Trips Associated with the Agnew Dam Alternatives by Construction Season and Month

Activity	Helicopter Trips[1,2]			Truck Trips[3,4]		
	Total Trips (RT)	Trips/ Construction Season	Trips/ Month	Total Trips (RT)	Trips/ Construction Season	Trips/ Month
Full Dam Removal[5]						
Total	988	494	98.8	334	334	66.8
Partial Dam Removal						
Total	110	110	22	76	76	15.2

Notes: RT = round trip

[1] Helicopter trip calculations include construction operations only. Trips associated with restoration are not included.

[2] Helicopter trip calculations are based on estimated weight (pounds) of material.

[3] Truck trip calculations include construction operations only. Trips associated with restoration are not included.

[4] Truck trip calculations are based on estimated weight (pounds) of material.

Table 8. Preliminary List of Construction Equipment Associated with the Agnew Dam Alternatives

Equipment Type	Example Make/Model	Quantity (No.)
Excavator, Large	CAT 340F	1
Excavator, Medium	CAT 330	1
Excavator, Mini	CAT 306	1
Tracked Dump	Panther T6	2
Mobile Crane	Grove 30 Ton	1
Concrete Batch Plant	EZ 1-1	1
Stabilizing Material Pump	Warrior 500	1
Water Pump	Honda WB2.0XT	1
Fuel Tank Trailer	Lee DT 975	1
Potable Water Tank	Norwesco 44115	1
Welder	Miller Bobcat 200	1
Container	restroom/shower	1
Container	job office	1
Container	tool unit	2
Work Platform	—	2
Temporary Bridge	40-foot shipping length	2

Table 9. Gem Dam and Lake Specifications

	Existing (Seismic Restriction)	Post Retrofit
Dam		
Type	multiple arch (16 complete; 2 partial)	No change
Material	concrete	No change
Height (maximum)	84 ft	62 ft
Length	688 ft	No change
Volume	21,612 cy	21,612 cy
Elevation of Dam Crest	9,057.5 ft	9,035 ft
Spillway		
Type	Uncontrolled	No change
Upper Spillway Elevation	9,053.64 ft	9,027.5 ft
• Openings/Dimensions	5 openings / 5 ft wide x 2 ft high	Wide, ungated, free overflow spillway in Arches No. 10 to No. 14
Lower Spillway Elevation	9,051.63 ft	Removed
• Openings/Dimensions	8 openings/5 ft wide x 2 ft high	Removed
Capacity (maximum)	1,100 cfs	8,700 cfs
Reservoir		
Elevation at Maximum Operating Water Surface	9,027.5 ft	9,027.5 ft
Gross Storage	10,752 ac-ft	10,752 ac-ft
Area at Maximum Operating Water Surface	256 ac	256 ac

Notes: ac = acre
ac-ft = acre-feet
cfs = cubic foot/feet per second
cy = cubic yard
ft = foot/feet

Table 10. Overview of Construction Activities Associated with the Gem Dam Alternatives

	Retrofitting	Full Dam Removal	Partial Dam Removal
Number of Construction Seasons	3	6	5
On-site Use of Demolition Material (cy)	10,198	0	18,200
Export of Demolition Material (cy)	0	22,700	0
Import of Stabilizing Material (cy)[1]	3,000	0	470
Helicopter Trips (RT)	1,980	9,660	1,200
Heavy Lift	1,380	8,870	750
Light Lift	600	800	450
Truck Trips (RT)	2,000	3,390	2,080
Construction	1,825	970	1,960
Disposal	175	2,420	130
Mule Trips (RT)	3,600	5,670	4,420

Notes: cy = cubic yard
RT = round trip

[1] The amount of import material does not reflect the import of recycled material from Agnew Dam for retrofitting of Gem Dam. The availability of recycled material from Agnew Dam will be determined pending future material examination/testing by a contractor in coordination with a geotechnical engineer and a structural engineer.

Table 11. Estimated Helicopter and Truck Trips Associated with Gem Dam Alternatives by Construction Season and Month

Activity	Helicopter Trips[1,2]			Truck Trips[3,4]		
	Total Trips (RT)	Trips/ Construction Season	Trips/ Month	Total Trips (RT)	Trips/ Construction Season	Trips/ Month
Retrofitting						
Total	1,980	660	132	2,000	665	133
Full Dam Removal						
Dam Removal	9,660	1,610	322	3,390	565	113
Other Ancillary Facilities[5]	530	89	18	370	62	13
Total	10,190	1,699	340	3,760	627	126
Partial Dam Removal						
Dam Removal	1,200	240	48	2,080	416	84
Other Ancillary Facilities[5]	530	106	22	370	74	15
Total	1,730	346	70	2,450	490	99

Notes: RT = round trip

[1] Helicopter trip calculations include construction operations only. Trips associated with restoration are not included.

[2] Helicopter trip calculations are based on estimated weight (pounds) of material.

[3] Truck trip calculations include construction operations only. Trips associated with restoration are not included.

[4] Truck trip calculations are based on estimated weight (pounds) of material.

[5] Refer to Table 10 for an estimate of the total volume of export material.

Table 12. Preliminary List of Construction Equipment Associated with Gem Dam Alternatives

Equipment Type	Example Make/Model	Retrofitting Quantity (No.)	Full/Partial Dam Removal Quantity (No.)
Excavator, Large	CAT 340F	1	1
Excavator, Medium	CAT 330	1	2
Excavator, Mini	CAT 306	1	2
Tracked Dump	Panther T6	2	2
Mobile Crane	Grove 30 Ton	1	1
Track Drill	IR ECM370	1	2
Boom Man Lift	Genie S-65 HF	2	2
Concrete Batch Plant	EZ 1-1	1	1
Water Pump	Honda WB2.0XT	1	1
Fuel Tank Trailer	Lee DT 975	1	1
Potable Water Tank	Norwesco 44115	1	1
Welder	Miller Bobcat 200	1	1
Container	job office	1	1
Container	tool unit	2	2
Work Platform	—	4	4
Barges (Floats)	—	2	0
Skiff	—	1	0
Temporary Bridge	40-foot shipping length	2	2

FIGURES

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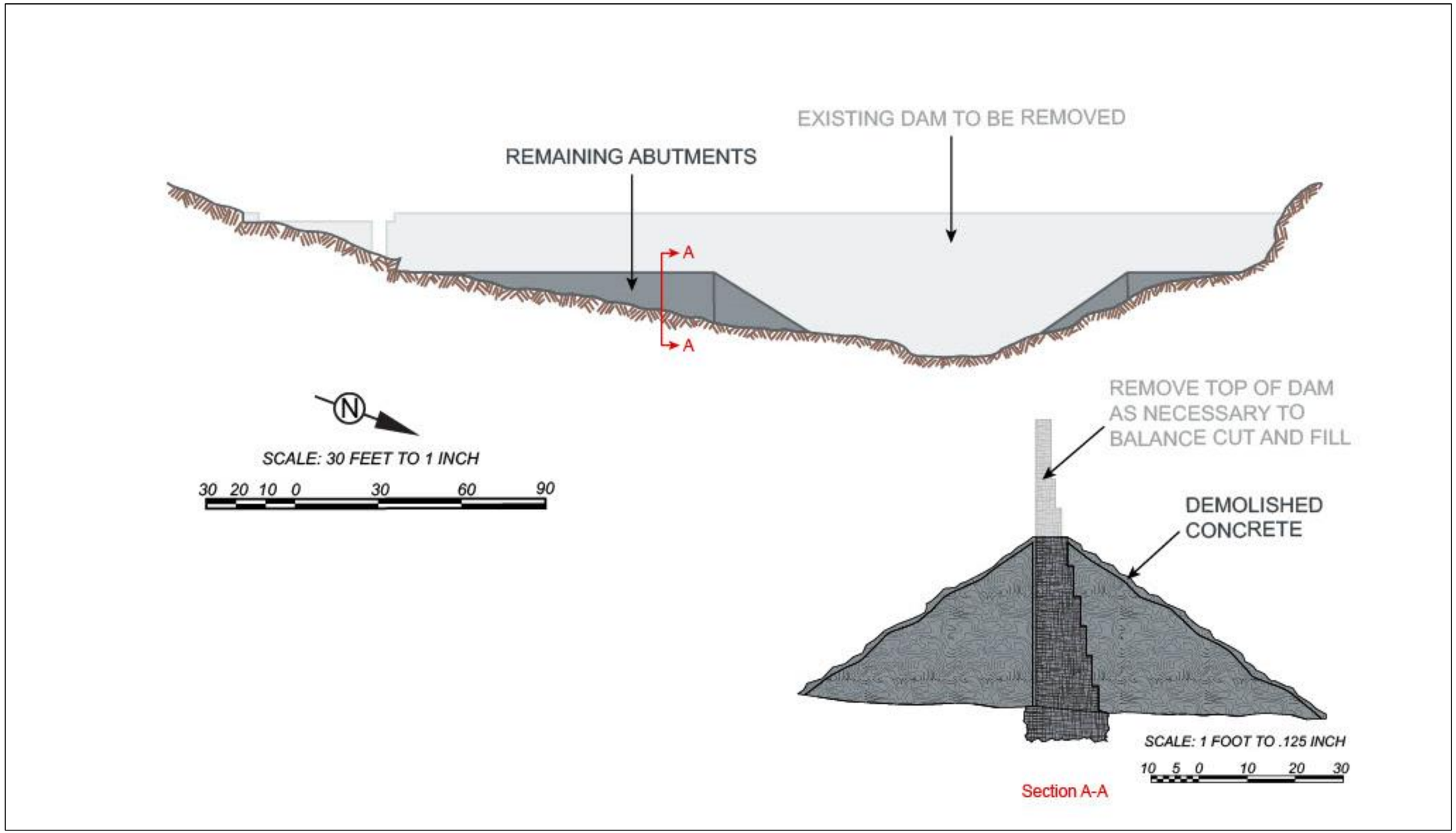

Figure 1. Cross Section of the Existing Rush Meadows Dam and Remaining Abutments Associated with the Partial Dam Removal Alternative

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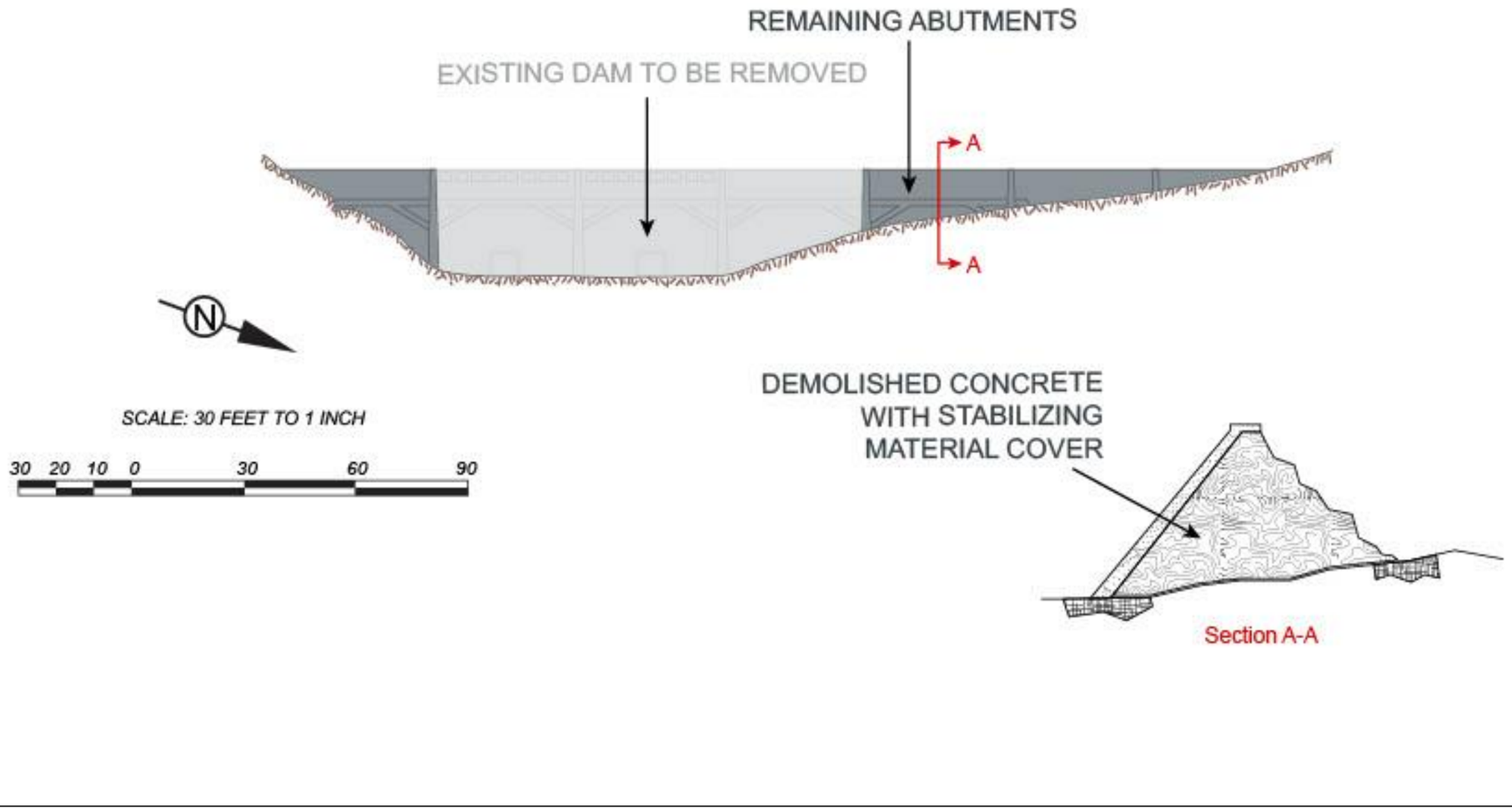

Figure 2. Cross Section of the Existing Agnew Dam and Remaining Abutments Associated with the Partial Dam Removal Alternative

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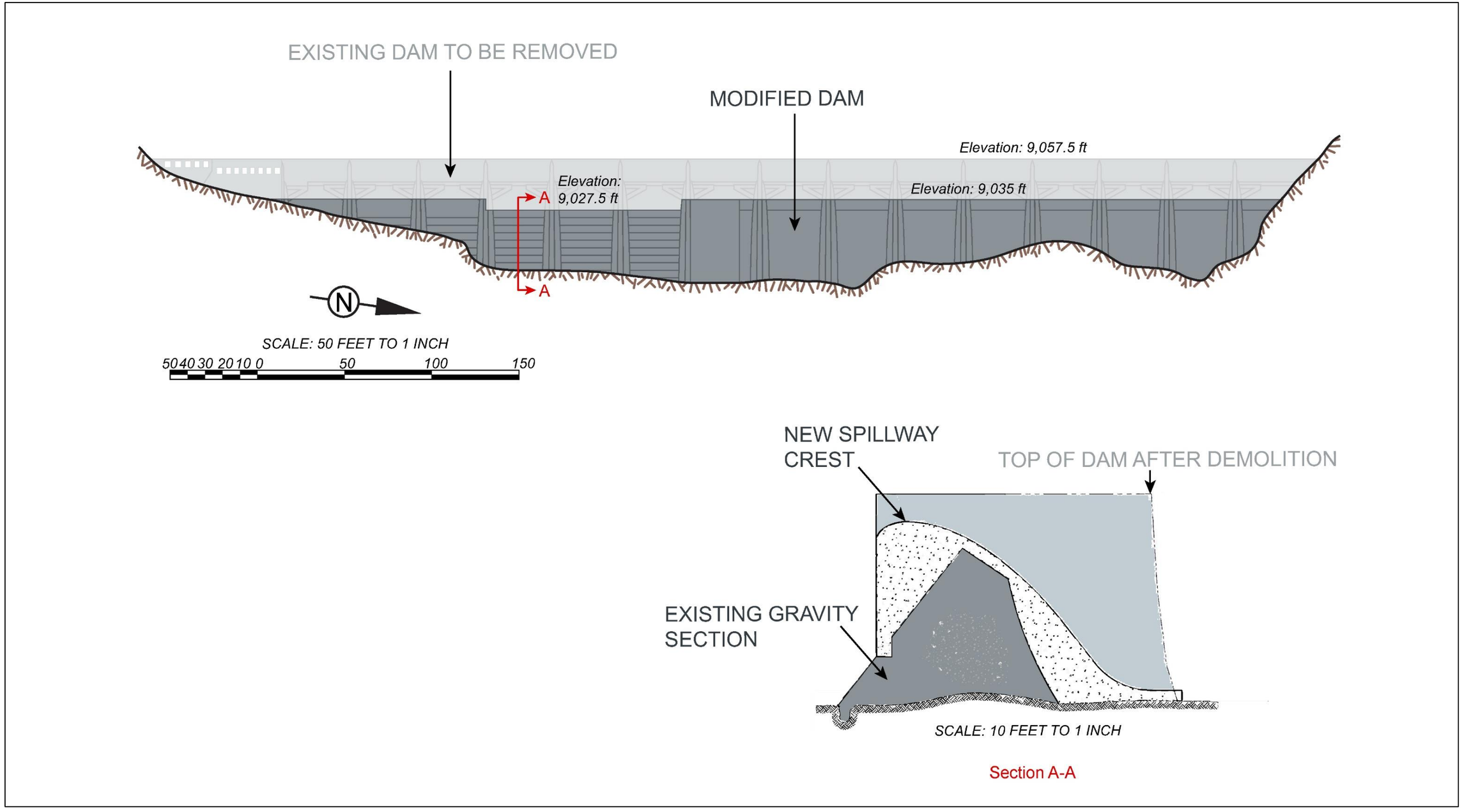

Figure 3. Cross Section of the Existing Gem Dam and Modified Dam Associated with the Gem Dam Retrofitting Alternative

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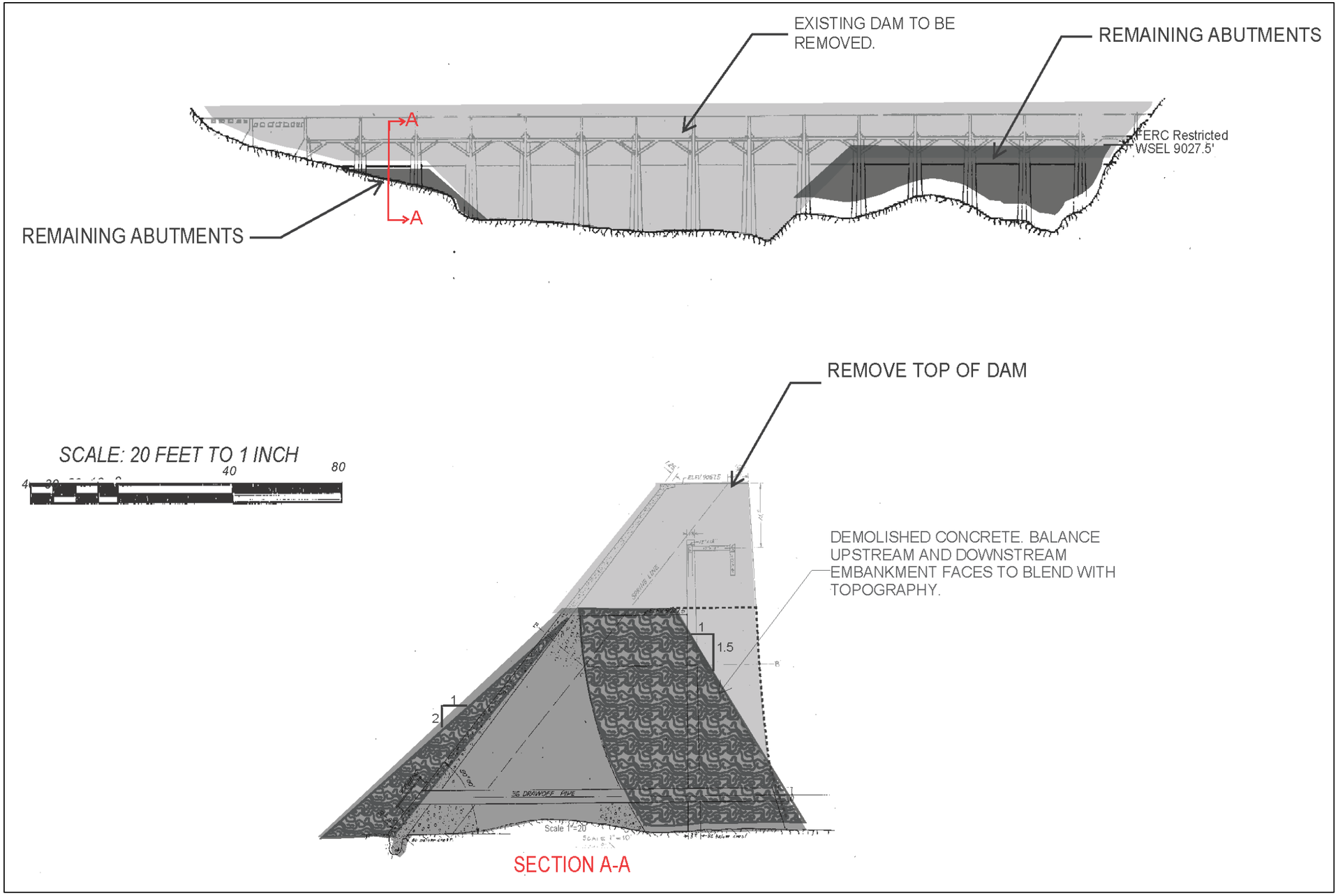

Figure 4. Cross Section of the Existing Gem Dam and Remaining Abutments Associated with the Gem Dam Partial Removal Alternative

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MAPS

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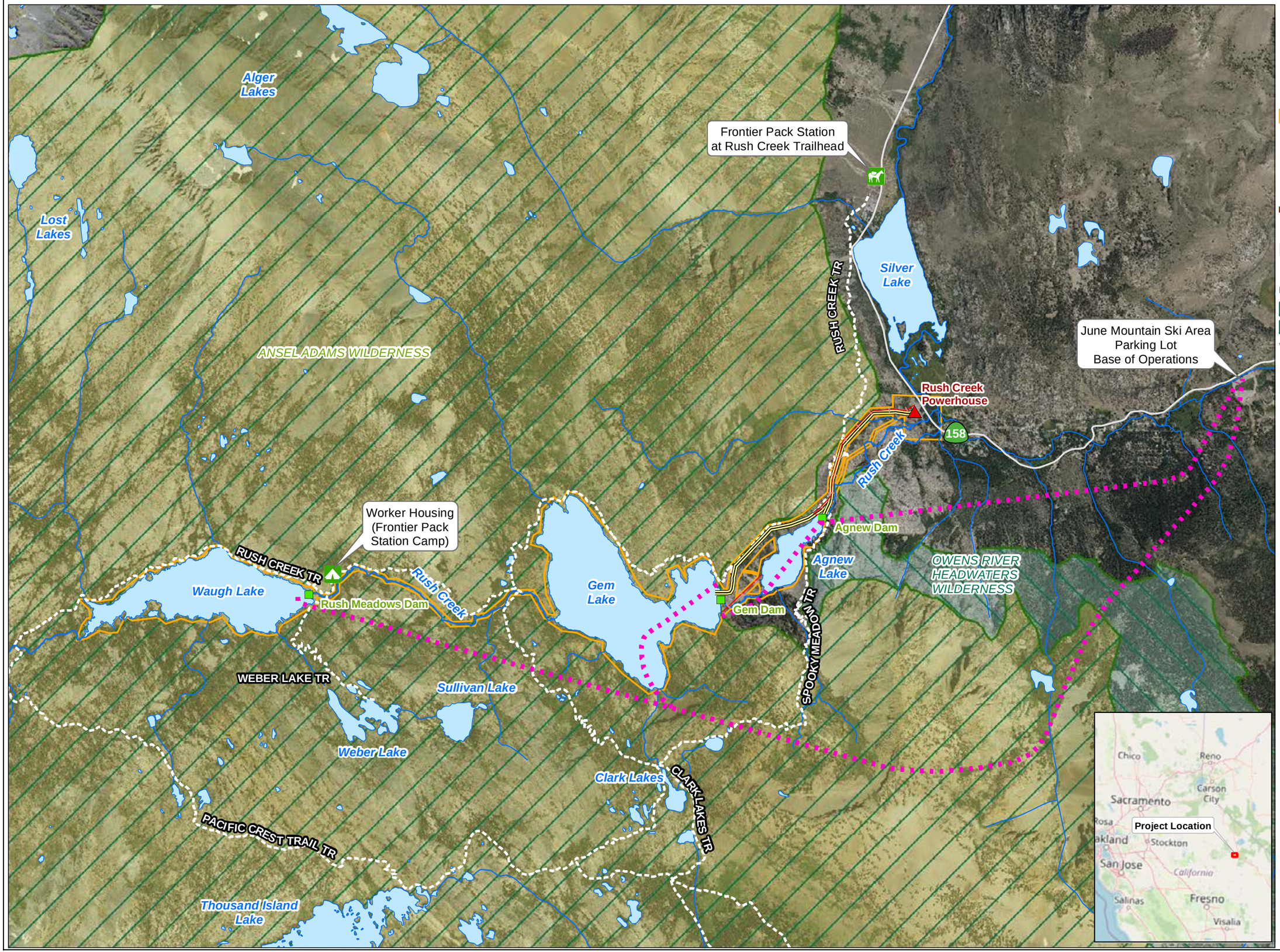

SCE Facilities

- Dam
- Powerhouse
- Flowline / Penstock
- Tramway
- FERC Boundary

Other Features

- Approximate Helicopter Flight Path
- Highway
- County Boundary
- Watercourse
- Lake
- Non-Project Trail

Land Management

National Wilderness Area*

- Ansel Adams Wilderness
- Owens River Headwaters Wilderness

*NOTE: Ansel Adams Wilderness and Owens River Headwaters Wildernes are located on USFS Lands

SOUTHERN CALIFORNIA EDISON
Energy for What's Ahead™

Rush Creek Project (FERC 1389)

Map 1

Location of Base of Operations, Flight Paths, and Recreation Trails

0 1,250 2,500 Feet

Date: 7/2/2024

Projection: UTM Zone 11
Datum: NAD 83

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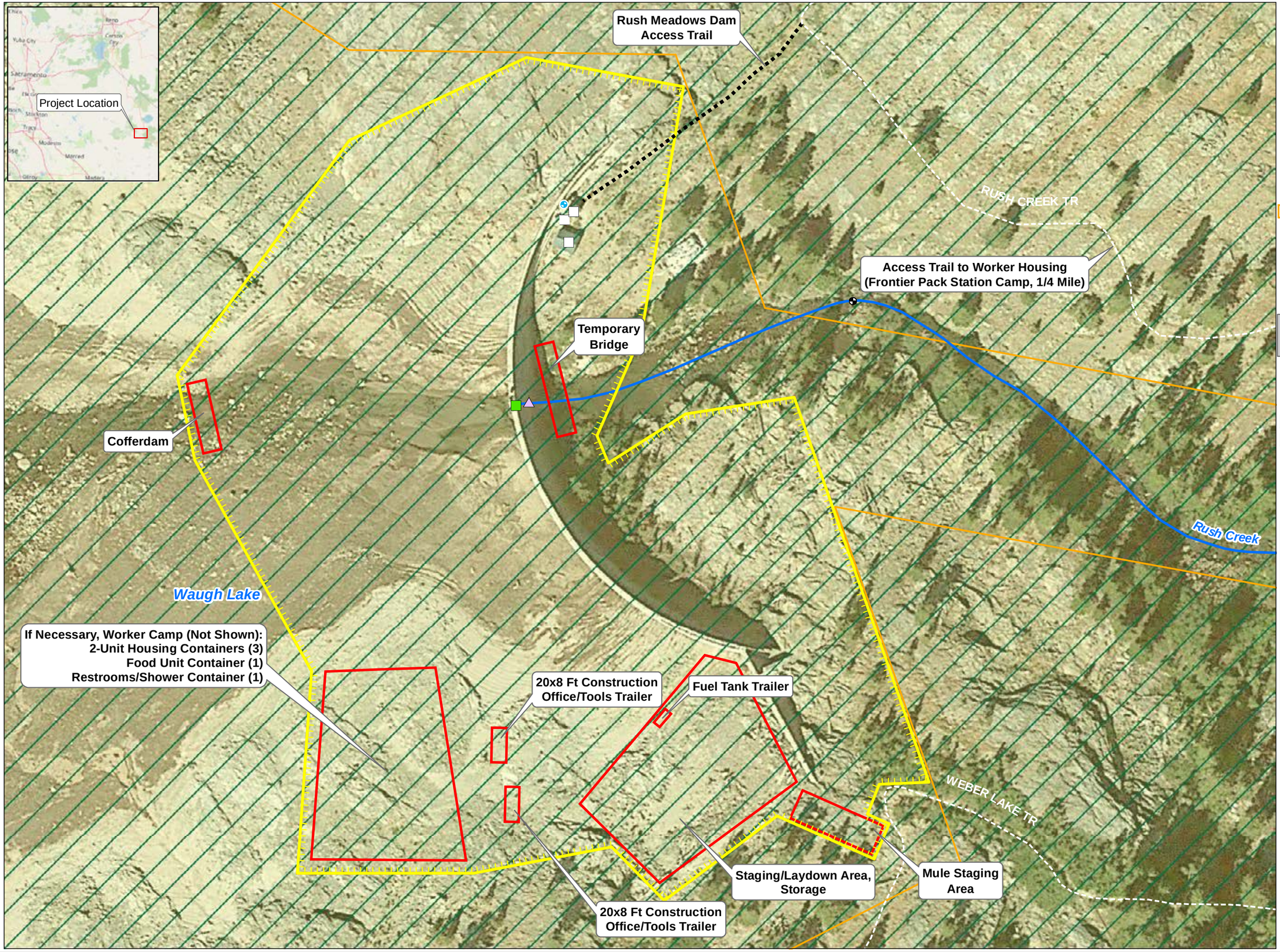


SCE Facilities

- Dam
- Stream Gage
- Reservoir Gage
- Ancillary Facility
- Tramway
- Helicopter Landing Site
- Water Conveyance Feature
- Tailrace
- Tunnel
- Flowline / Penstock
- Power Line
- Comm Line
- Project Road
- Project Trail
- FERC Project Boundary

Other Features

- Watercourse
- Lake
- Non-Project Trail

Construction Features*

- Construction Area
- Other Feature / Area

*** PRELIMINARY AND SUBJECT TO CHANGE**

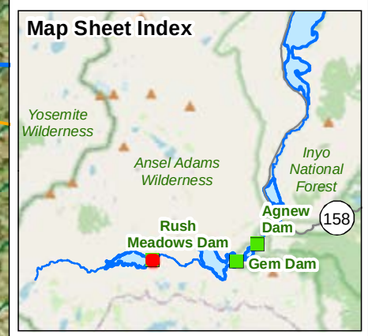
Land Management

National Wilderness Area**

- Ansel Adams Wilderness
- Owens River Headwaters Wilderness

**NOTE: Ansel Adams Wilderness and Owens River Headwaters Wildernes are located on USFS Lands

Map Sheet Index



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Energy for What's Ahead™

Rush Creek Project (FERC 1389)

Map 2

Rush Meadows Dam Construction Area

0 25 50 Feet

Projection: UTM Zone 11
Datum: NAD 83

Date: 7/2/2024

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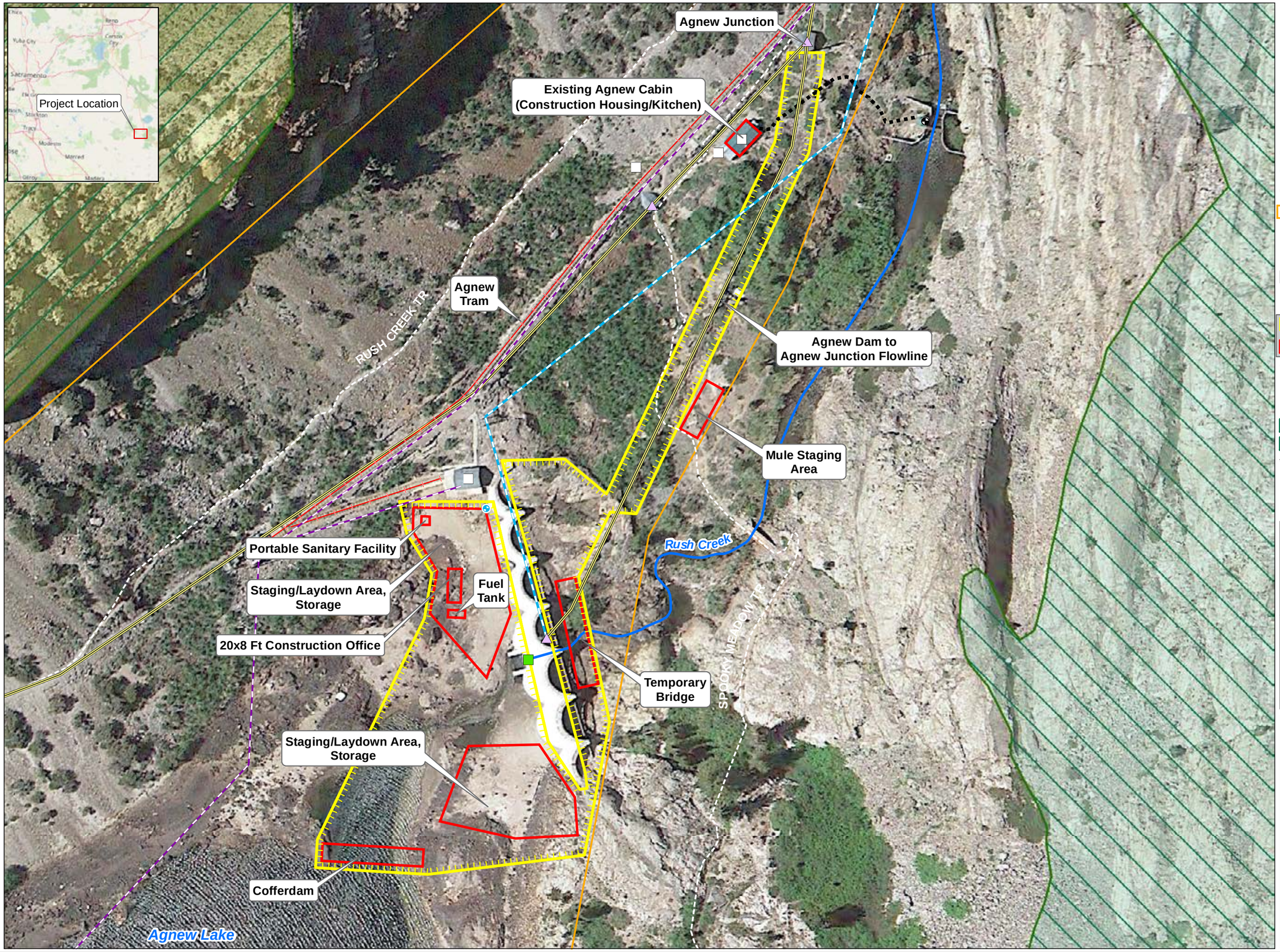


SCE Facilities

- Dam
- Stream Gage
- Reservoir Gage
- Ancillary Facility
- Tramway
- Helicopter Landing Site
- Water Conveyance Feature
- Tailrace
- Tunnel
- Flowline / Penstock
- Power Line
- Comm Line
- Project Road
- Project Trail
- FERC Project Boundary

Other Features

- Watercourse
- Lake
- Non-Project Trail

Construction Features*

- Construction Area
- Other Feature / Area

*** PRELIMINARY AND SUBJECT TO CHANGE**

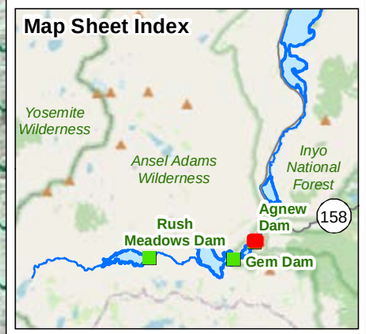
Land Management

National Wilderness Area**

- Ansel Adams Wilderness
- Owens River Headwaters Wilderness

**NOTE: Ansel Adams Wilderness and Owens River Headwaters Wildernes are located on USFS Lands

Map Sheet Index



SOUTHERN CALIFORNIA EDISON
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Rush Creek Project (FERC 1389)

Map 3

Agnew Dam Construction Area

0 25 50 Feet

Date: 7/2/2024

Projection: UTM Zone 11
Datum: NAD 83

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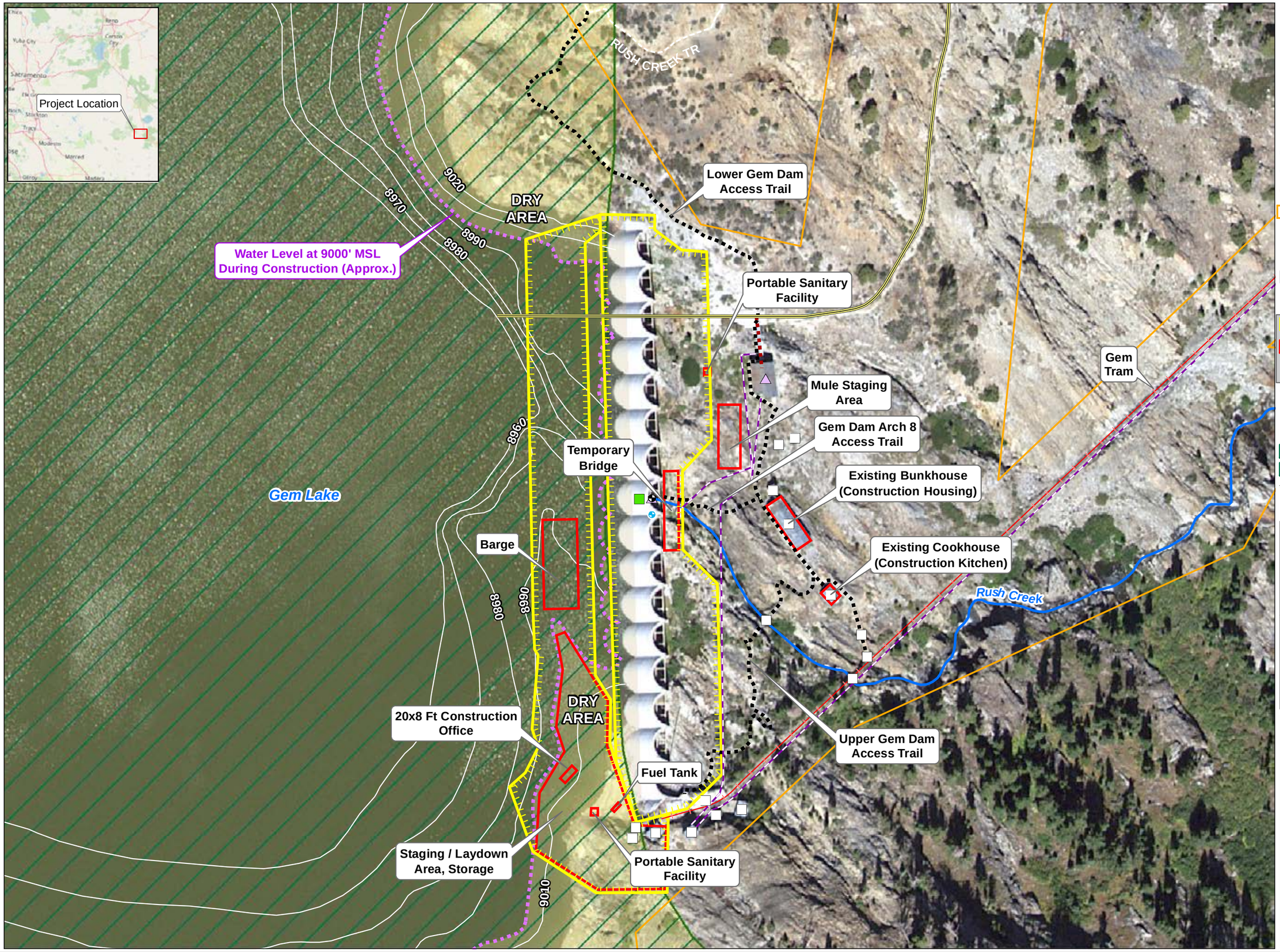


SCE Facilities

- Dam
- Stream Gage
- Reservoir Gage
- Ancillary Facility
- Tramway
- Helicopter Landing Site
- Water Conveyance Feature
- Tailrace
- Tunnel
- Flowline / Penstock
- Power Line
- Comm Line
- Project Road
- Project Trail
- FERC Project Boundary

Other Features

- Watercourse
- Lake
- Non-Project Trail

Construction Features*

- Construction Area
- Other Feature / Area
- Water Level at 9000' MSL (Approx.)

*** PRELIMINARY AND SUBJECT TO CHANGE**

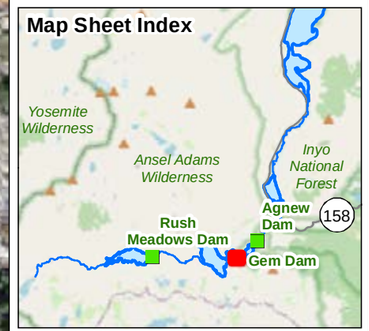
Land Management

National Wilderness Area**

- Ansel Adams Wilderness
- Owens River Headwaters Wilderness

**NOTE: Ansel Adams Wilderness and Owens River Headwaters Wildernes are located on USFS Lands

Map Sheet Index



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Rush Creek Project (FERC 1389)

Map 4a

Gem Dam Construction Area - Dam Retrofitting

0 25 50 Feet

Projection: UTM Zone 11
Datum: NAD 83

Date: 7/2/2024

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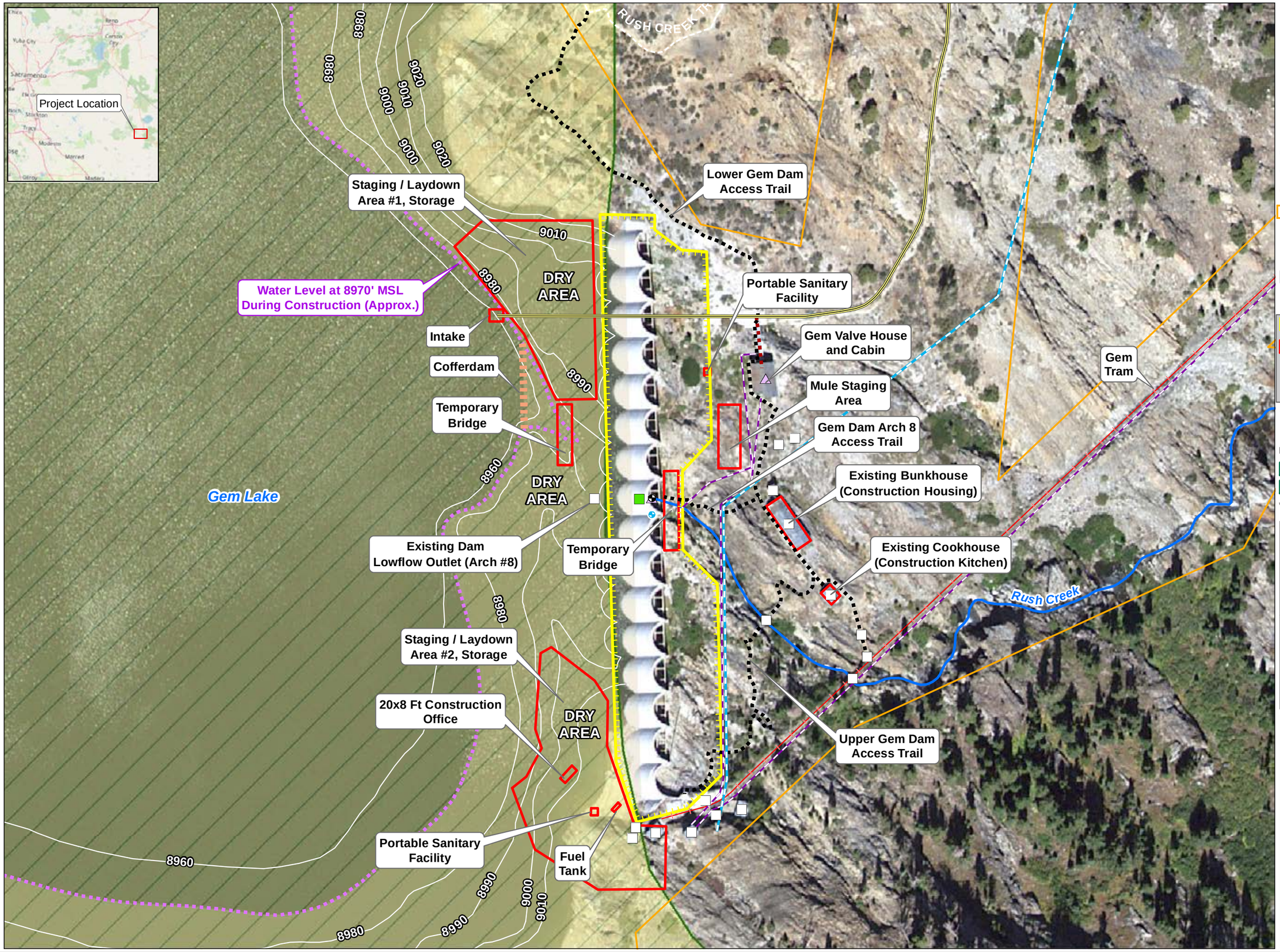


SCE Facilities

- Dam
- Stream Gage
- Reservoir Gage
- Ancillary Facility
- Tramway
- Helicopter Landing Site
- Water Conveyance Feature
- Tailrace
- Tunnel
- Flowline / Penstock
- Power Line
- Comm Line
- Project Road
- Project Trail
- FERC Project Boundary

Other Features

- Watercourse
- Lake
- Non-Project Trail

Construction Features*

- Construction Area
- Other Feature / Area
- Cofferdam
- Water Level at 8970' MSL (Approx.)

*** PRELIMINARY AND SUBJECT TO CHANGE**

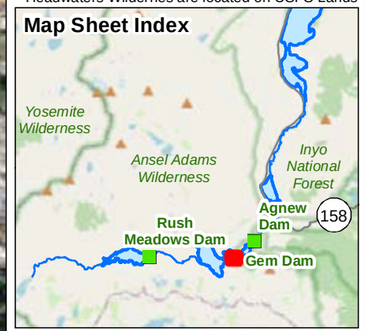
Land Management

National Wilderness Area**

- Ansel Adams Wilderness
- Owens River Headwaters Wilderness

**NOTE: Ansel Adams Wilderness and Owens River Headwaters Wildernes are located on USFS Lands

Map Sheet Index



SOUTHERN CALIFORNIA EDISON
Energy for What's Ahead℠

Rush Creek Project (FERC 1389)

Map 4b

Gem Dam Construction Area
Full / Partial Dam Removal

0 25 50 100 Feet

Projection: UTM Zone 11
Datum: NAD 83

Date: 7/2/2024

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APPENDIX B
Estimate of Costs for Each Alternative

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1 ESTIMATE OF COSTS FOR EACH ALTERNATIVE

1.1 INTRODUCTION

The Federal Energy Regulatory Commission (FERC) Study Plan Determination (FERC 2022) requested Southern California Edison (SCE) to conduct a study to evaluate the effects of decommissioning the Rush Creek Project (Project). For each decommissioning alternative, FERC requested that SCE provide estimates of the associated capital, operational (including lost power production), and maintenance costs. This attachment summarizes current Project operations for context and identifies the decommissioning alternatives and their associated costs (Table B-1). Methods for determining costs are provided below the table.

1.2 CURRENT PROJECT OPERATIONS

Current Project operations at each reservoir are summarized below:

- Waugh Lake – Waugh Lake storage is maintained below the seismic restriction (9,321.1 feet elevation) reducing storage in Waugh Lake to 1,555 acre-feet (ac-ft). During the winter and early spring, the reservoir is completely drained (the low-level outlets are left open). Since approximately 2017, the low-level outlets have generally been left open year-round. The notching of the spillway in 2018 facilitates compliance with the FERC-mandated reservoir elevation restrictions.

- Agnew Lake – Agnew Lake is no longer used for storing water or power generation. A pre-Project natural lake is present with a maximum elevation of 8,470 feet and gross storage of 569 ac-ft. Currently, the 30-inch low-level outlet is fully opened to manage water levels in Agnew Lake and pass water downstream. If inflow during the runoff season exceeds the capacity of the low-level outlet, water will be impounded in the reservoir, potentially up to the bottom of the notches in Arches No. 5 and No. 6.

- Gem Lake – Gem Lake fills up to the maximum seismic restriction capacity of 10,752 ac-ft (9,027.5 feet elevation) and maintains storage through the summer. Most of the storage is released in the fall and the reservoir remains low until spring high flows refill it the following year.

1.3 DECOMMISSIONING ALTERNATIVES AND ASSOCIATED COSTS AND POWER PRODUCTION

The following dam decommissioning alternatives at Rush Meadows Dam (Waugh Lake), Agnew Dam, and Gem Dam are being evaluated.

Rush Meadows Dam

- Full dam removal

- Partial dam removal (abutments remain)

Agnew Dam

- Full dam removal
- Partial dam removal (abutments remain)

Gem Dam

- Dam retrofit / continued operation of Rush Creek Powerhouse
- Full dam removal
- Partial dam removal (abutments remain)

Table B-1 provides information requested by FERC to facilitate evaluation of decommissioning alternatives for the Project. A description of the approach to determine costs is provided below.

Table B-1. Decommissioning Alternatives and Associated Costs and Power Production

Project Decommissioning Alternative	Capital Costs of Decommissioning/ Retrofitting	Annual Operating Costs	Annual Maintenance Costs	Annual Power Production (MWh)
Rush Meadows Dam Decommissioning				
Full Dam Removal	$45,980,000	-	-	-
Partial Dam Removal	$13,800,000	-	$10,000	-
Agnew Dam Decommissioning				
Full Dam Removal	$20,570,000	-	-	-
Partial Dam Removal	$9,200,000	-	$10,000	-
Gem Dam Retrofitting/Decommissioning				
Dam Retrofit / Continued Operations of Rush Creek Powerhouse	$71,300,000	$910,738	$278,259	35,709 MWh
Full Dam Removal	$235,950,000	-	-	-35,709 MWh
Partial Dam Removal	116,160,000	-	$10,000	-35,709 MWh

1.3.1 Approach to Determine Costs

1.3.1.1 Capital Costs of Decommissioning / Retrofitting

- Capital costs of decommissioning/retrofitting are Class 4 cost estimates.

- Capital costs associated with decommissioning of Rush Meadows and Agnew dams and retrofitting, or removal of Gem Dam represent the total construction costs.

- Costs associated with permitting, restoration, monitoring, and mitigation measures of dam decommissioning alternatives and enhancement of the lower Rush Creek channel are not included as these items are either unknown at this time or have not been developed.

1.3.1.2 Annual Operating Costs

- There are no operating costs associated with Rush Meadows or Agnew dams.

- Based on SCE's FERC Form 1 submittals for the previous five years (2019-2023), annual operating costs for the Rush Creek Project (total costs for all developments) were tallied and the annual average operating costs determined ($1,138,422). SCE estimates that continued operation of Gem Dam, Rush Creek Powerhouse, and above-ground flowlines/penstocks represents 80% of total Project operating costs ($910,738).

1.3.1.3 Annual Maintenance Cost

- No annual maintenance costs are assumed for full removal of Rush Meadows, Agnew, and Gem dams.

- Annual maintenance costs associated with partial removal of Rush Meadows, Agnew, and Gem dams include periodic inspection and maintenance of remaining abutments for the first five years following removal activities. It is assumed that once the abutments are considered stable that annual maintenance will no longer be required.

- Based on SCE's FERC Form 1 submittals for the previous five years (2019-2023), annual maintenance costs for the Rush Creek Project (total costs for all developments) were tallied and the annual average maintenance costs determined ($347,824). SCE estimates that continued maintenance of Gem Dam, Rush Creek Powerhouse, and above-ground flowlines/penstocks represents 80% of total Project maintenance costs ($278,259).

1.3.1.4 Annual Power Production

- Since approximately 2017, the low-level outlets at Rush Meadows Dam have been left open year-round; therefore, over the last five-year period (2019-2023) Rush Meadows Dam has not contributed to annual power production.

- In 2017, Agnew Dam and Flowline were modified such that no water is impounded or diverted into the powerhouse; therefore, over the last five-year period (2019-2023) Agnew Dam has not contributed to annual power production.

- Annual power production for Gem Dam represents average annual power generation over the last five-year period (2019-2023). Annual power production associated with Gem Dam retrofitting is positive representing the amount of generation that would be possible with Gem Lake having 10,752 ac-ft of storage and direct diversion capabilities following the retrofit.

- Annual power production associated Gem Dam decommissioning (full and partial) is negative representing lost generation from the absence of the dam and associated loss of storage (below the seismic restriction) in Gem Lake (10,752 ac-ft) and loss of direct diversion capability.

1.4 REFERENCES

FERC (Federal Energy Regulatory Commission). 2022. Rush Creek Hydroelectric Project (FERC Project No. 1389). Study Plan Determination. October.

APPENDIX C
Flow and Water Level Changes Under Each Alternative

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1.0 INTRODUCTION

The Federal Energy Regulatory Commission (FERC) Study Plan Determination (FERC 2022) required Southern California Edison (SCE) to conduct a study to evaluate the effects of decommissioning the Rush Creek Project (Project). Appendix C provides an initial hydrology analysis of the potential for localized flooding to occur in the vicinity of Highway 158. Refer to Map 1 for the area of interest. Detailed analysis of localized flooding is currently being conducted as part of the AQ-1 Instream Flow Technical Study with results available in June 2024. The appendix also provides a description of the Rush Creek Project reservoir levels and stream flow conditions under each alternative as modeled in the AQ 2 – Hydrology Technical Study. Modeling includes the 1990–2022 period-of-record (POR) for Unimpaired Flow (Full Dam Decommissioning), Proposed Project (Gem Dam retrofitting and removal of Agnew and Rush Meadows dams), and the Existing Condition (operations of the Project under the current seismic restrictions). Reservoir storage is provided for Waugh (Rush Meadows Dam), Gem, and Agnew lakes. Flow is provided at five locations, Rush Creek below Rush Meadows Dam, Rush Creek below Gem Dam, Rush Creek below Agnew Dam, and Rush Creek below Silver Lake.

2.0 RESULTS

2.1 POTENTIAL FLOODING

Based on recent hydrology and site observations, potential localized flooding may occur near Highway 158 in the vicinity of Dream Mountain Estates and Lockhart properties when total flows through Silver Lake are in the range of approximately 600 cubic feet per second (cfs) as occurred spring of 2017, 2019, and 2023. Map C-2 shows the standing water conditions near the Dream Mountain Estates and Lockhart properties on July 13, 2023, when flows through Silver Lake were 566 cfs. Localized flooding was more extensive in 2017, however, aerial photograph was unavailable. Table C-1 shows the frequency (days and years) that flows exceed 500 cfs and 600 cfs under each of the flow scenarios (Unimpaired Flow, Proposed Project, Existing Condition) for the 1990–2022 POR.

Flows exceeded the 600 cfs threshold for potential flooding in 13 of the 33 years for both the Unimpaired Flow and Proposed Project (36%) during the POR (Table C-1). For the Unimpaired Flow, the total number of days >600 cfs was 135 days compared to 102 days for the Proposed Project. For the Existing Condition, flows exceeded 600 cfs in 8 of 33 years (24%) and the total number of days flow was >600 cfs for the POR was 67 days.

2.2 RESERVOIR STORAGE AND FLOWS

Figures C-1 through C-3 show Waugh, Gem, and Agnew Lake storage levels, respectively, for the POR. Waugh Lake only stores a small amount of water under the Existing Condition when spring inflows exceed the capacity of the low level outlets. Agnew Lake has no storage under any of the scenarios.

Figures C-4 through C-7 show flows in Rush Creek below Rush Meadows Dam, Rush Creek below Gem Dam, Rush Creek below Agnew Dam, and Rush Creek below Silver Lake, respectively. Figure C-7, Rush Creek below Silver Lake flows, includes inflows to Silver Lake from the Project and additional local tributaries unaffected by the Rush Creek Project (Reversed Creek, Alger's Creek, and unnamed tributaries). These local tributaries affect the potential flooding conditions (discussed above), by either increasing the elevation of Silver Lake (creating backwater effects at Highway 158) and/or contributing to overbank flows in the potential flooding areas (Reversed Creek, unnamed tributary).

TABLES

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Table C-1. Modeled Rush Creek Flows below Silver Lake (Days above 500 cfs and 600 cfs)

Year	Scenarios					
	Days above 500 cfs			Days above 600 cfs		
	Unimpaired Flow (Full Dam Decommissioning)	Proposed Project	Existing Condition	Unimpaired Flow (Full Dam Decommissioning)	Proposed Project	Existing Condition
1990	0	0	0	0	0	0
1991	2	0	0	0	0	0
1992	0	0	0	0	0	0
1993	7	7	3	1	1	0
1994	0	0	0	0	0	0
1995	38	31	33	23	23	18
1996	9	4	1	2	2	0
1997	7	2	1	2	2	1
1998	32	23	21	10	5	3
1999	5	3	0	0	0	0
2000	8	3	0	0	0	0
2001	5	0	0	1	0	0
2002	0	0	0	0	0	0
2003	10	5	0	7	1	0
2004	0	0	0	0	0	0
2005	30	14	8	10	6	0
2006	35	23	25	9	6	2
2007	0	0	0	0	0	0
2008	0	0	0	0	0	0
2009	1	0	0	0	0	0
2010	16	15	12	11	10	3
2011	26	25	25	17	15	9
2012	0	0	0	0	0	0
2013	0	0	0	0	0	0
2014	0	0	0	0	0	0
2015	0	0	0	0	0	0
2016	1	0	0	0	0	0
2017	52	39	36	31	21	23
2018	2	3	1	0	1	0

Year	Scenarios					
	Days above 500 cfs			Days above 600 cfs		
	Unimpaired Flow (Full Dam Decommissioning)	Proposed Project	Existing Condition	Unimpaired Flow (Full Dam Decommissioning)	Proposed Project	Existing Condition
2019	16	11	15	11	9	8
2020	0	0	0	0	0	0
2021	0	0	0	0	0	0
2022	0	0	0	0	0	0
Total Days	**302**	**208**	**181**	**135**	**102**	**67**
Total Years	**19**	**15**	**12**	**13**	**13**	**8**

FIGURES

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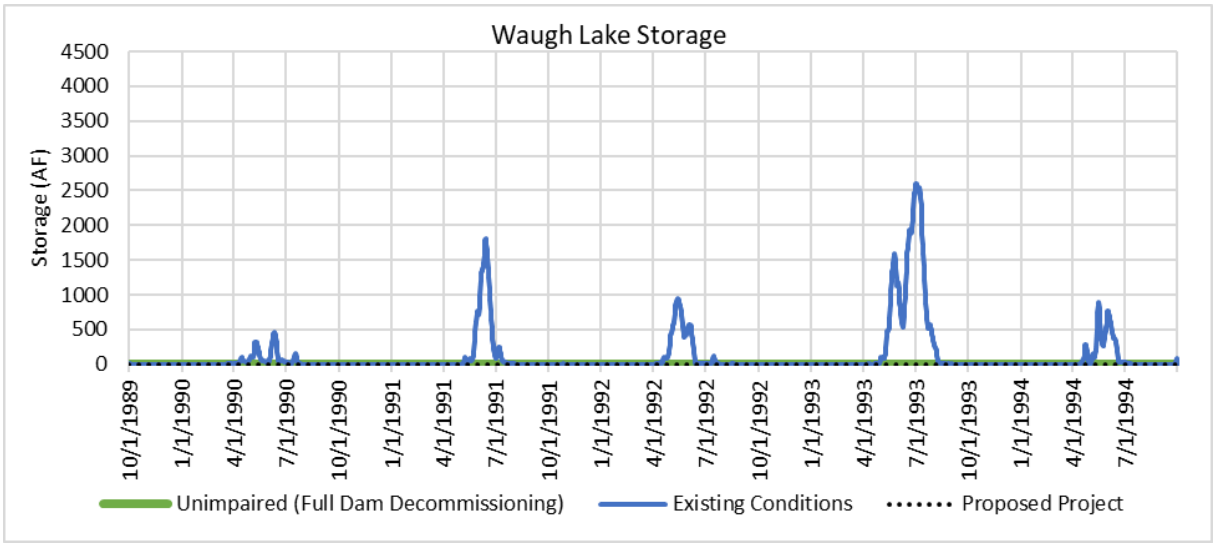
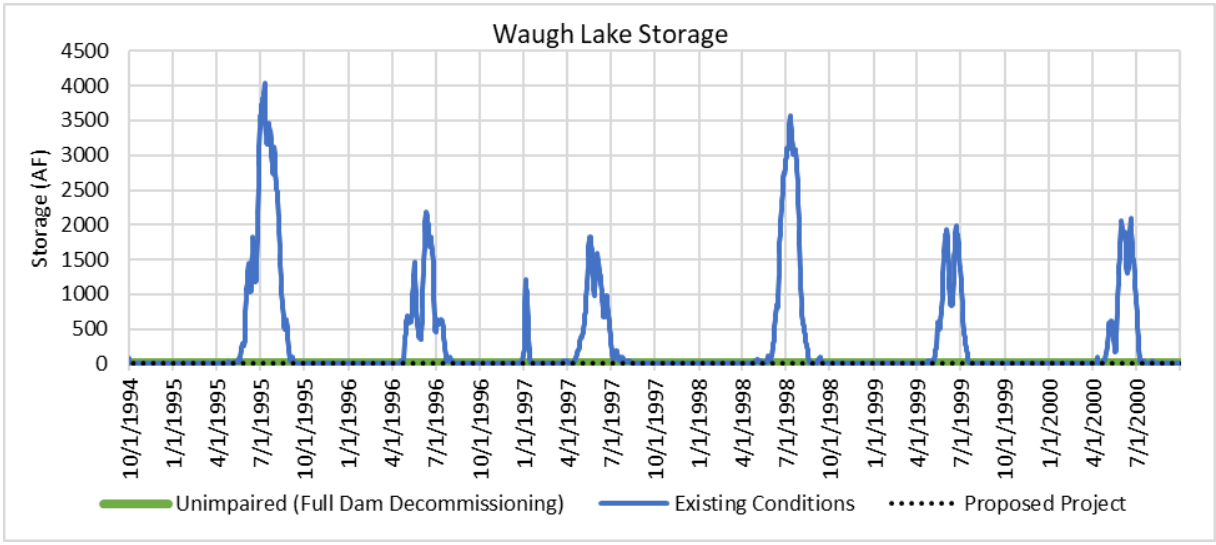




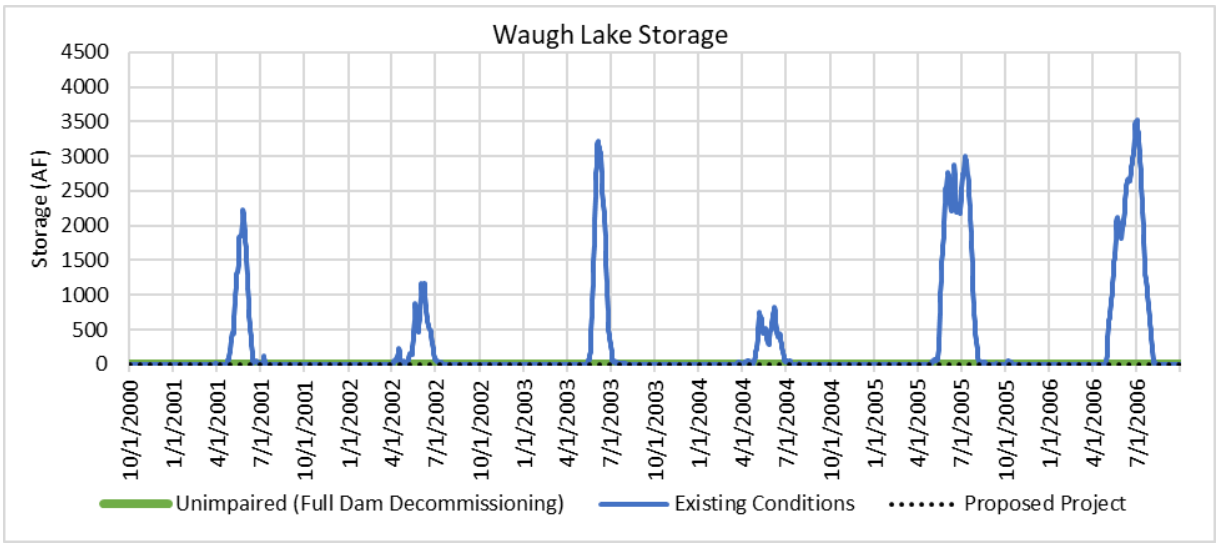


Figure C-1. Modeled Waugh Lake Storage

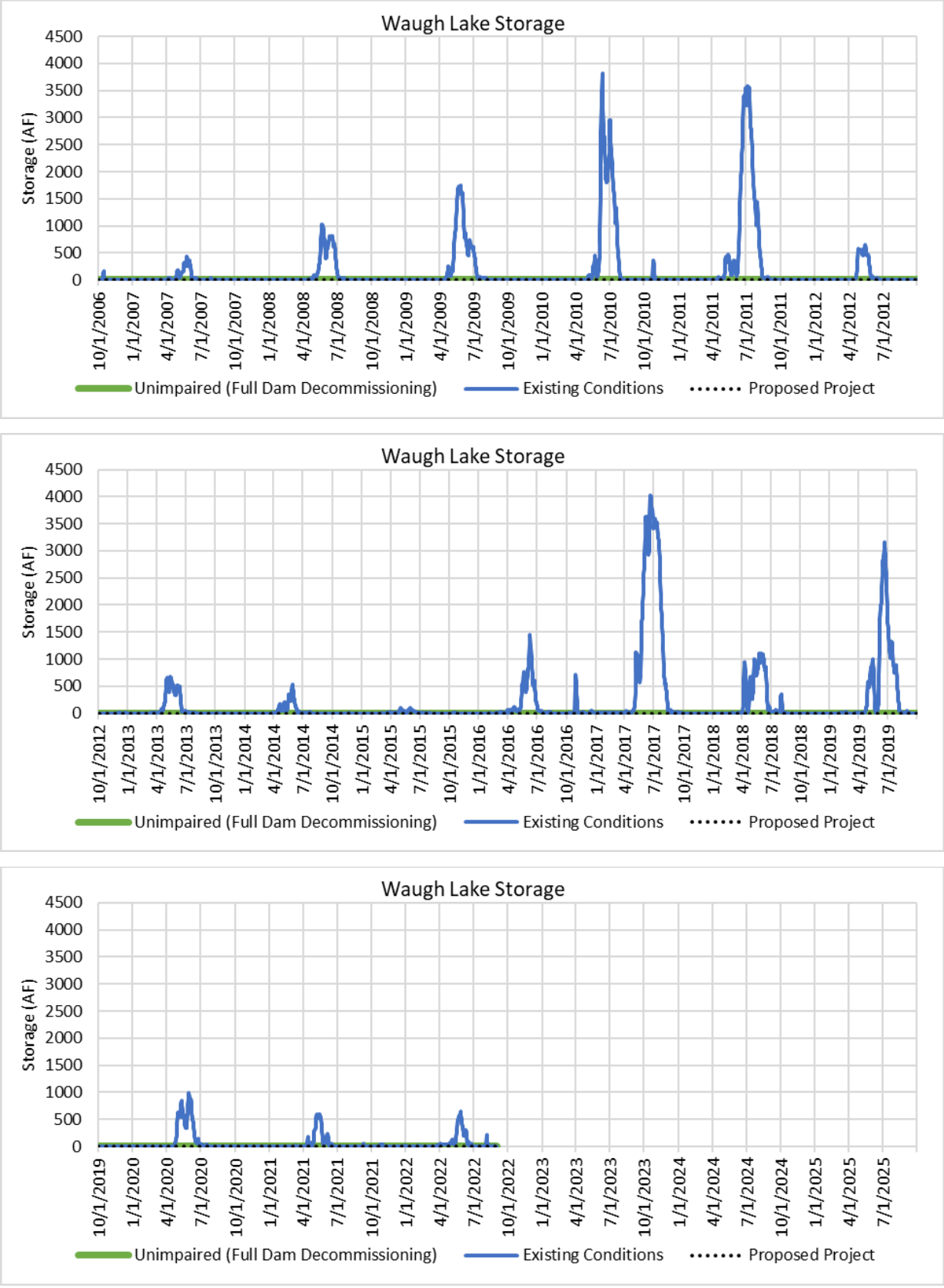
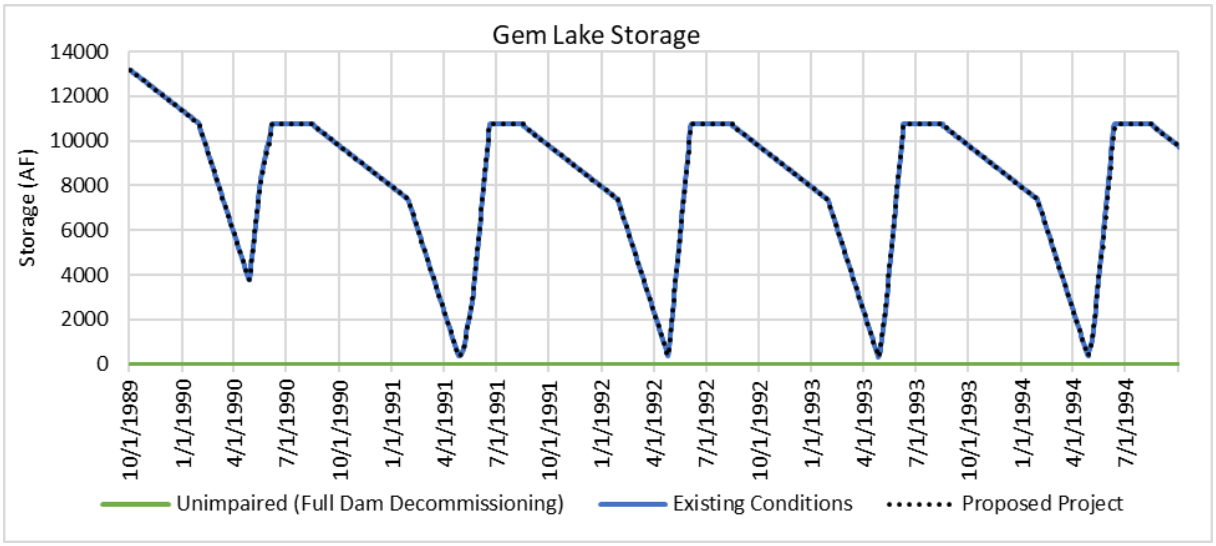
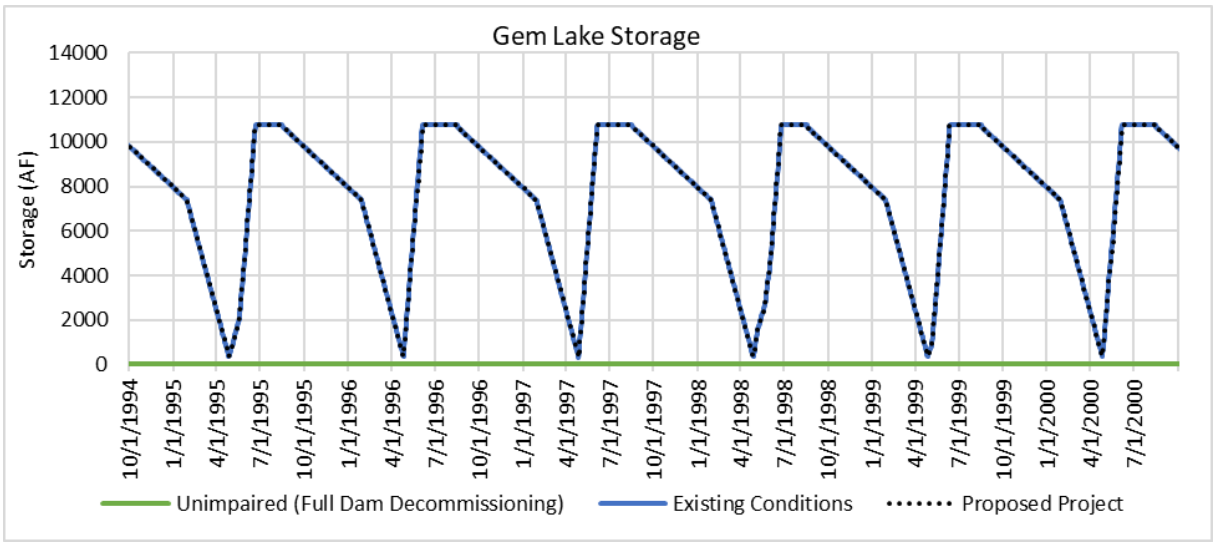


Figure C-1 (continued). Modeled Waugh Lake Storage





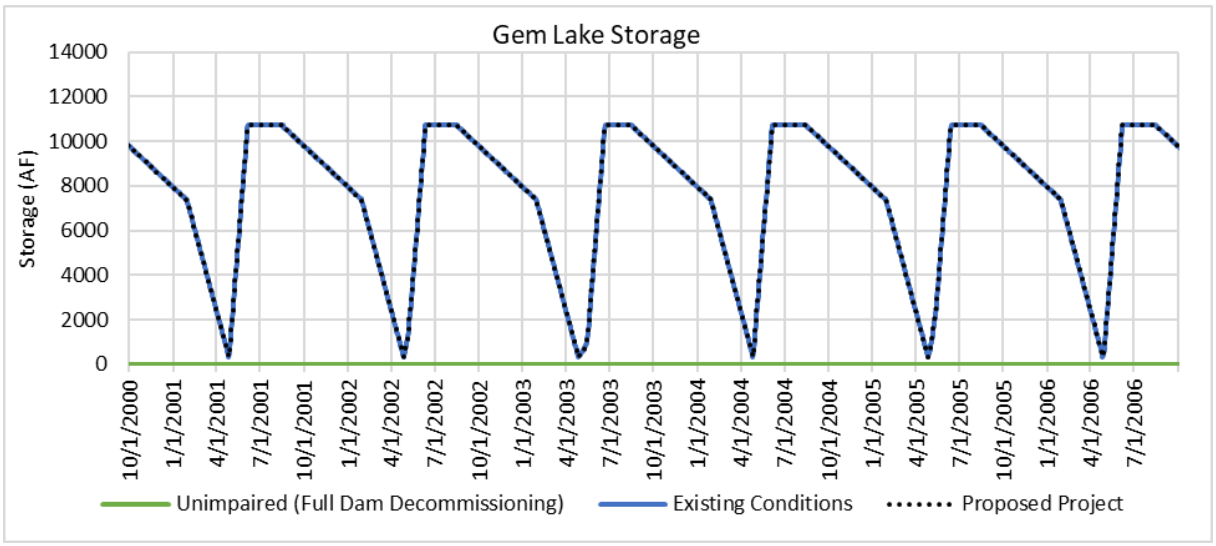
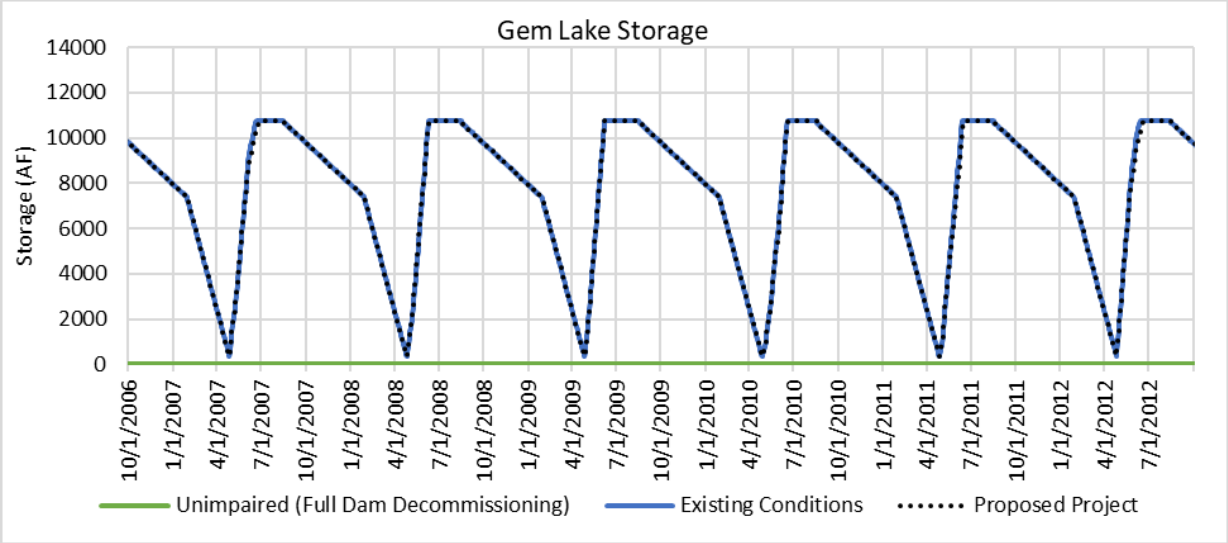
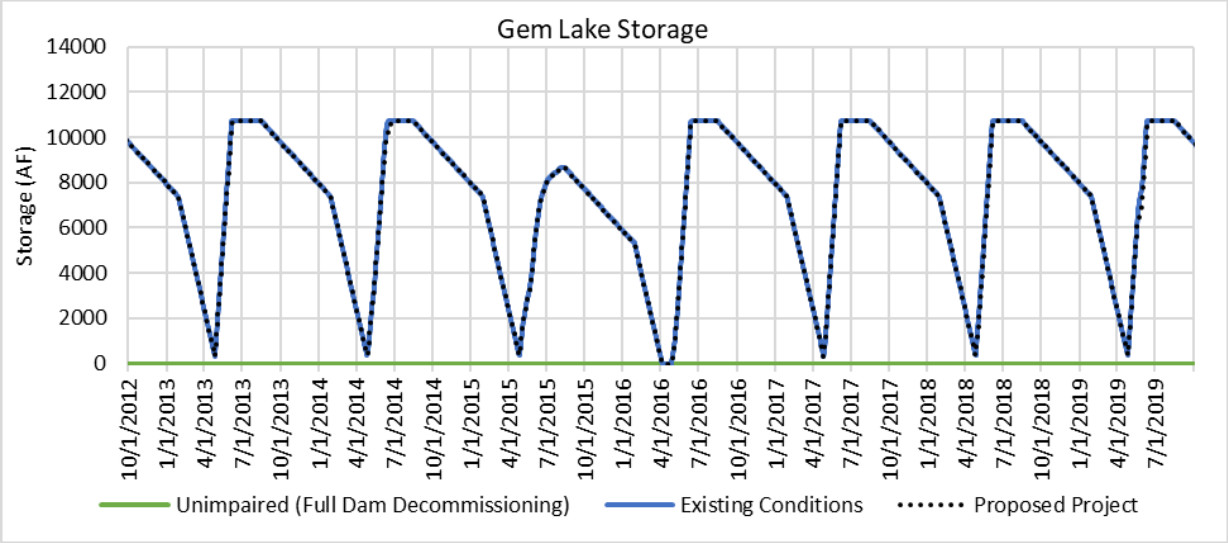


Figure C-2. Modeled Gem Lake Storage





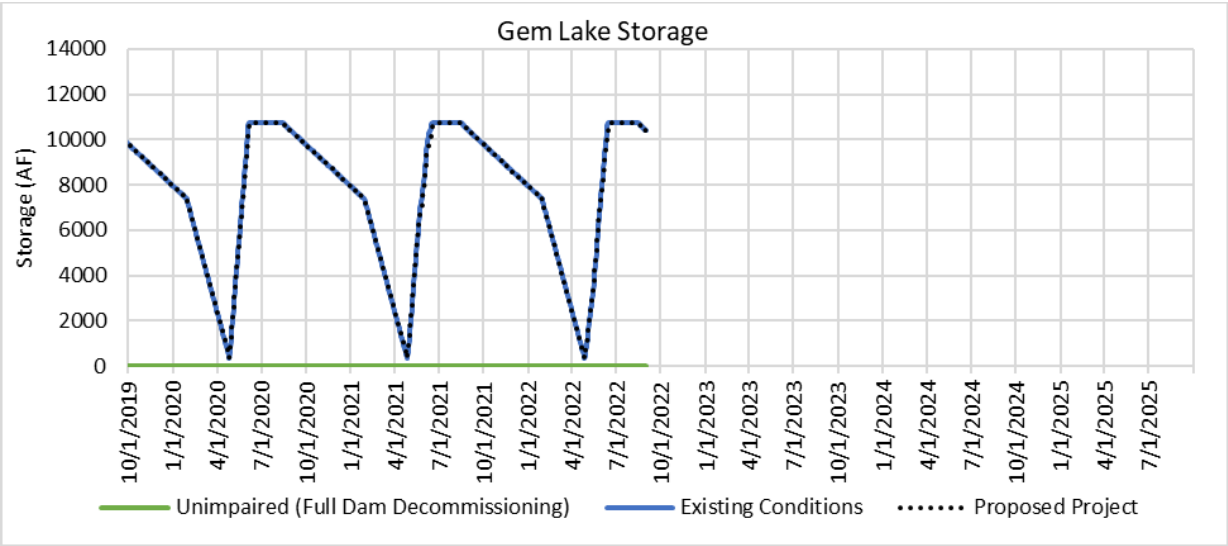
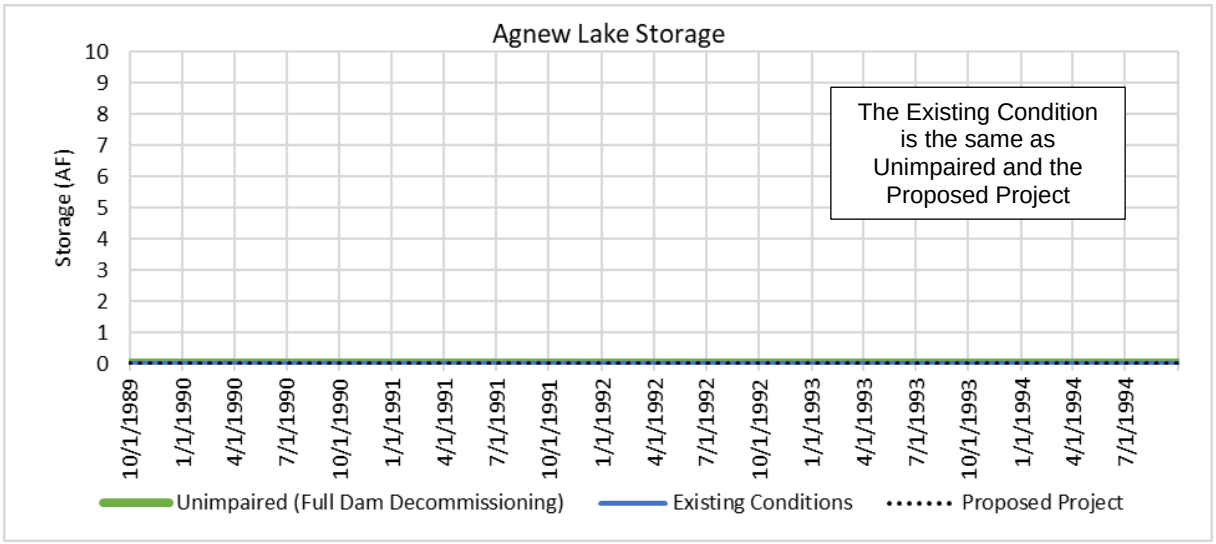
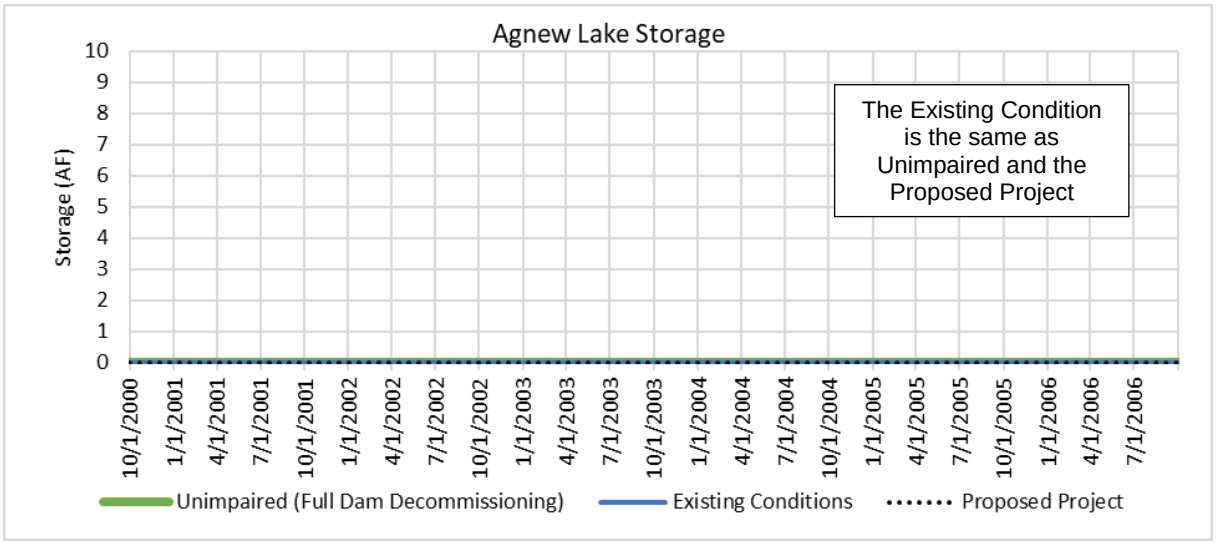


Figure C-2 (continued). Modeled Gem Lake Storage





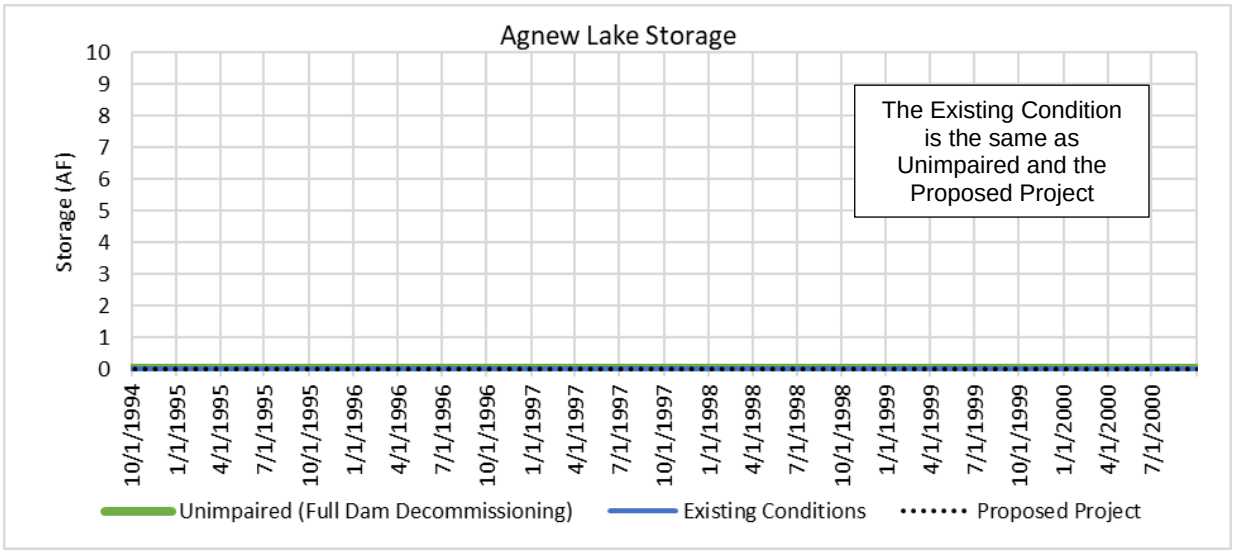
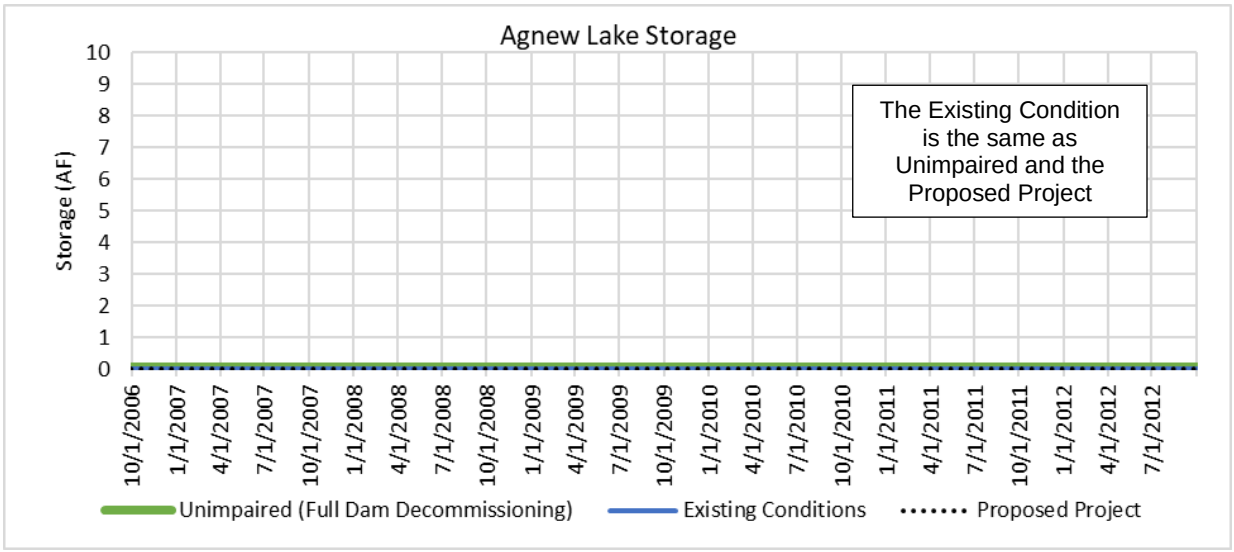
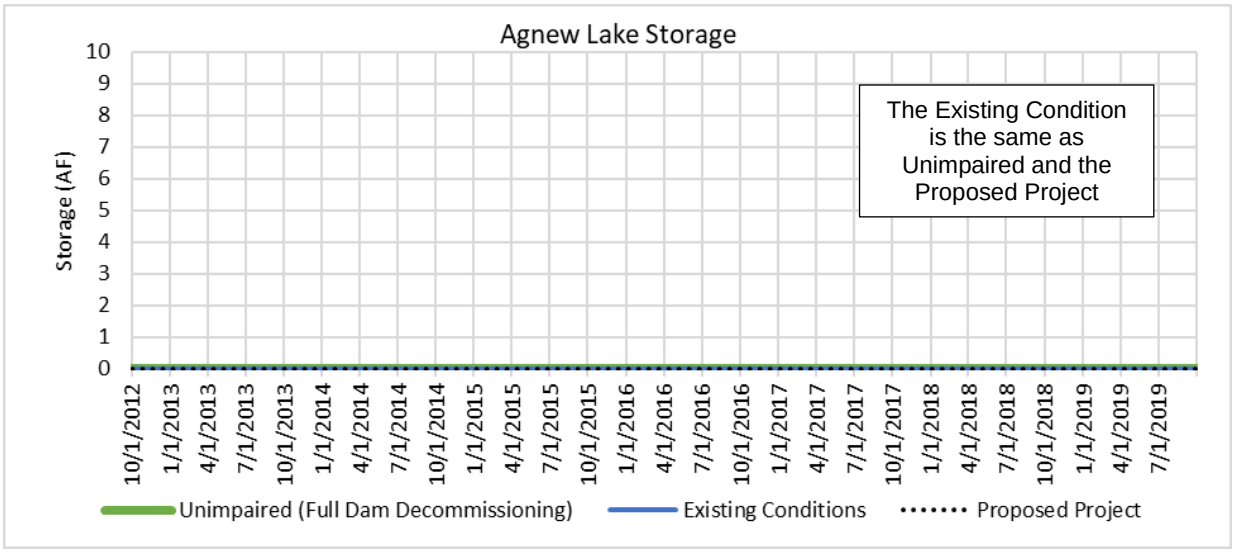


Figure C-3. Modeled Agnew Lake Storage





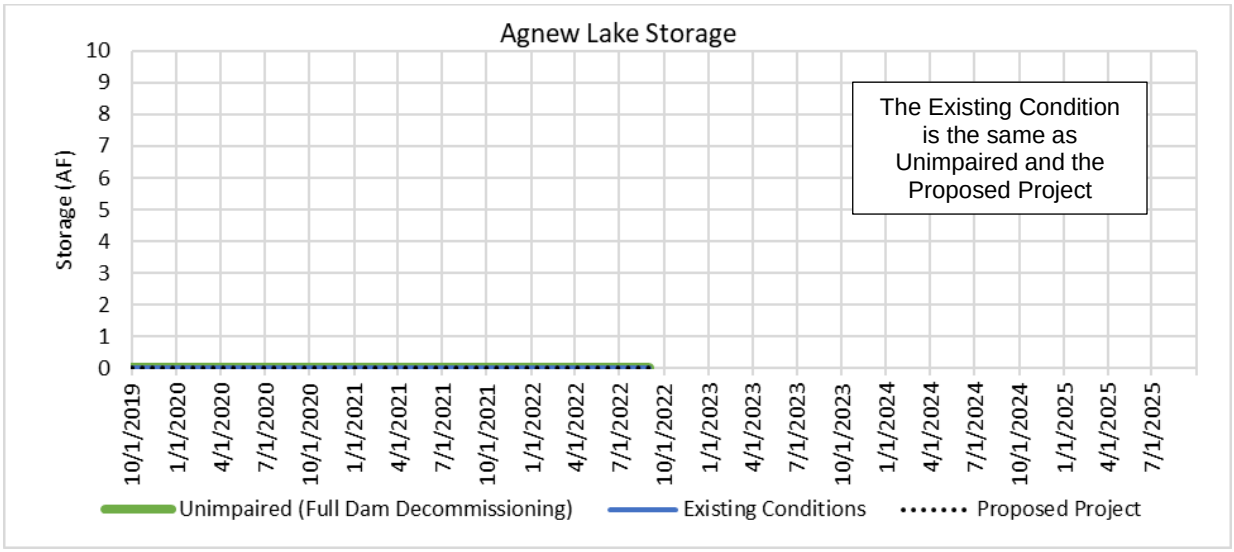
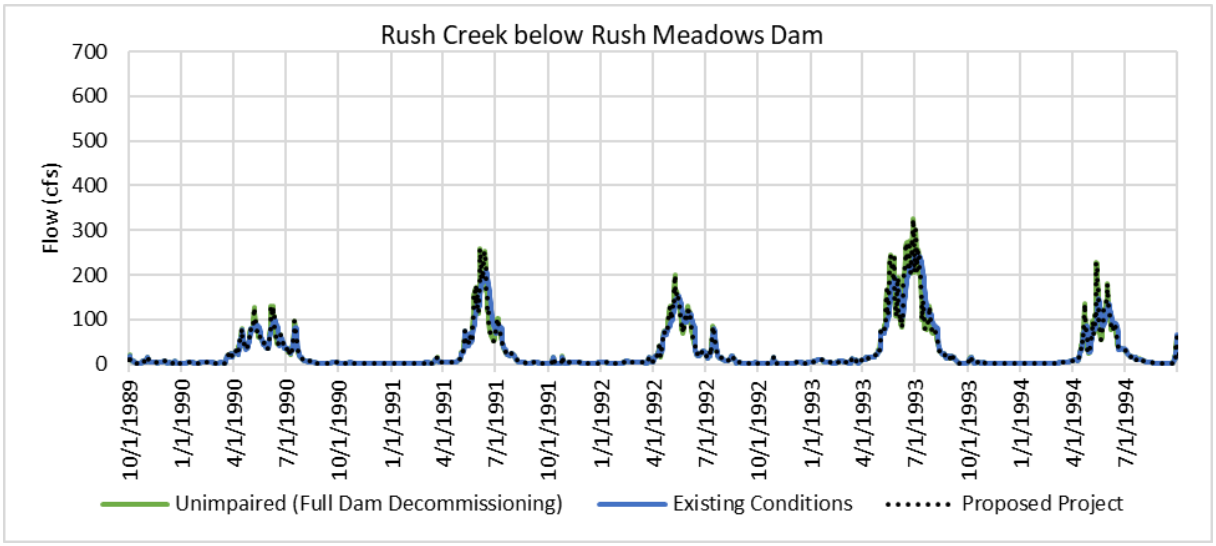
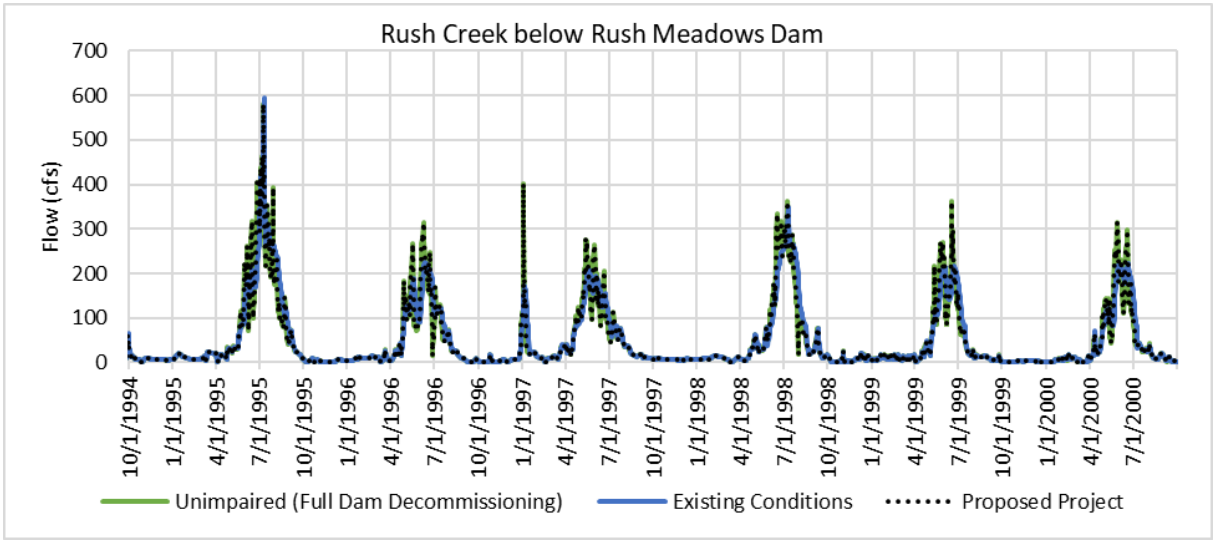


Figure C-3 (continued). Modeled Agnew Lake Storage





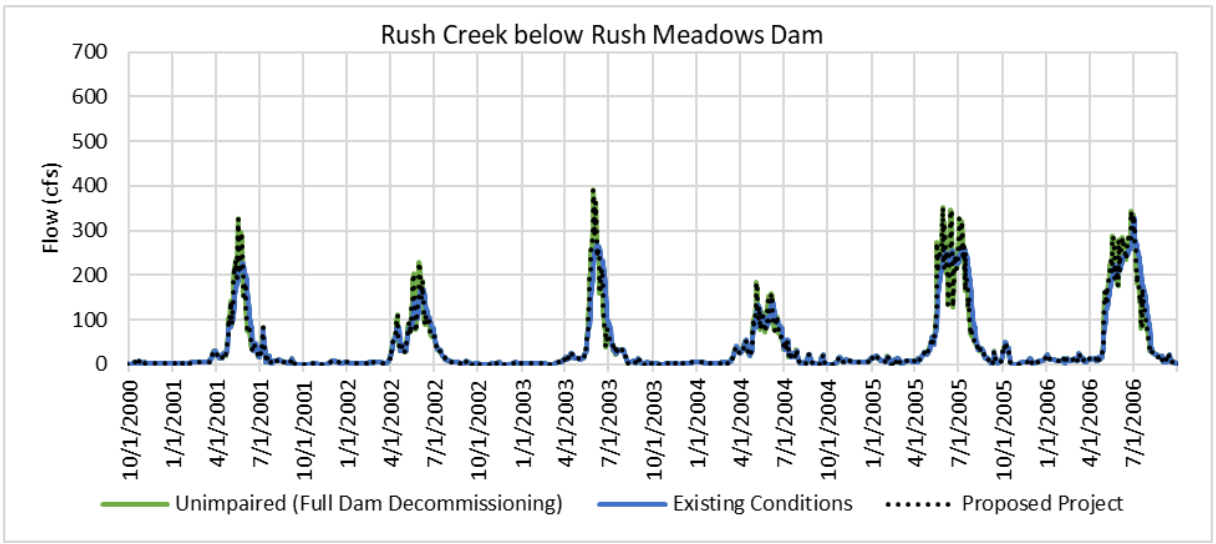
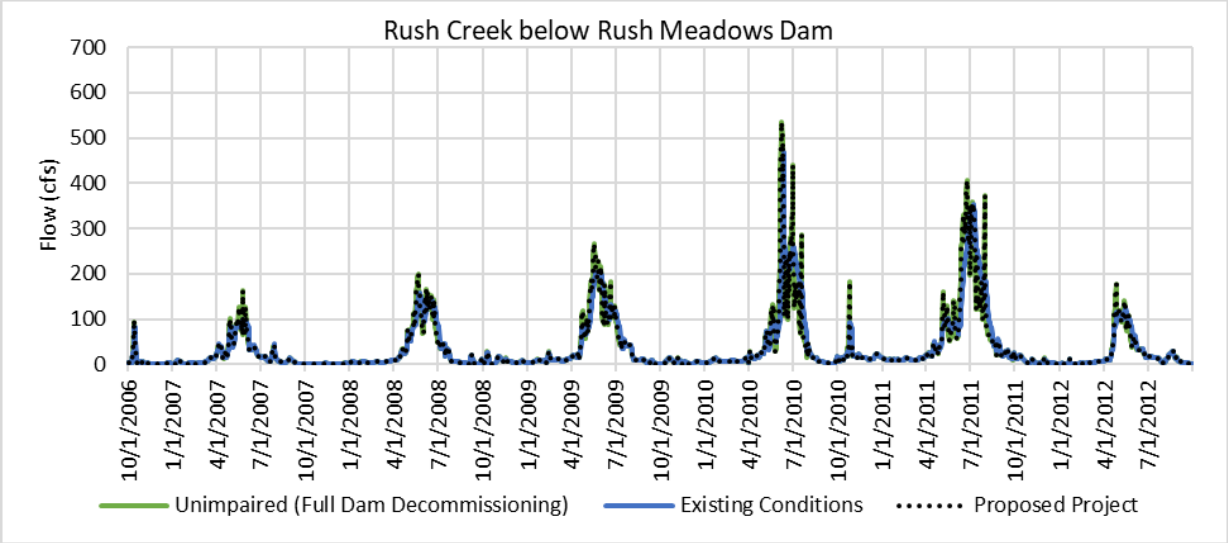
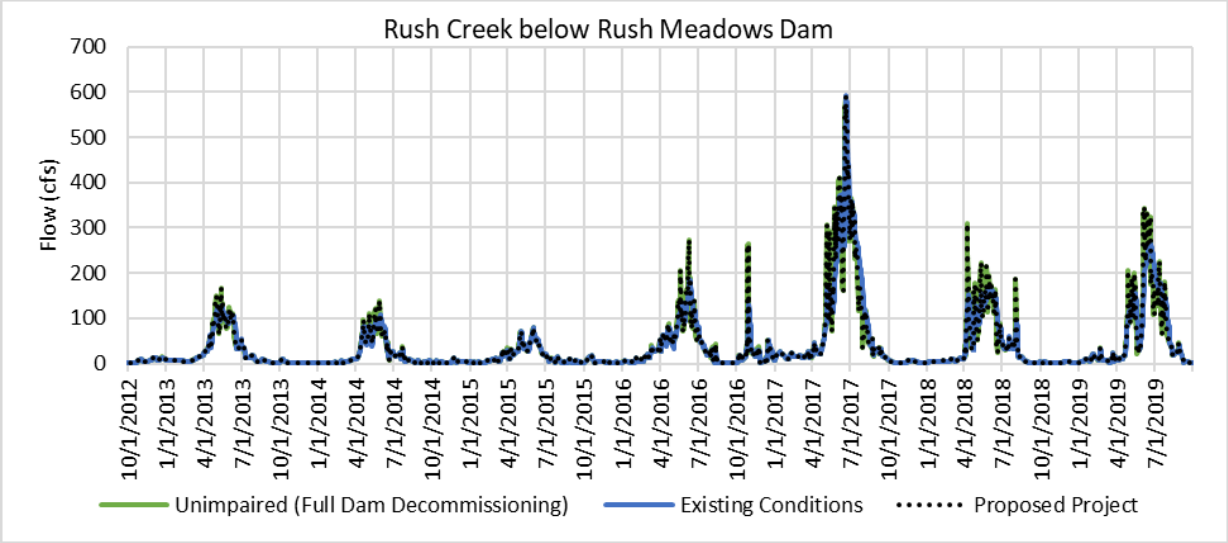


Figure C-4. Modeled Rush Creek Flow Below Rush Meadows Dam





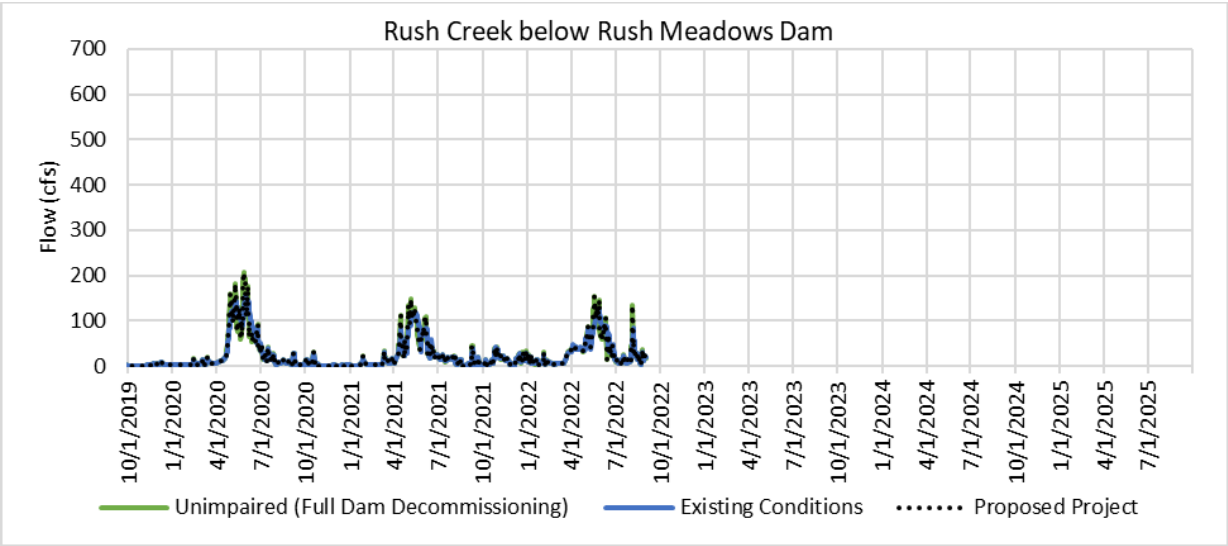


Figure C-4 (continued). Modeled Rush Creek Flow Below Rush Meadows Dam

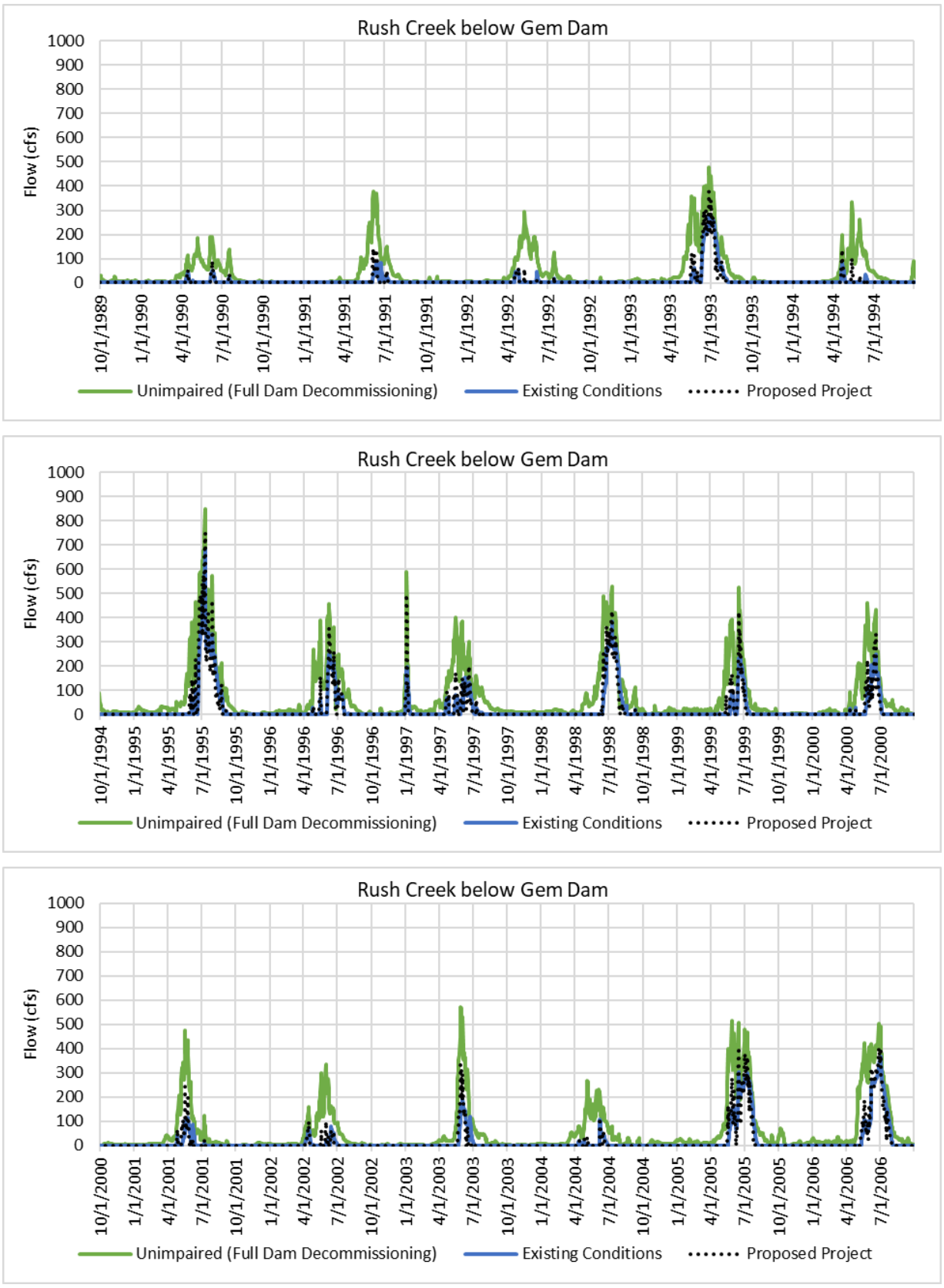
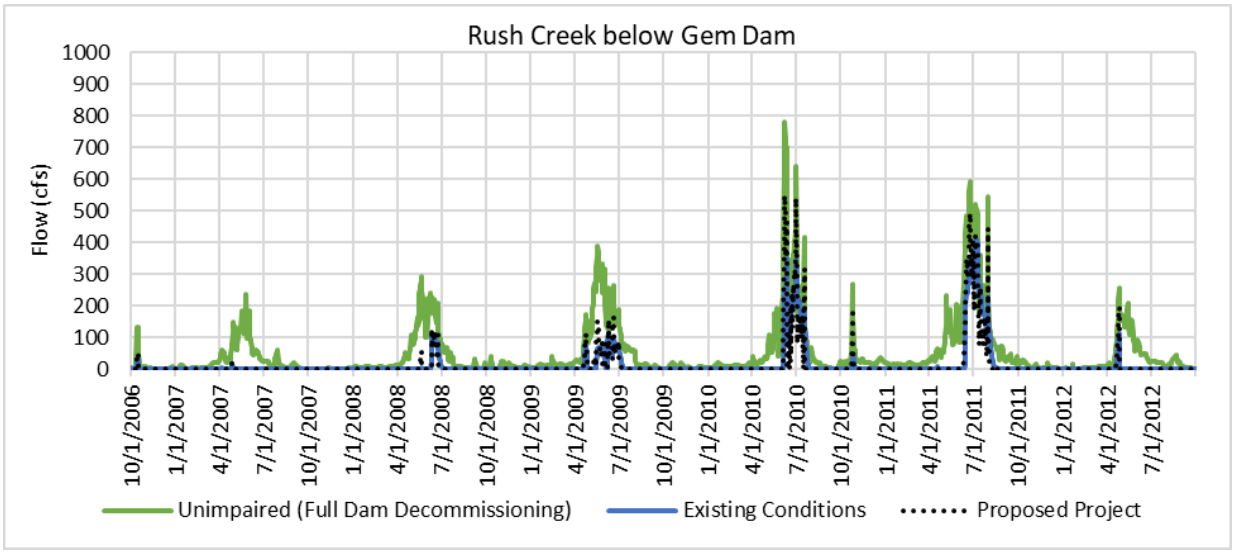
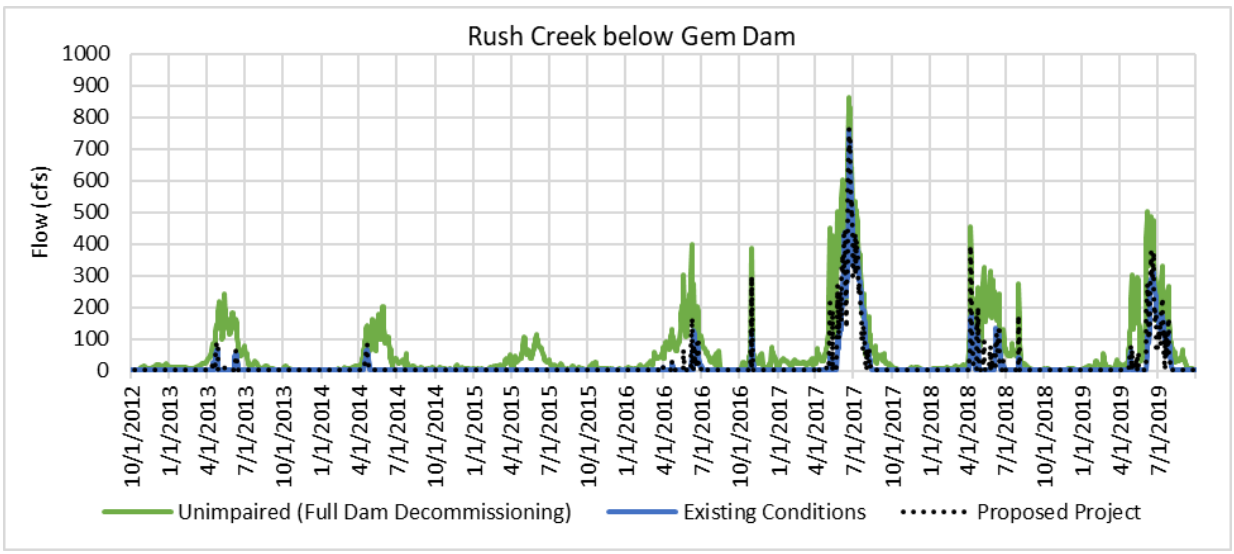


Figure C-5. Modeled Rush Creek Flow Below Gem Dam





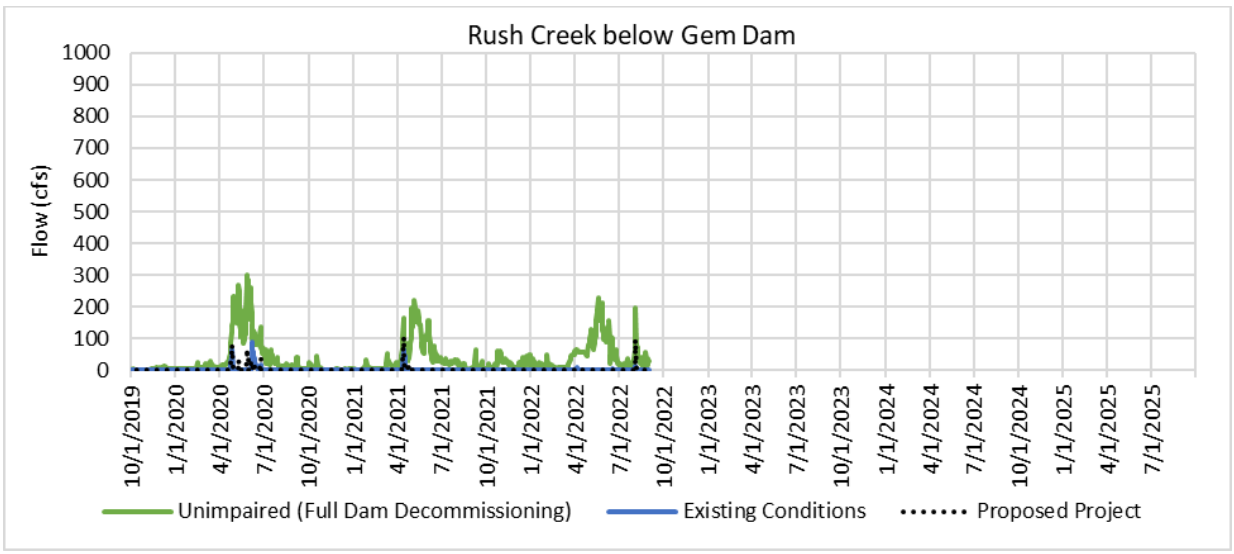


Figure C-5 (continued). Modeled Rush Creek Flow Below Gem Dam

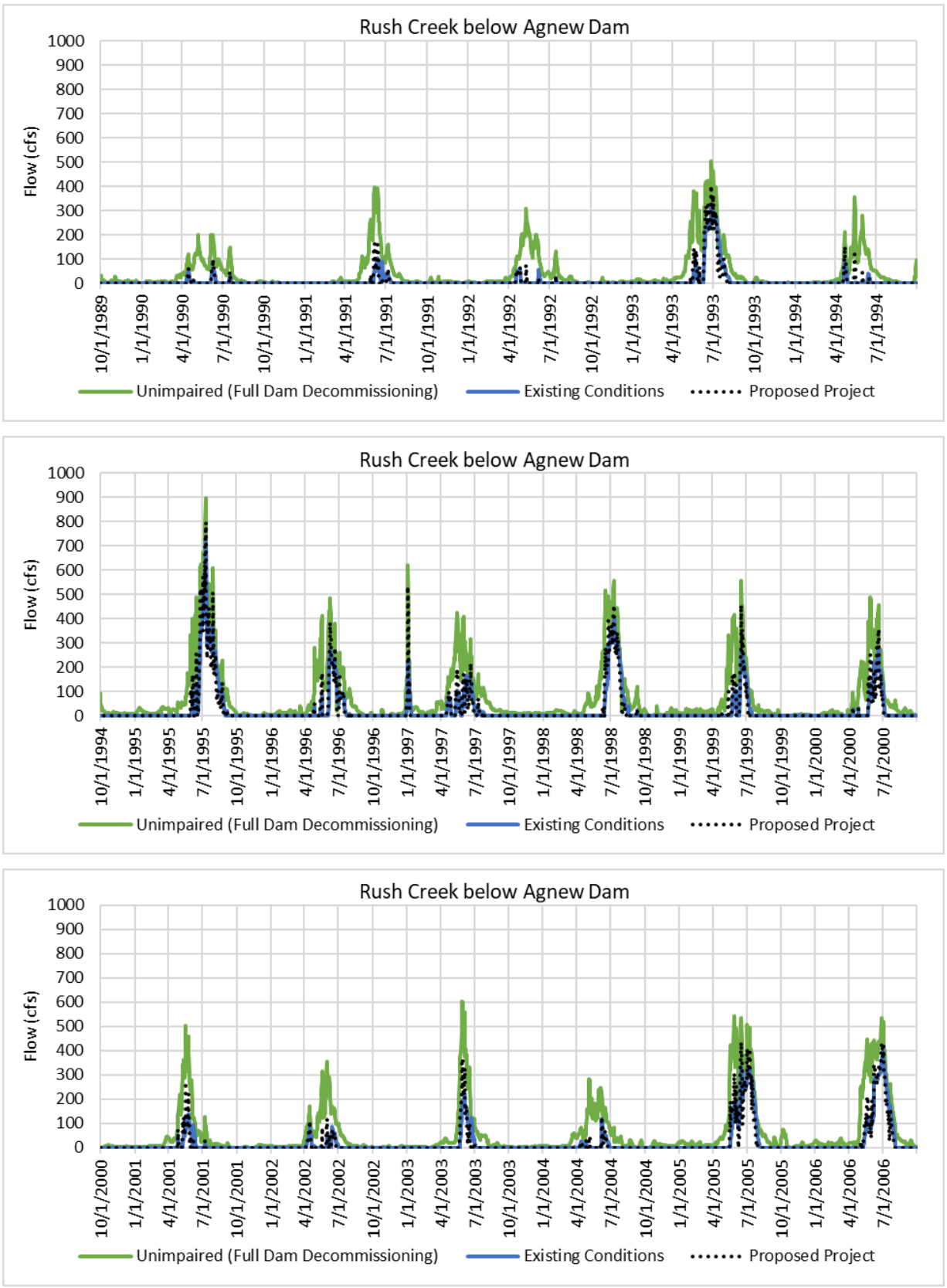
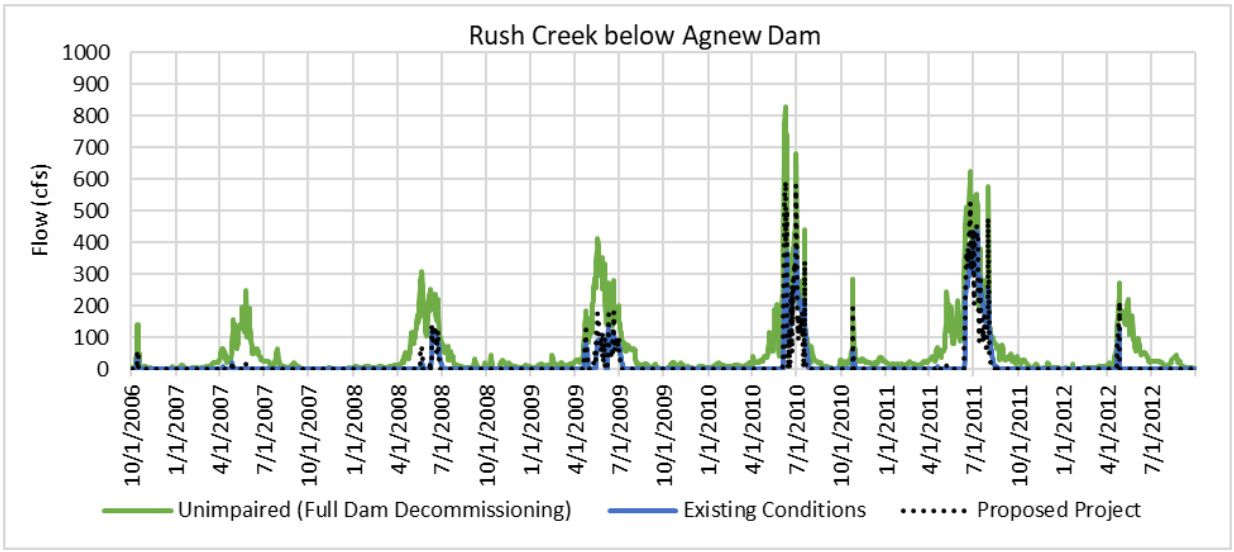
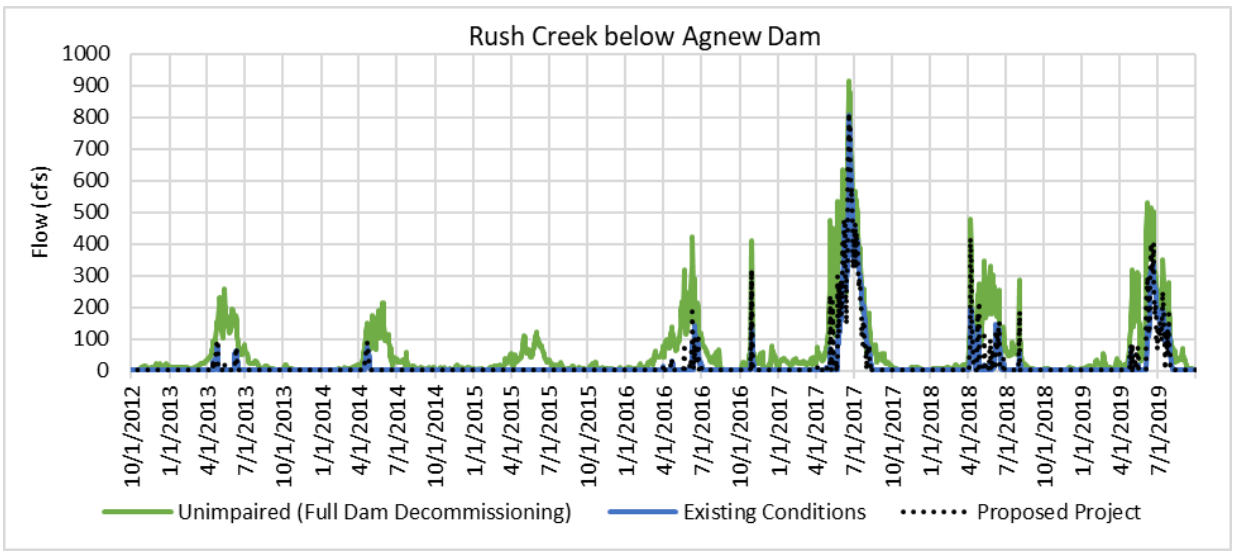


Figure C-6. Modeled Rush Creek Flow Below Agnew Dam





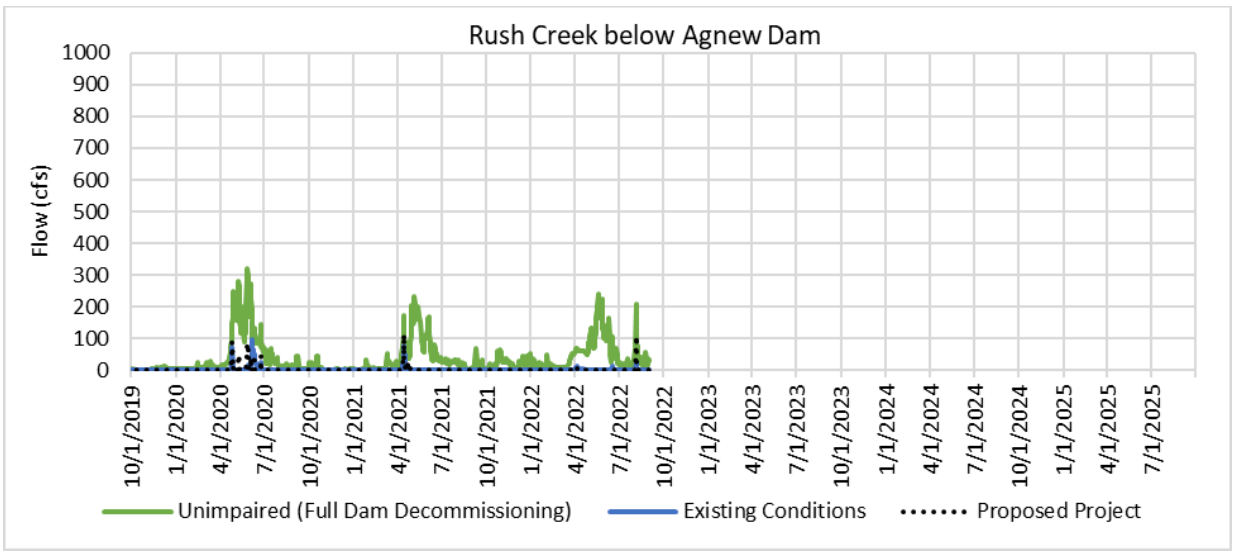


Figure C-6 (continued). Modeled Rush Creek Flow Below Agnew Dam

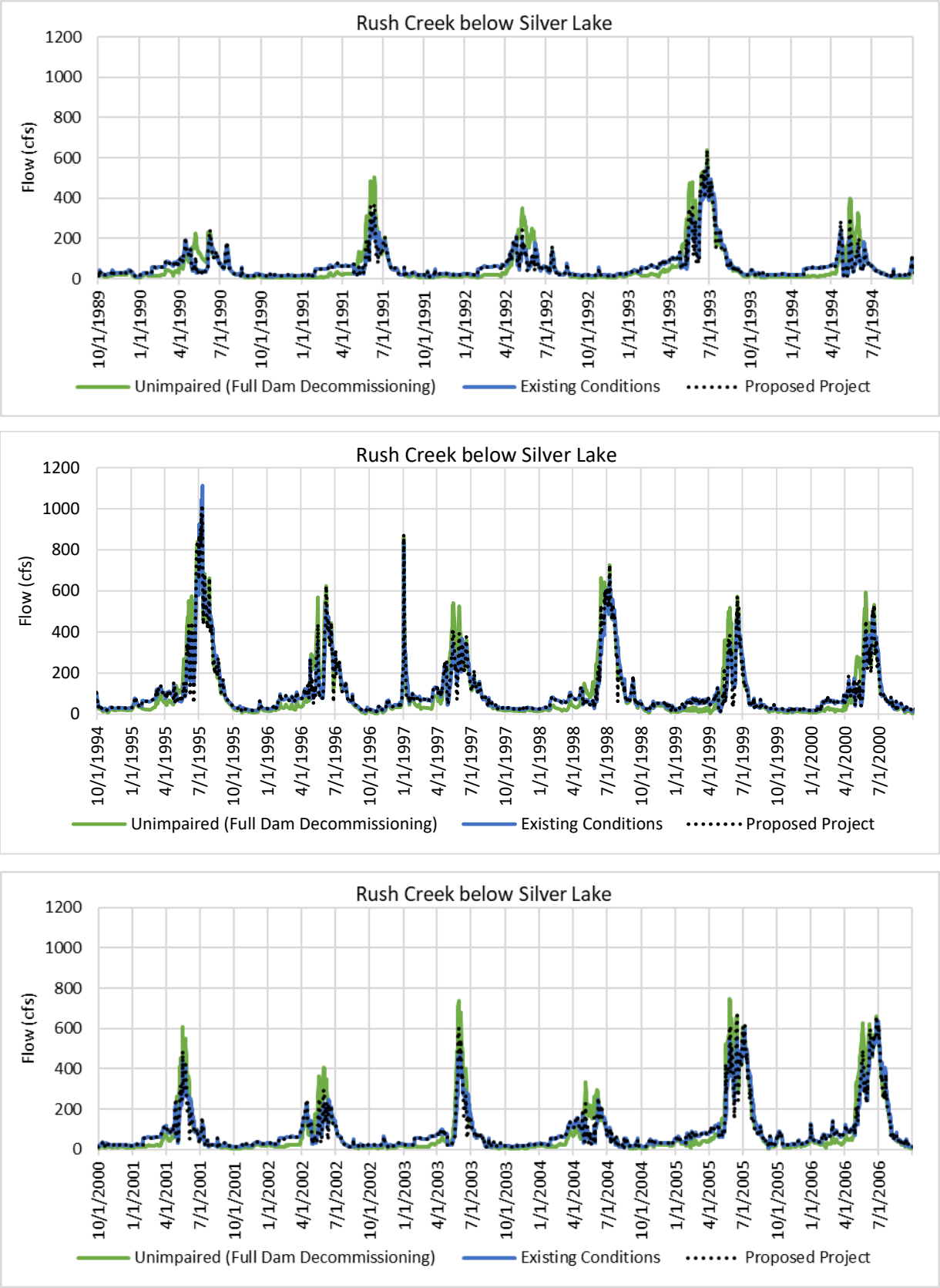


Figure C-7. Modeled Rush Creek Flow Below Silver Lake

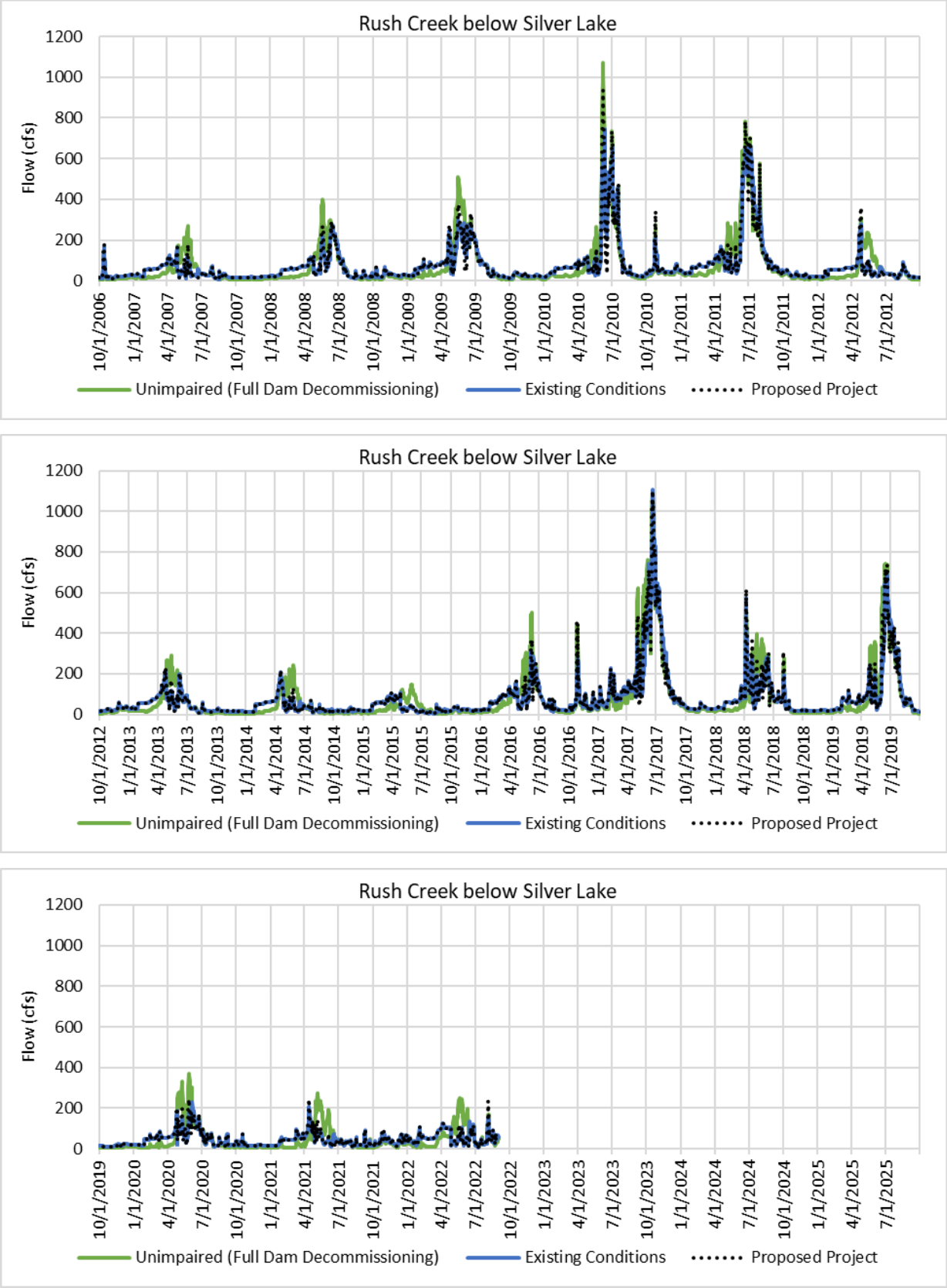


Figure C-7 (continued). Modeled Rush Creek Flow Below Silver Lake

MAPS

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Map C-1. Silver Lake and the Area of Interest for Potential Flooding (July 2023; Standing Water in Upper Silver Lake Area [Left])

Map C-2. Aerial Map of Potential Flooding Area (Lockhart and Dream Mountain Estates Properties) in July 2023 (Standing Water in Property Areas [Top]) and June 2022 (No Standing Water in Property Areas [Bottom])

APPENDIX D

Study Approach to Characterize Sediment in Project Lakes

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STUDY APPROACH TO CHARACTERIZE SEDIMENT IN PROJECT LAKES

Rush Creek Hydroelectric Project
FERC Project No. 1389

March 2024

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POTENTIAL RESOURCE ISSUES

- Sediment accumulated in the Project reservoirs (Waugh, Gem, Agnew), if released from the dams, could affect downstream stream conveyance capacity, flooding of channels, and aquatic species downstream of the dams.

PROJECT NEXUS

- Full project decommissioning would remove the Project dams. As a result, sediment could be released from behind the dams into downstream river reaches.

RELEVANT INFORMATION

The following information is available to characterize the sediment type, quantity, and contaminants behind the Project dams:

- Historical contour maps of the reservoirs available as part of Southern California Edison's (SCE) previous license applications.

- Characterization of existing sediment conditions in the Project-affected stream reaches collected during implementation of the AQ-5 Geomorphology Technical Study Plan in 2023.

- Sediment characterization (sediment type and quality) at Waugh Lake collected during implementation of the AQ-5 Geomorphology Technical Study Plan in 2023/2024.

- Evaluation of initiation of sediment transport under different flows regimes in the selected Project-affected stream reaches developed during implementation of the AQ-5 Geomorphology Technical Study Plan and AQ-1 Instream Flow Technical Study Plan in 2023/2024.

- Evaluation of sediment deposition/ transport in Rush Creek near the Silver Lake inlet developed during implementation of the AQ-5 Geomorphology Technical Study Plan and AQ-1 Instream Flow Technical Study Plan in 2023/2024.

POTENTIAL INFORMATION GAPS

- Characterization of the sediment (type, quantity, and contaminants) in Project reservoirs.

- Characterization of sediment contaminants at reference sites.

STUDY OBJECTIVES

- Characterize the current bathymetry in each Project reservoirs (Waugh, Gem, and Agnew lakes) and compared to historical bathymetry to quantify accumulated sediment behind the dams.

- Characterize the sediment type in the Project reservoirs.
- Characterize potential sediment contaminates in the Project.
- Characterize sediment contaminates at reference sites.
- Assess the sediment quantity, type, and contaminants that could potentially be released from behind Project dams under full decommissioning.
- Characterize the movement (transport and deposition) of sediment released from each dam into Rush Creek post-removal of the dams.

EXTENT OF STUDY AREA

- The study area includes Waugh Lake, Gem Lake, Agnew Lake, downstream Rush Creek stream reaches, and Silver Lake.

STUDY APPROACH

The following describes the full decommissioning reservoir sediment study approach.

QUANTITY OF RESERVOIR ACCUMULATED SEDIMENT

The quantity of accumulated sediment in the reservoirs that has potential to be released following dam removal (see Reservoir Sediment Release below) will be determined using different methods for the exposed reservoir sediments and for the underwater sediments. Reservoir bathymetry will be collected using a combination Light Detection and Ranging (LIDAR) for out of water bathymetry and real time kinematics global positioning system (RTK-GPS) coupled sonar for underwater bathymetry.

- In Waugh, Gem, and Agnew lakes collect LIDAR data of the exposed reservoir bed at the lowest water surface elevation practical. Note it is anticipated that Waugh Reservoir will be completely exposed with limited residual water in the reservoir during the LIDAR data collection.
- In Gem and Agnew lakes collect detailed sonar data using RTK-GPS coupled single beam and/or multi-beam sonar at the highest water surface elevation practical.
    - Gem Lake sonar will require a minimum of 3-days of motorized boat use on Gem Lake. Motorized boat use on Gem Lake must be approved by the Forest Service.
- Merge the sonar and LIDAR data to create a full bathymetry data set for each reservoir.
- Compare the current bathymetry data to historical contour data to determine the accumulated sediment capture/deposition in Project reservoirs (Waugh, Gem, and Agnew).

- Where applicable, utilize the sediment facies depth mapping (detailed below) to help identify sediment quantity (e.g., merge the facies depth data with the bathymetry in specific areas).

POTENTIAL RESERVOIR SEDIMENT MOBILIZATION

Identify the reservoir sediment that has potential for downstream movement post-dam removal. Each of the Project reservoirs and dams have a unique bathymetry and sediment release potential. Available historical contours of each reservoir are shown in Maps 1a-b, 2a-b, and 3 for Waugh, Gem, and Agnew lakes, respectively. Close up contour maps near each of the dams are shown in Maps 4, 5, and 6, respectively Typically, only sediment upstream of the dams at an elevation equal or higher than the base of the dams has the potential to be mobilized downstream post-dam removal. With removal of the dams, that sediment could headcut / erode and be transport downstream. In the case of Gem and Agnew lakes, historical natural lakes at these sites would affect downstream sediment transport. The natural lake bathymetry would capture / prevent eroding sediment upstream of the lake from moving downstream, assuming the existing lake retains sufficient depth / volume to capture the sediment.

- Preliminary Sediment Mobilization Evaluation

  - Waugh Lake – Waugh Lake appears to have historically been a meadow. Rush Meadows Dam is located at the end of the low gradient meadow area (Maps 1a and 1b). The historical contours indicate that a large portion of the meadow area could erode with dam removal at least to the elevation of the bottom of the dam. Preliminary evaluation from the contours indicates that approximately the area outlined in Figure 1 could be eroded to the depth of the dam removal (Map 4) and transported downstream.

  - Gem Lake – Gem Lake was historically two natural lakes (Map 2a and 2b). The residual depth and volume the natural lakes will be accessed as part of the Reservoir Accumulated Sediment Quantity scope of work (SOW) previously described above. Gem Dam is located at the end of the smaller natural lake. The historical contours indicate that only the portion of Gem Lake immediately upstream of the dam and at the elevation of the lowest part of the dam base (or higher) could erode and transport downstream with dam removal (see near dam area in Map 5).

  - Agnew Lake – Agnew Lake before construction of Agnew Dam was historically a natural lake (Map 3). The residual depth and volume the natural lake will be accessed in the Reservoir Accumulated Sediment Quantity SOW previously described above. Agnew Dam is located at the end of the natural lake. The historical contours indicate that only the portion of Agnew Lake immediately upstream of the dam and above the elevation of the lowest part of the dam base (or higher) could erode and transport downstream with dam removal (see near dam area in Map 6).

- Final Sediment Mobilization Evaluation

    - After LIDAR and sonar evaluation of each of the reservoir bathymetries is completed (Reservoir Accumulated Sediment Quantity SOW above) and the type of sediment has been quantified (see Reservoir Sediment Type SOW below), a final evaluation of the potential spatial area / volume of sediment mobilization from upstream of each of the reservoir dams will be determined. This will primarily be completed based on an elevation analysis (lowest elevation of the dam removal versus elevation of upstream sediment for potential mobilization). For Waugh Lake, a sediment transport model developed as part of the AQ-5 Geomorphology Study Plan will also be utilized.

RESERVOIR SEDIMENT TYPE

The type of sediment accumulated in the Project reservoirs (Waugh, Gem, and Agnew) will be evaluated differently for the exposed and underwater portions of the lake beds.

- Exposed Sediment

    - Map all sediment facies in the exposed reservoir bed areas, estimate the depth of each sediment facies and estimate the volume of each sediment type. It is anticipated that all of Waugh Lake will be exposed lakebed during the field studies and only a portion of the Gem and Agnew lakebeds will be exposed.

        - Subsample the exposed sediment facies for depth and gradation (size of sediment) at the locations shown in Figures 1 and 2. Sample the depth with sediment probes. Sample gradation to a depth of approximately 3 - 4 ft, if possible, using bulk sampling techniques (McNeil and Ahnell 1960) and a hand operated core sampler in 1 ft increments. If the sediment is approximately uniform, then composite the bulk sample. If significant vertical stratification of the sediment size is present, then separately evaluate the core sample gradation as appropriate.

        - Coarse sediments will be dried, sieved, and weighed on-site. Finer sediments will be packaged for transport from the field site and later dried, sieved, and weighed. The amount of sediment below the sand/silt break (0.0625 mm) will be quantified.

        - Plot particle size composition as cumulative distribution curves and histograms. Statistically analyze the particle size composition as represented by the D50, D16, and D84.

- Underwater Sediments

    - For Gem and Agnew lakes where the sediment is underwater, subsample sediment gradation only in the portion of the bed that has the potential to be mobilized (see Potential Reservoir Sediment Mobilization SOW above) (Figure 2). Sampling will include a combination of bulk sampling techniques

(e.g., Van Walt dredge) and gravity operated core sampler. If the sediment is approximately uniform in the core sample, then composite the bulk sample. If significant vertical stratification of the sediment size is present, then separately evaluate the core sample gradation in 1-foot increments, as appropriate.

- Gem lake sediment sampling will require a minimum of 3 days of motorized boat use on Gem Lake. Motorized boat use on Gem Lake must be approved by the Forest Service.

- Coarse sediments can be dried, sieved, and weighed on-site. Finer sediments will be packaged for transport from the field site and later dried, sieved, and weighed. The amount of sediment below the sand/silt break (0.0625 mm) will be quantified.

- Plot particle size composition as cumulative distribution curves and histograms. Statistically analyze the particle size composition as represented by the D50, D16, and D84.

RESERVOIR AND REFERENCE SITE SEDIMENT CONTAMINATES

Test the sediment in each of the Project reservoirs (Waugh, Gem, Agnew lakes) and at two reference sites for contaminants.

- Sample sediment at each of the locations identified in Figures 1 and 2. There are 5locations in Waugh Lake, 4 locations in Gem Lake, and 3 locations in Agnew Lake. Sample three reference sediment locations in tributaries into Waugh Lake upstream of the lake and three sediment samples in Rush Creek upstream of Silver Lake.

- Sample sediment up to 3 - 4 feet at each location, if possible, with either a handheld or gravity operated sediment coring device in the exposed bed of Waugh Lake. Use a shovel to assist core sampling in 1-foot increments up to 4 feet deep (as the sediment type and depth allows). In the inundated lakebed areas, use a gravity operated core sampler and sample to a depth that the core sampler allows. If limited soft sediment is present that precludes use of the core sampler, then use a Van Walt type dredge to obtain surface sediment samples.

  - Gem lake sediment sampling will require a minimum of 3 days of motorized boat use on Gem Lake. Motorized boat use on Gem Lake must be approved by the Forest Service.

- Composite the 1-foot increment core samples or Van Walt type dredge samples at each site for contaminate analysis, unless visual observation of the core samples indicates unique stratification in the sediment. Collect a minimum of 1000 ml (or the amount required by the laboratory) of sediment in wide-mouth containers with Teflon lined lids. Containers will be laboratory-provided, pre-cleaned, and certified. The laboratory will be consulted prior to sampling to verify the amount of sediment needed for the laboratory analysis.

- Utilize a certified laboratory to analyze the sediment samples for potential contaminates (nutrients and metals) listed in Table 1 using the laboratory specified hold-times to the extent that the remote locations allow. A review of the study area, which is primarily located in a remote high elevation wilderness area, and contaminates studies in the Sierra Nevada mountain range (e.g., Yosemite National Park; Landers et al. 2008) indicate that the potential for industrial chemicals, pesticides, insecticides, or hydrocarbons is in sediments at significant levels is extremely unlikely.

- Comply with the Regional Water Quality Control Board's chain of custody procedures regarding soil samples.

REPORTING

- Study methods and results will be documented in a Full Decommissioning Reservoir Sediment Technical Study Report.

- The TSR will include summary tables and maps, as appropriate.

- Upon request, data will be provided to resource agencies and interested stakeholders in an Excel spreadsheet (electronic format).

SCHEDULE

Date	Activity
June–July 2024	Conduct Sonar Bathymetry Surveys in Agnew and Waugh lakes
August–September 2024	Complete LIDAR Surveys in Agnew, Gem, and Waugh lakes
August–September 2024	Conduct sediment capture/deposition surveys. Collect sediment samples for laboratory analyses
October 2024–November 2024	Analyze data and prepare a technical study report
January 2025	Distribute technical report in the Final License Application

REFERENCES

Landers, D.H. and 16 Other Authors. 2008. The Fate, Transport, and Ecological Impacts of Airborne Contaminates in Western National Parks (USA).

McNeil, W.J. and W.H. Ahnell. 1960. Measurement of gravel composition of salmon stream beds. University of Washington Fish. Res. Inst. Circ. No. 120.

TABLES

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Table 1. Contaminate Testing Analytical Methods and Sample Quantitation Limits

Parameter	Analysis Method	Sample Holding Times	Sample Quantitation Limit (SQL)
Conventional			
Ammonia	SM 4500-NH3	TBD	TBD
Total Nitrogen	NO2,NO3, TKN	TBD	TBD
Total Phosphorus	SM 4500-P E	TBD	TBD
Total Solids	SM 2540 B	TBD	TBD
Total Volatile Solids	SM 2540 E	TBD	TBD
TOC	SM 5310 C	TBD	TBD
BOD	SM 5210 B	TBD	TBD
Grain Size (%)	PSEP 1986 or ASTM D-422 mod	TBD	TBD
Metals			
ICP Metals Scan *	EPA 200.2, 200.7	TBD	TBD
Aluminum, Antimony, Arsenic, Barium, Beryllium, Bismuth, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Gallium, Iron, Lead, Lithium, Magnesium, Manganese, Molybdenum, Nickel, Phosphorus, Potassium, Scandium, Selenium, Silver, Sodium, Strontium, Tin, Thallium, Titanium, Vanadium & Zinc			
Mercury	EPA 245.1	TBD	TBD

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FIGURES

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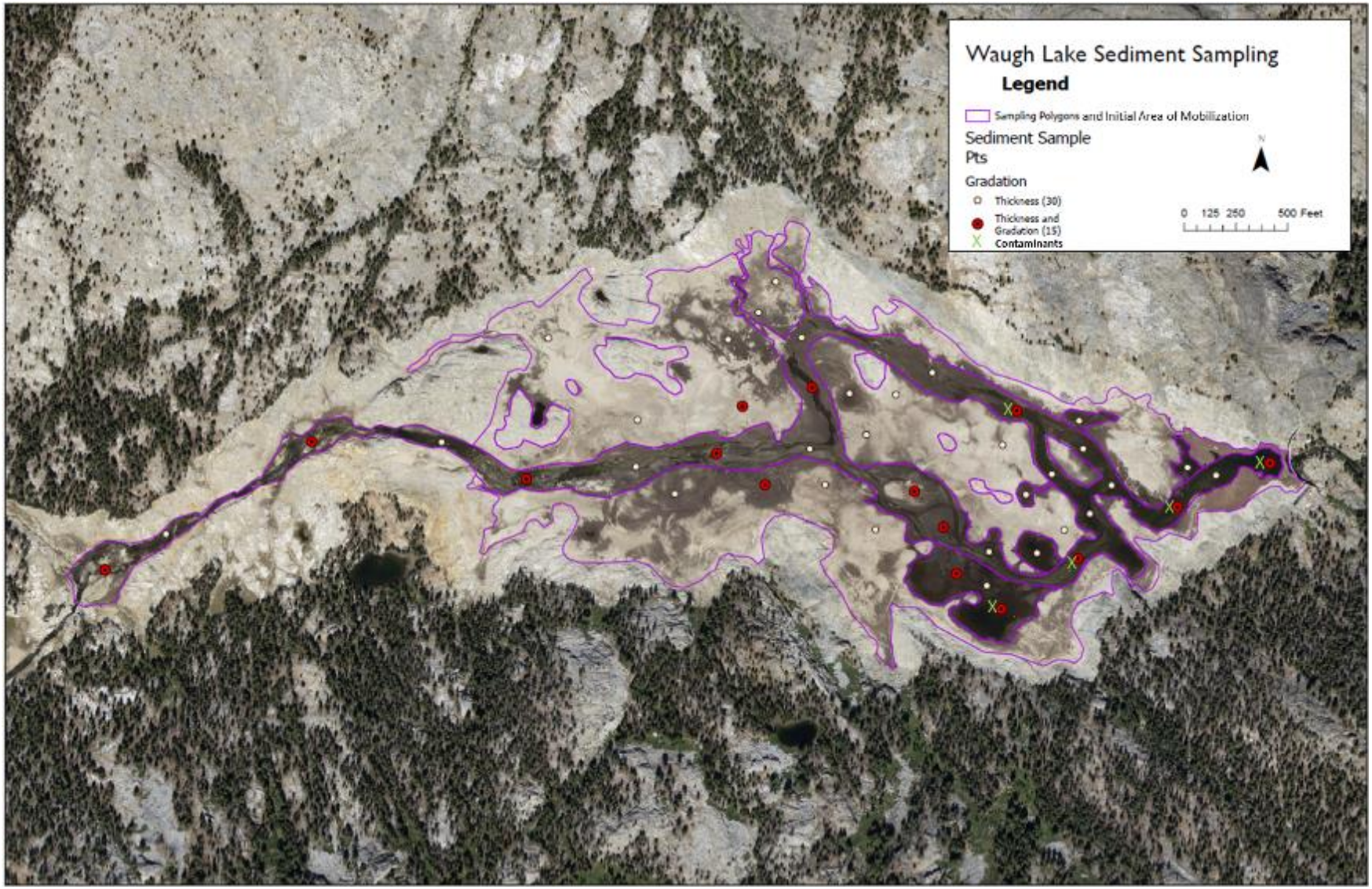

Figure 1. Waugh Lake Sediment Sampling Locations

Figure 2. Gem Lake (left) and Agnew Lake (right) Sediment Sampling Locations (red circles with green x)

MAPS

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Map 1a. Waugh Lake Historical Contour Elevations

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Map 1b. Waugh Lake Historical Contour Elevations

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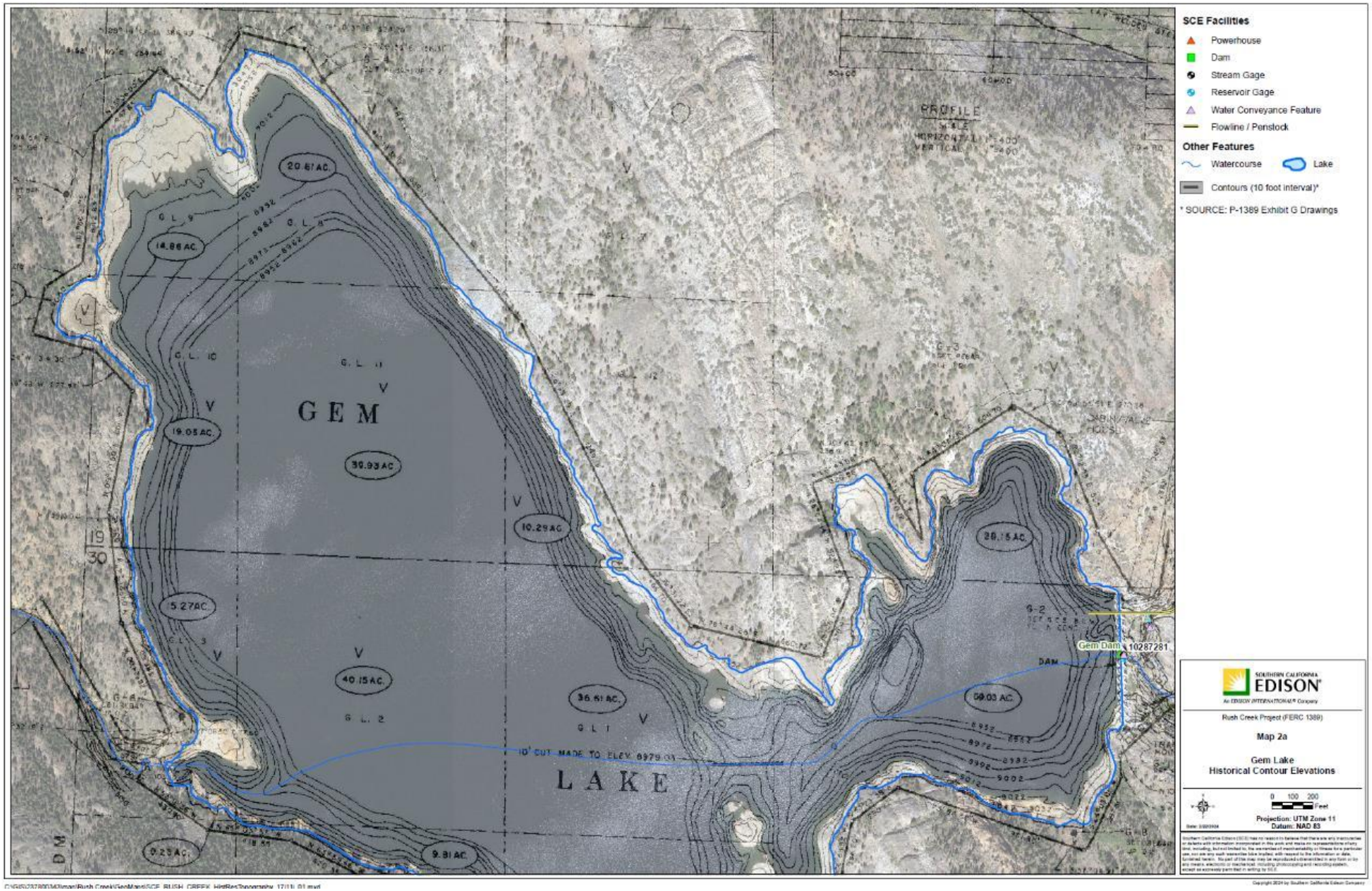

Map 2a. Gem Lake Historical Contours Elevations

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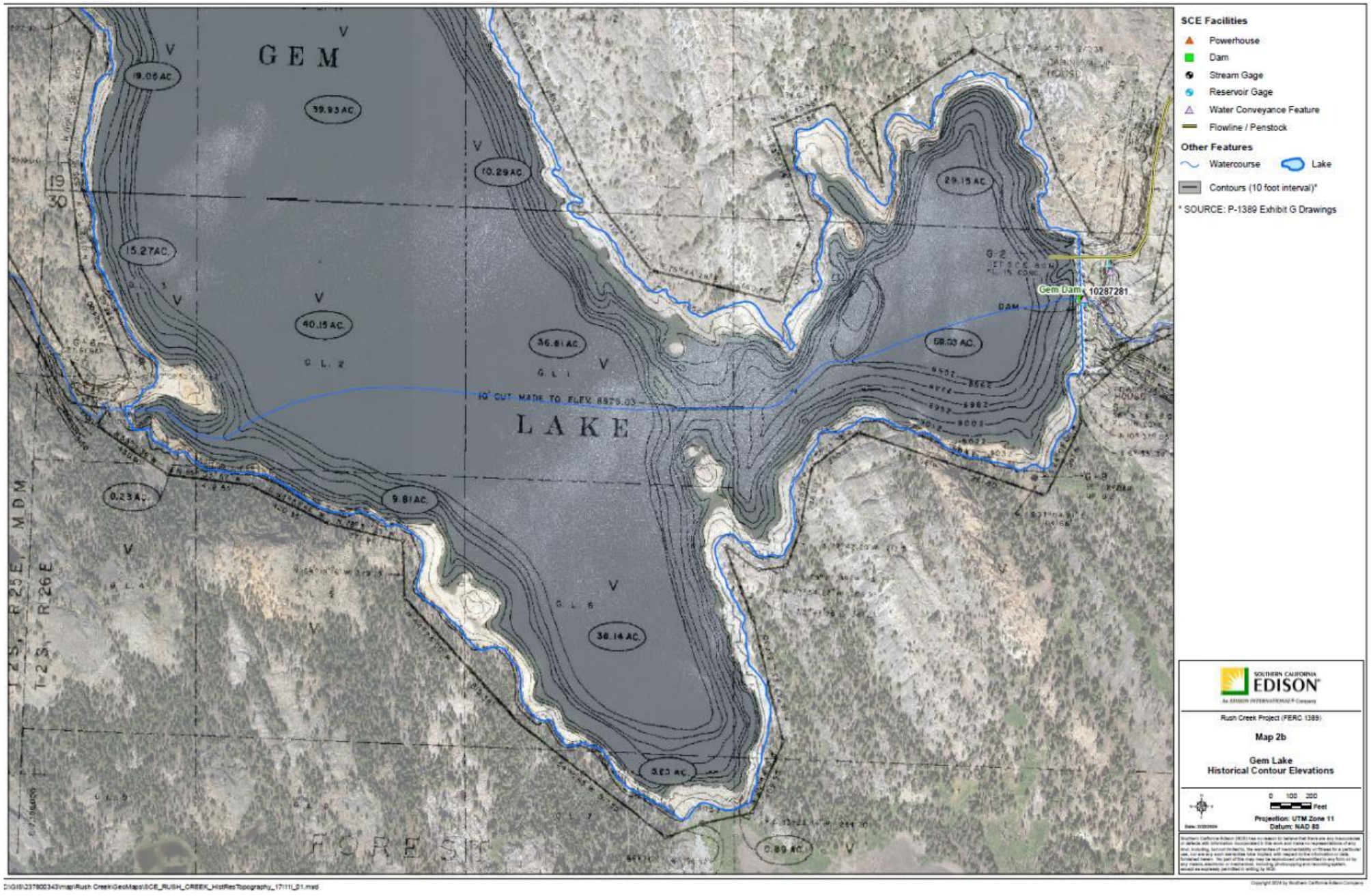

Map 2b. Gem Lake Historical Contours

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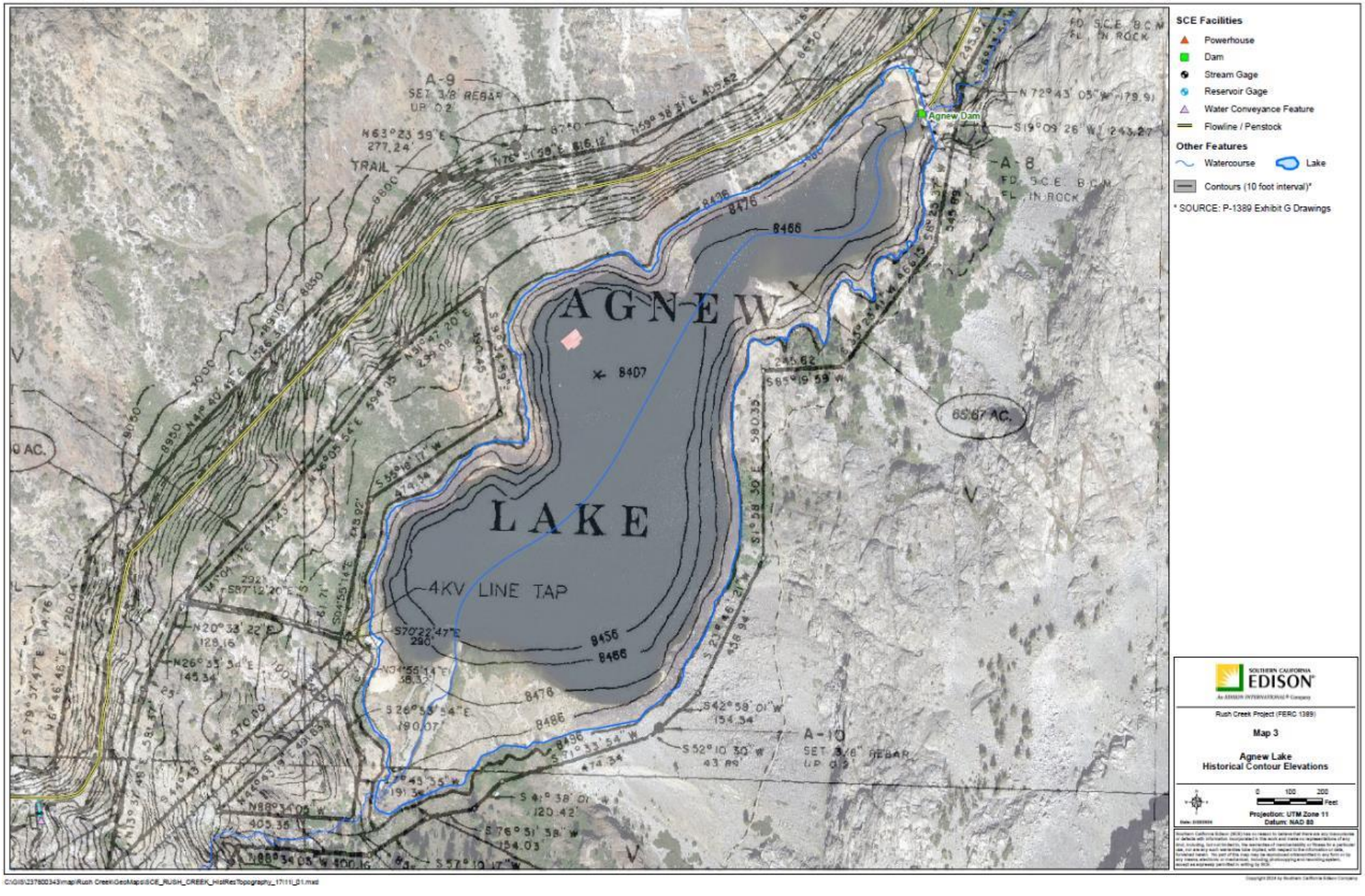

Map 3. Agnew Lake Historical Contours Elevations

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Map 4. Waugh Lake Near Dam Historical Contour Elevations

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Map 5. Gem Lake Near Dam Historical Contour Elevations

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Map 6. Agnew Lake Near Dam Historical Contour Elevations

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