MITGATED NEGATIVE DECLARATION
for the
Delta Dams Rodent Burrow Remediation Project

**Project**: Delta Dams Rodent Burrow Remediation Project

**Lead Agency**: California Department of Water Resources (DWR)

**Project Location**: The proposed Project activities would occur at three DWR facilities—Clifton Court Forebay, Dyer Dam, and Patterson Dam.

- **Clifton Court Forebay**: Contra Costa County, approximately 10 miles northwest from the City of Tracy.
- **Dyer Dam**: Alameda County, in the Altamont Hills, approximately 13 miles west of the City of Tracy and 7 miles southeast of the City of Livermore.
- **Patterson Dam**: Alameda County, approximately 1 mile east of the City of Livermore.

**Project Description**: The Delta Dams Rodent Burrow Remediation Project consists of remediation of rodent burrows and other maintenance and repair activities for the earthen embankment dams at Clifton Court Forebay, Dyer Dam, and Patterson Dam to improve the stability and safety of each dam. Specifically, the Project involves collapsing and/or excavating burrows, backfilling the dam surface, and compacting the soil. In some locations, wire and/or rock would be placed to provide permanent armoring to deter future rodent burrowing.

**Mitigation Measures**: The mitigation measures presented in Table 1 would be implemented as part of the project to avoid, minimize, rectify, reduce, or eliminate, or compensate for potentially significant environmental impacts. Implementation of these mitigation measures would reduce the potentially significant environmental impacts of the proposed project to less-than-significant levels.

### Table 1. Mitigation Measures

<table>
<thead>
<tr>
<th>Measure Number</th>
<th>Measure Text</th>
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<tr>
<td>BIO-1</td>
<td>Avoid or Minimize Impacts on Native Plants and Wildlife. To avoid or minimize impacts on plants and wildlife, the following general measures shall be implemented throughout the Project site:</td>
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<td>• Approved Biologists. At least 15 days prior to start of Project activities, the California Department of Water Resources (DWR) shall submit the names and credentials of personnel seeking to act as approved biologists to the U.S. Fish and Wildlife Service (USFWS) and California Department of Fish and Wildlife (CDFW) for review. Biologists shall have appropriate training and experience with the species for which they are seeking approval. All biologists shall be approved in writing by USFWS and CDFW prior to conducting proposed Project activities.</td>
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<td>• Environmental Awareness Training. An approved biologist shall conduct environmental awareness training for all individuals working on the Project before work begins. The training shall cover the life history, habitat requirements, and conservation measures for potentially affected species. The training shall also include information on federal and state regulatory protections, restrictions, and guidelines that must be followed by crews to avoid and minimize impacts to threatened and endangered species and their habitat. Upon</td>
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<th>Measure Number</th>
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<td>completion of training, crews shall sign a form stating that they attended the training and understand all conservation measures. If new personnel are added to the Project, the new personnel shall receive the training prior to starting work.</td>
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<td>• <strong>Approved Biologist Authority.</strong> An approved biologist shall be available to inspect all Project activities to ensure compliance with avoidance and minimization measures and shall monitor all ground-disturbing activities. Approved biologists shall perform weekly surveys of the Project area to ensure appropriate application of all general and species measures. Approved biologists shall have the authority to stop work if a listed species is encountered within active work areas or activities may result in take of listed species.</td>
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<td>• <strong>Speed Limits.</strong> Project-related vehicles shall observe a daytime speed limit of 15 mph, except on county roads and state and federal highways. Emergency vehicles are exempt from these restrictions in emergency situations.</td>
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<td>• <strong>Off-Road Traffic Prohibition.</strong> Off-road traffic outside of designated Project areas shall be prohibited.</td>
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<td>• <strong>Trash Abatement.</strong> All food-related trash items, such as wrappers, cans, bottles, and food scraps, shall be disposed of in a closed container and removed from the Project site daily.</td>
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<td>• <strong>Spill Prevention.</strong> A Spill Prevention Control and Countermeasure Plan shall be prepared prior to Project implementation. All machinery shall be properly maintained and cleaned to prevent spills and leaks. Any spills or leaks from equipment shall be reported and cleaned up in accordance with applicable local, state, and/or federal regulations.</td>
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<td>• <strong>Fire Prevention.</strong> A Fire Prevention and Suppression Plan shall be prepared prior to the start of Project activities.</td>
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<td>• <strong>Reporting.</strong> A final report containing details of the construction activities and any observations of listed species shall be submitted to the U.S. Fish and Wildlife Service and California Department of Fish and Wildlife within 30 days of Project completion. The report shall document the number of each species encountered.</td>
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<td>BIO-2</td>
<td><strong>Avoid, Minimize, and Mitigate Impacts to Special-Status Plants.</strong> Permanent and temporary impacts to long-styled sand-spurrey (California Rare Plant Rank [CRPR] 1B.2) individuals would result from implementation of the Project at Clifton Court Forebay Dam; these impacts are significant and require mitigation. Compensatory mitigation for permanent impacts to long-styled sand-spurrey shall include one of the following:</td>
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<td>a. The protection, through land acquisition or a conservation easement, of land that supports an equal or greater number of plants of similar health. Or,</td>
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<td>b. Salvage and relocation or propagation of impacted plants to create a new population on suitable unoccupied habitat or expand the existing Clifton Court Forebay population at a 1:1 ratio. Plant relocation or propagation would be subject to the following requirements:</td>
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<td>• A special-status plant mitigation plan shall be prepared by a qualified biologist and include (1) seed/propagule collection methods, (2) identification of receiver sites or locations for relocated or propagated plants and rationale for their selection, (3) success criteria for population establishment, including a not-to-exceed threshold for invasive species cover, (4) 5 years of maintenance and monitoring, (5) the adaptive management approaches that would be used to evaluate monitoring results and adjust management actions, if necessary, and (6) financial assurances for the funding of special-status plant mitigation.</td>
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</tbody>
</table>
Table 1. Mitigation Measures

<table>
<thead>
<tr>
<th>Measure Number</th>
<th>Measure Text</th>
</tr>
</thead>
<tbody>
<tr>
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<td>• Prior to disturbance of the existing long-styled sand-spurrey population, propagules shall be collected. This may include seed collection, cuttings, or seed-bearing topsoil salvage, and these propagules shall be used to establish a new population on suitable, unoccupied habitat or expand the existing population, as described above. Transplantation of whole plants may be attempted, but shall not be used as the primary means for creating a new occurrence or expanding an existing occurrence.</td>
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<td>• The biologist shall conduct a literature review to determine appropriate and viable propagation or planting techniques for the species, appropriate seed-collection techniques, and seeding rates.</td>
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<td>BIO-3</td>
<td><strong>Avoid, Minimize, and Mitigate Impacts to Sensitive Natural Communities.</strong> The Project would result in permanent and temporary impacts to sensitive vegetation communities at Clifton Court Forebay Dam and Dyer Dam; these impacts are significant and require mitigation. All temporary impacts to sensitive vegetation communities shall be restored on site. Restoration shall include recontouring and seeding and/or planting with native plants that comprise the sensitive natural community impact. Prior to seeding and/or planting the temporary ground-disturbance areas, the approved biologist shall review the seeding/plant palette to ensure that seeding/planting does not contain non-native or invasive plant species, as identified in the most recent version of the California Invasive Plant Inventory for the region. The California Department of Water Resources (DWR) shall ensure recontouring and revegetation of disturbed portions of sensitive vegetation communities in areas temporarily affected by construction within 1 year of demobilization by the contractor during the appropriate seasonal period for revegetation. Mitigation for permanent impacts to sensitive natural communities shall occur at a mitigation bank or within an in-lieu fee program, and shall occur at a ratio no less than 1:1 for the impacts to sensitive natural communities.</td>
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<td>BIO-4</td>
<td><strong>Minimize Temporary Impacts on Potential Vernal Pool Fairy Shrimp Habitat.</strong> Prior to constructing the temporary toe access road adjacent to potential vernal pool fairy shrimp habitat at Clifton Court Forebay Dam (i.e., 5.36-acre wetland outboard of Stations 32 + 00 to 64 + 00), an approved biologist shall direct the placement of erosion control fencing along the downstream (southern) perimeter of the access road to avoid sedimentation of adjacent habitat. The biologist shall also direct the placement of rinsed gravel and covering with geotextile fabric over any depressions overlapping the road’s footprint to minimize damage to the soils and protect existing contours. Erosion control fencing and temporary fill shall be removed within 72 hours of the completion of burrow remediation activities at this location.</td>
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</table>
**Table 1. Mitigation Measures**

<table>
<thead>
<tr>
<th>Measure Number</th>
<th>Measure Text</th>
</tr>
</thead>
</table>
| **BIO-5** | **Avoid and Minimize Impacts to California Tiger Salamander and California Red-legged Frog.** This mitigation measure identifies two separate sets of requirements—one for Clifton Court Forebay Dam and the other for Dyer Dam and Patterson Dam.  

**Clifton Court Forebay Dam:** The following measure shall be implemented to avoid take of individual California tiger salamanders in low-quality grassland and iodine bush scrub upland habitat south of Clifton Court Forebay Dam:  

- **California Tiger Salamander Take Avoidance.** The Project shall be performed during daylight hours, and work along the southern dam embankment (Stations 3+15 to 85+00) shall begin on or after June 1 and be completed by October 31 of each year. Within seven days prior to clearing existing vegetation for the staging areas in this area, an approved biologist shall survey for the presence of potential underground refugia for California tiger salamander (i.e., small mammal burrows). If potential refugia are observed, they shall be excavated by hand (e.g., shovels and non-powered hand tools) to confirm California tiger salamander absence. An approved biologist shall monitor all refugia excavation. All excavated burrows shall be backfilled after the biologist confirms that tiger salamanders are absent. If any California tiger salamanders are found, the approved biologist shall stop any Project activities that could potentially result in California tiger salamander take and reinitiate consultation with USFWS and CDFW. No tiger salamanders would be captured or relocated under this measure. If no tiger salamanders are found during burrow excavation, temporary exclusion fencing shall be installed along the boundary of the Project where burrows were excavated to prevent amphibians from entering. Exclusion fencing shall be a minimum of 2.5 feet tall and the bottom 6 inches shall be buried to prevent amphibians from crawling under the fence. During work hours, a portion of the fencing around upland staging areas may be removed to facilitate Project activities, but must be reinstalled at the end of the day and the bottom secured with sandbags or other heavy material. When sections are removed, the section shall be reviewed for resting or hiding species prior to removal. Exclusion fencing shall be removed within 72 hours of completion of work.  

**Dyer Dam and Patterson Dam:** The following measures shall be implemented to avoid and minimize impacts on California tiger salamander and California red-legged frog at Dyer Dam and Patterson Dam:  

- **Work Window.** The Project shall be performed during daylight hours, and any work in wetted areas shall occur between May 1 and October 31.  

- **Access Road Burrow Protection.** Any burrows or large cracks in the ground that may be traversed by heavy equipment traffic over unimproved access roads shall be covered with minimum 5/8-inch-thick plywood to prevent burrow collapse.  

- **Relocation Plan.** Prior to implementation of this measure, a relocation plan shall be developed that outlines the specific methods for safely capturing, holding, transporting, and releasing California tiger salamanders and California red-legged frogs, including equipment sterilization techniques. The plan shall also outline where relocated individuals will be moved and a process for reducing oversaturation.  

- **Morning Inspections.** An approved biologist shall survey the work area for California red-legged frogs and California tiger salamanders each morning prior to Project activities. Any California red-legged frog or California tiger salamander found in the work area shall be captured, transported to a predetermined relocation site, and released. Only approved biologists shall capture and handle frogs or salamanders. The biologist shall monitor any relocated frog or salamander until such time that the animal is safe from any obvious or immediate hazard or danger. |
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<table>
<thead>
<tr>
<th>Measure Number</th>
<th>Measure Text</th>
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<td>• <strong>Amphibian Exclusion Fencing.</strong> Exclusion fencing shall be installed between work areas and adjacent habitat for California red-legged frog and California tiger salamander. The fence shall be a minimum of 2.5 feet tall and the bottom 6 inches shall be buried to prevent amphibians from crawling under the fence. Placement and installation of fencing around drainage work areas shall be coordinated with any sediment control fencing requirements of other resource agency permits. During work hours, a portion of the fencing around upland staging areas may be removed to facilitate Project activities, but must be reinstalled at the end of the day and the bottom secured with sandbags or other heavy material. When sections are removed, the section shall be reviewed for resting or hiding species prior to removal. The exclusion fencing shall be maintained until all construction activities are completed and removed within 72 hours of the completion of work.</td>
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<td>• <strong>Vegetation Removal Inspections.</strong> Vegetation and sediment removed from drainages shall be carefully placed in the dump truck bed and examined for frogs and salamanders by approved biologists prior to disposal.</td>
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<td>Impacts on areas determined to be habitat for California tiger salamander and California red-legged frog shall be fully mitigated, in consultation with the U.S. Fish and Wildlife Service and the California Department of Fish and Wildlife.</td>
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<td>BIO-6</td>
<td><strong>Avoid and Minimize Impacts to Western Pond Turtle.</strong> To minimize impacts on western pond turtles known to nest at the northeastern corner of Clifton Court Forebay, burrow remediation activities adjacent to the drainage along the toe access road (Stations 230+00 to 262+00, approximately) shall occur from May 1 to June 15 and September 1 to October 15 to avoid the peak nesting period (mid-June to August) and minimize mortality of hatchlings overwintering in nest sites (approximately November to April).</td>
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<td>BIO-7</td>
<td><strong>Avoid and Minimize Impacts to Special-Status and Non-Special-Status Birds.</strong> The following measures shall be implemented throughout the Project to avoid and minimize impacts to nesting birds, including special-status species:</td>
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<td>• A qualified biologist shall conduct preconstruction surveys for nesting birds no more than 7 days prior to any construction activity involving vegetation removal (i.e., grubbing of herbaceous vegetation and grass, removal of trees or shrubs) that begins between March 15 and August 31 and shall resurvey if there is a four-day or more lapse in construction activities during this period. Surveys shall cover the construction footprint and suitable habitat within 100 feet for all birds, 300 feet for raptors (including white-tailed kite and northern harrier) and tricolored blackbird, and 0.25 miles for Swainson’s hawk. If the biologist does not find any nests but suitable habitat would be removed, the biologist shall conduct a final survey of such habitat and areas within 100 feet of the habitat within 48 hours of the activity to confirm the absence of nests. Any construction activity that occurs from September 1 to March 14 shall not require preconstruction nesting bird surveys. Work along the southern dam embankment at Clifton Court Forebay between Stations 3+15 to 85+00 shall begin on or after June 1 and be completed by October 31 of each year.</td>
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<td>• If nests are located during preconstruction surveys, impacts shall be minimized by establishing an appropriate nondisturbance buffer zone around active nests or vegetation patches supporting nesting birds. The size of the buffer shall be determined by the biologist based on the species’ sensitivity to disturbance, time of year, and planned work activities in the vicinity. The buffer shall remain in effect until the nest is no longer active. Buffers for Swainson’s hawk nests shall be based on the guidance in the Recommended Timing and Methodology for Swainson’s Hawk Nesting Surveys in California’s Central Valley (SHTAC 2000).</td>
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| BIO-8          | **Avoid and Minimize Impacts to Burrowing Owl.** The following measures shall be implemented throughout the Project to avoid and minimize impacts to burrowing owl:  
  - A qualified biologist shall conduct a burrowing owl take avoidance survey no more than 14 days prior to the initiation of any construction activities within burrowing owl habitat areas as identified during 2021 field surveys (Appendix B). Surveys shall cover the construction footprint and suitable habitat within 250 feet.  
  - If an active burrow is found during the nesting season (March 15 to August 31), clear, visible markers will be placed on the roadways to clearly demarcate the burrow location so vehicles traveling either direction on the road and workers at the project site will avoid disturbing the area. If the burrow is in a proposed work area and work cannot be postponed until after the nesting season, a no-activity zone will be established by a qualified biologist and will at a minimum be 250-feet radius from the occupied burrow, following recommendations in the CDFW Staff Report on Burrowing Owl Mitigation (CDFG 2012).  
  - If burrowing owls are present at the site during the non-breeding period, a qualified biologist will establish a no-activity zone of at least 160 feet.  
  - If an effective no-activity zone cannot be established in either case, a qualified biologist will develop a site-specific plan (i.e., a plan that considers the type and extent of the proposed activity, the duration and timing of the activity, the sensitivity and habituation of the owls, and the dissimilarity of the proposed activity with background activities) to minimize the potential to affect the reproductive success of the owls. |
| BIO-9          | **Avoid and Minimize Impacts to San Joaquin Kit Fox.** Any potential kit fox dens identified during 2021 field surveys (Appendix B) that are on California Department of Water Resources (DWR) property and located within 50 feet of the Project site shall be temporarily blocked with burlap bags or filled with soil (after three consecutive nights of tracking or game camera monitoring have confirmed that the den is not currently in use) to prevent access to these dens during Project activities. If a den is determined to be a natal den, then exclusion may not occur until the family has moved to another den location. A 100-foot exclusion zone shall be marked around any known kit fox dens within the survey area using lathe and flagging. The U.S. Fish and Wildlife Service (USFWS) Standardized Recommendations for the Protection of the Endangered San Joaquin Kit Fox Prior to or During Ground Disturbance (January 2011) or the latest guidance from the USFWS shall be referenced when implementing this measure. |
| BIO-10         | **Avoid and Minimize Impacts to American Badger.** Within 14 days prior to the initiation of Project activities within 100 feet of potential badger dens identified during 2021 field surveys (Appendix B) and concurrent with the take avoidance surveys for burrowing owl, a qualified biologist shall perform a survey to identify the presence of active or inactive American badger dens. If this species is not found, no further mitigation shall be required. If badger dens are identified within the construction footprint during the surveys or afterwards, dens shall be inspected and closed as follows:  
  - When unoccupied dens are encountered outside of work areas but within 100 feet of proposed activities, vacated dens shall be inspected to ensure they are empty and temporarily covered using plywood sheets or similar materials. If badger occupancy is determined at a given site within the work area, work activities at that site shall be halted. Depending on the den type, reasonable and prudent measures to avoid harming badgers shall be implemented and may include seasonal limitations on Project construction near the site (i.e., restricting the construction period to avoid spring–summer pupping season), and/or establishing a construction-exclusion zone around the identified site, or resurveying the den at a later time to determine species presence or absence. |
Table 1. Mitigation Measures

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<th>Measure Number</th>
<th>Measure Text</th>
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<td>• Bio-11</td>
<td><strong>Avoid, Minimize, and Mitigate Impacts to Jurisdictional Waters.</strong> All temporary impacts to jurisdictional waters of the United States/state shall be restored on site. Restoration shall include recontouring and erosion control with a native seed mix, where applicable. Prior to seeding temporary ground-disturbance areas, the approved biologist shall review the seeding palette to ensure that no seeding of non-native or invasive plant species, as identified in the most recent version of the California Invasive Plant Inventory for the region, will occur. The California Department of Water Resources (DWR) shall ensure recontouring and revegetation of disturbed portions of jurisdictional areas in areas temporarily affected by construction prior to demobilization by the contractor at the end of Project construction. Compensatory mitigation for permanent impacts to prevent net loss of functions and values at Clifton Court Forebay, Dyer Reservoir, and Patterson Reservoir shall occur either at an approved mitigation bank (e.g., Cayetano Mitigation Bank [approval pending]), within an in-lieu fee program (e.g., National Fish and Wildlife Foundation’s Sacramento District California In-Lieu Fee Program), or through on-site or off-site permittee-responsible mitigation. Where on-site or off-site permittee-responsible mitigation is pursued, it shall include establishment, restoration, or enhancement of aquatic resources at a ratio no less than 1:1 for the impacts to jurisdictional waters or at a ratio determined in the jurisdictional waters permits. Under any permittee-responsible mitigation effort, a Compensatory Mitigation and Monitoring Plan shall be prepared that outlines the compensatory mitigation to address permanent loss, including functions and values, of aquatic resources in compliance with requirements from applicable regulatory agencies (i.e., U.S. Army Corps of Engineers [USACE], Regional Water Quality Control Board [RWQCB], and California Department of Fish and Wildlife [CDFW]). The Compensatory Mitigation and Monitoring Plan shall be developed in coordination with CDFW, USACE, and RWQCB and shall include the following: Compensatory Description. A description of the quantity (acres and linear feet) affected by the project; aquatic resource types and amounts (acres and linear feet) for which compensatory mitigation is being provided, the type of compensation (i.e., restoration, establishment, enhancement, and/or preservation); and the process in which the resource functions of the compensatory mitigation efforts would address the needs of the watershed or ecoregion. Site Selection. A description of the factors considered in the site selection process, including demonstrating that an attempt to select a site within the same watershed and documentation of the characteristics of the site that would support restoration and/or establishment of aquatic resources. A description of the final proposed mitigation site(s) and site-specific plans to compensate for aquatic resources losses resulting from the project. Performance Standards. A description of the minimum performance standards that must be met at or before the end of monitoring to ensure no net loss of functions and values of aquatic resources. The description shall also include a description for annual success criteria, including a minimum percent cover of native vegetation within the compensatory mitigation area.</td>
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<td>• Monitoring and Reporting Specification. A description of the monitoring obligations, monitoring periods (not less than annual reports for 5 years), and reporting specifications.</td>
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<td>• Adaptive Management. A description of the adaptive management strategy to address changes in site conditions or other components of the compensatory mitigation efforts.</td>
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<td>• Financial Assurances. A description of financial assurances which would be provided for the success of compensatory mitigation.</td>
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<td>CUL-1</td>
<td>Unanticipated Archaeological Resources. A Worker Environmental Awareness Training for cultural resources shall be prepared and provided to all construction workers prior to initiation of work. The training shall generally summarize the protocols provided below that must be followed in the event that there is an inadvertent discovery of cultural resources and/or potential tribal cultural resources. In the event that cultural resources (e.g., sites, features, or artifacts) are exposed during construction activities, all ground disturbing work occurring within 100 feet of the find shall immediately stop until a qualified specialist, meeting the Secretary of the Interior’s Professional Qualification Standards, can evaluate the significance of the find and determine whether additional study is warranted. Prehistoric archaeological deposits may be indicated by the presence of discolored or dark soil, fire-affected material, concentrations of fragmented or whole freshwater bivalves shell, burned or complete bone, non-local lithic materials, or the characteristic observed to be atypical of the surrounding area. Common prehistoric artifacts may include modified or battered lithic materials; lithic or bone tools that appeared to have been used for chopping, drilling, or grinding; Projectile points; fired clay ceramics or non-functional items; and other items. Historic-age deposits are often indicated by the presence of glass bottles and shards, ceramic material, building or domestic refuse, ferrous metal, or old features such as concrete foundations or privies. Depending upon the significance of the find under the California Environmental Quality Act (CEQA) (14 CCR 15064.5[f]; California Public Resources Code, Section 21082), the archaeologist may simply record the find and allow work to continue. If the discovery proves significant under CEQA, additional work, such as preparation of an archaeological treatment plan, testing, or data recovery, may be warranted.</td>
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<td>CUL-2</td>
<td>Unanticipated Human Remains. In accordance with Section 7050.5 of the California Health and Safety Code, if potential human remains are found, the county coroner shall be immediately notified of the discovery. No further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent remains shall occur until the county coroner has made their determination regarding the appropriate next steps to be taken. This determination must be completed within 2 working days of notification of the discovery. If the county coroner determines that the remains are, or are believed to be, Native American, he or she shall notify the Native American Heritage Commission in Sacramento within 24 hours. In accordance with California Public Resources Code, Section 5097.98, the Native American Heritage Commission must immediately notify those persons it believes to be the most likely descendant from the deceased Native American. The most likely descendant shall complete his or her inspection within 48 hours of being granted access to the site. The designated Native American representative would then determine, in consultation with the property owner, the disposition of the human remains.</td>
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<td>GEO-1</td>
<td>Unanticipated Paleontological Resources. In the event that paleontological resources (e.g., fossils) are exposed during construction activities for the Project, all construction work occurring within 50 feet of the find shall immediately stop until a qualified paleontologist meeting the professional standards of the Society of Vertebrate Paleontology (SVP) can evaluate the significance of the find and determine whether additional study is warranted. If the discovery is clearly not significant, the paleontologist may document the find and allow</td>
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Table 1. Mitigation Measures

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<th>Measure Number</th>
<th>Measure Text</th>
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<td>work to continue. If the discovery may consist of or include unique paleontological resources as defined under the California Environmental Quality Act, a qualified paleontologist shall evaluate the resource and prepare a proposed mitigation plan in accordance with SVP guidelines (1995) sufficient to ensure that the project does not result in the direct or indirect destruction of any unique paleontological resources. The proposed mitigation plan may include a field survey, construction monitoring, sampling and data recovery procedures, museum storage coordination for any specimen recovered, and a report of findings.</td>
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<td>HYD-1</td>
<td><strong>Avoid or Minimize Increased Erosion.</strong> To avoid or minimize the potential for increased erosion downstream of the low-level drainage outlet improvements at Patterson Dam, the California Department of Water Resources (DWR) shall complete a fluvial geomorphology study for the drainage outlet that evaluates the physical shape of the outlet and the properties (e.g., velocity, volume, and flow resistance) of water and sediment transport through the drainage outlet. The fluvial geomorphology study shall also provide design criteria for the proposed improvements that will ensure the Project does not increase erosion within or downstream of the affected segment.</td>
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**Determination:** In compliance with CEQA, DWR has prepared an Initial Study (IS) to evaluate the potential physical environmental effects of the proposed Project and identify mitigation measures that would avoid, reduce, or provide compensation for any significant adverse Project effects. As demonstrated in Section 3 of the IS, the analysis determined that the Project would result in potential adverse impacts associated with Biological Resources, Cultural Resources, Geology and Soils, Hydrology and Water Quality, and Tribal Cultural Resources, but that these impacts would be reduced to less-than-significant levels with implementation of mitigation measures. Thus, DWR has adopted this Mitigated Negative Declaration for the Project.

Signature
Gerald Snow
Environmental Assessment Manager
Division of Operations and Maintenance
California Department of Water Resources
Table of Contents

<table>
<thead>
<tr>
<th>SECTION</th>
<th>PAGE NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACRONYMS AND ABBREVIATIONS</td>
<td>VII</td>
</tr>
<tr>
<td>1 INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>1.1 Project Overview</td>
<td>1</td>
</tr>
<tr>
<td>1.2 California Environmental Quality Act Compliance</td>
<td>1</td>
</tr>
<tr>
<td>1.3 Project Background</td>
<td>2</td>
</tr>
<tr>
<td>1.4 Public Review Process</td>
<td>3</td>
</tr>
<tr>
<td>2 SUMMARY OF FINDINGS</td>
<td>5</td>
</tr>
<tr>
<td>2.1 Environmental Factors Potentially Affected</td>
<td>5</td>
</tr>
<tr>
<td>2.2 Environmental Determination</td>
<td>5</td>
</tr>
<tr>
<td>3 INITIAL STUDY CHECKLIST</td>
<td>15</td>
</tr>
<tr>
<td>3A Project Overview</td>
<td>15</td>
</tr>
<tr>
<td>3A.1 Introduction</td>
<td>16</td>
</tr>
<tr>
<td>3A.2 Background and Overview</td>
<td>17</td>
</tr>
<tr>
<td>3A.3 Clifton Court Forebay Dam</td>
<td>20</td>
</tr>
<tr>
<td>3A.4 Dyer Dam</td>
<td>25</td>
</tr>
<tr>
<td>3A.5 Patterson Dam</td>
<td>29</td>
</tr>
<tr>
<td>3A.6 Ongoing Maintenance</td>
<td>32</td>
</tr>
<tr>
<td>3B Environmental Factors Potentially Affected</td>
<td>35</td>
</tr>
<tr>
<td>3C Determination</td>
<td>36</td>
</tr>
<tr>
<td>3.1 Aesthetics</td>
<td>37</td>
</tr>
<tr>
<td>3.2 Agriculture and Forestry Resources</td>
<td>42</td>
</tr>
<tr>
<td>3.3 Air Quality</td>
<td>45</td>
</tr>
<tr>
<td>3.4 Biological Resources</td>
<td>51</td>
</tr>
<tr>
<td>3.5 Cultural Resources</td>
<td>86</td>
</tr>
<tr>
<td>3.6 Energy</td>
<td>95</td>
</tr>
<tr>
<td>3.7 Geology and Soils</td>
<td>96</td>
</tr>
<tr>
<td>3.8 Greenhouse Gas Emissions</td>
<td>103</td>
</tr>
<tr>
<td>3.9 Hazards and Hazardous Materials</td>
<td>109</td>
</tr>
<tr>
<td>3.10 Hydrology and Water Quality</td>
<td>113</td>
</tr>
<tr>
<td>3.11 Land Use and Planning</td>
<td>119</td>
</tr>
<tr>
<td>3.12 Mineral Resources</td>
<td>120</td>
</tr>
<tr>
<td>3.13 Noise</td>
<td>122</td>
</tr>
<tr>
<td>3.14 Population and Housing</td>
<td>126</td>
</tr>
<tr>
<td>3.15 Public Services</td>
<td>127</td>
</tr>
<tr>
<td>3.16 Recreation</td>
<td>131</td>
</tr>
</tbody>
</table>
3.17 Transportation .................................................................132
3.18 Tribal Cultural Resources .................................................135
3.19 Utilities and Service Systems ............................................138
3.20 Wildfire ...........................................................................140
3.21 Mandatory Findings of Significance .................................143

4 REFERENCES AND PREPARERS ..............................................145
4.1 References Cited ...............................................................145
4.2 List of Preparers ................................................................150

5 RESPONSES TO COMMENTS ................................................291
Comment Letter A .................................................................293
Comment Letter B .................................................................313
Comment Letter C .................................................................327
Responses to Comments References .....................................335

TABLES
1 Mitigation Measures ..........................................................5
2 Estimated Project Footprint ................................................16
3 Remediation Types ............................................................19
4 Clifton Court Forebay Dam Estimated Grading Impacts ............24
5 Clifton Court Forebay Dam Estimated Materials Quantities ........24
6 Dyer Dam Estimated Materials Quantities ................................28
7 Patterson Dam Estimated Materials Quantities ........................32
8 Thresholds of Significance ..................................................46
9 Average Daily Unmitigated Construction Emissions .................49
10 Vegetation Communities within the Project Site (acres) .............54
11 Acres (and Linear Feet) of USACE Potential Waters of the United States by Project Facility ..........56
12 Acres (and Linear Feet) of RWQCB-Jurisdictional Waters of the United States/State by Project Facility ..........56
13 Acres (and Linear Feet) of CDFW-Jurisdictional Waters by Project Facility .........................................................56
14 Special-Status Wildlife Species Observed or with High Potential to Occur in Biological Resources Study Areas ........................................58
15 Project Impacts on California Tiger Salamander and California Red-Legged Frog Habitat .......................66
16 Estimated Annual Operational Greenhouse Gas Emissions ..........108
17 Construction Equipment Noise Emission Levels ......................123
RTC-1 Comments Received on the Draft Initial Study .................291

FIGURES
1 Project Location Overview ..................................................151
Existing Burrow and Erosion Conditions ........................................................................................................ 153
Burrow Remediation Overview .................................................................................................................... 155
Clifton Court Forebay Overview .................................................................................................................. 157
Clifton Court Forebay Dam Typical Section ................................................................................................. 159
Clifton Court Forebay Access ..................................................................................................................... 161
Clifton Court Forebay Hazard Categorization ............................................................................................... 163
Clifton Court Forebay Proposed Activities .................................................................................................. 165
Dyer Reservoir Overview ............................................................................................................................ 167
Dyer Dam Typical Section ............................................................................................................................. 169
Dyer Dam Access .......................................................................................................................................... 171
Dyer Dam Hazard Categorization ................................................................................................................ 173
Dyer Reservoir Proposed Activities ........................................................................................................... 175
Patterson Reservoir Overview ...................................................................................................................... 177
Patterson Dam Typical Section ..................................................................................................................... 179
Patterson Dam Access ................................................................................................................................... 181
Patterson Dam Hazard Categorization .......................................................................................................... 183
Patterson Reservoir Proposed Activities ..................................................................................................... 185
Impacts to Vegetation Communities – Clifton Court Forebay Dam ............................................................. 187
Impacts to Vegetation Communities – Clifton Court Forebay Dam ............................................................. 189
Impacts to Vegetation Communities – Clifton Court Forebay Dam ............................................................. 191
Impacts to Vegetation Communities – Clifton Court Forebay Dam ............................................................. 193
Impacts to Vegetation Communities – Clifton Court Forebay Dam ............................................................. 195
Impacts to Vegetation Communities – Clifton Court Forebay Dam ............................................................. 197
Impacts to Vegetation Communities – Clifton Court Forebay Dam ............................................................. 199
Impacts to Vegetation Communities – Clifton Court Forebay Dam ............................................................. 201
Impacts to Vegetation Communities – Clifton Court Forebay Dam ............................................................. 203
Impacts to Vegetation Communities – Clifton Court Forebay Dam ............................................................. 205
Impacts to Vegetation Communities – Dyer Dam ......................................................................................... 207
Impact to Vegetation Communities – Patterson Dam .................................................................................... 209
USACE – Impacts to Delineated Aquatic Resources – Clifton Court Forebay Dam ........................................ 211
USACE – Impacts to Delineated Aquatic Resources – Clifton Court Forebay Dam ........................................ 213
USACE – Impacts to Delineated Aquatic Resources – Clifton Court Forebay Dam ........................................ 215
USACE – Impacts to Delineated Aquatic Resources – Clifton Court Forebay Dam ........................................ 217
USACE – Impacts to Delineated Aquatic Resources – Clifton Court Forebay Dam ........................................ 219
USACE – Impacts to Delineated Aquatic Resources – Clifton Court Forebay Dam ........................................ 221
USACE – Impacts to Delineated Aquatic Resources – Clifton Court Forebay Dam ........................................ 223
USACE – Impacts to Delineated Aquatic Resources – Clifton Court Forebay Dam ........................................ 225
USACE – Impacts to Delineated Aquatic Resources – Clifton Court Forebay Dam ........................................ 227
<table>
<thead>
<tr>
<th>Page</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>22J</td>
<td>USACE – Impacts to Delineated Aquatic Resources – Clifton Court Forebay Dam</td>
</tr>
<tr>
<td>23</td>
<td>Impacts to USACE-Jurisdictional Areas – Dyer Dam</td>
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</tr>
<tr>
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</tr>
<tr>
<td>26</td>
<td>Impacts to RWQCB-Jurisdictional Areas – Dyer Dam</td>
</tr>
<tr>
<td>27</td>
<td>Impacts to RWQCB-Jurisdictional Areas – Patterson Dam</td>
</tr>
<tr>
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<td>30</td>
<td>Impacts to CDFW-Jurisdictional Areas – Patterson Dam</td>
</tr>
<tr>
<td>31</td>
<td>Impacts to Special-Status Plants – Clifton Court Forebay Dam</td>
</tr>
<tr>
<td>32</td>
<td>Temporary Impacts on Vernal Pool Fairy Shrimp Habitat</td>
</tr>
<tr>
<td>33</td>
<td>Impacts on California Red-legged Frog and California Tiger Salamander Habitat at Dyer Dam</td>
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<tr>
<td>34</td>
<td>Impacts on California Red-legged Frog and California Tiger Salamander Habitat at Patterson Dam</td>
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<td>RTC-1</td>
<td>Potential California Tiger Salamander Habitat Southwest of Clifton Court Forebay</td>
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</tr>
</tbody>
</table>

**APPENDICES**

A  Emissions Calculations  
B  Biological Resources Existing Conditions Report
C1 Archaeological Resources Inventory Report Clifton Court Forebay (Confidential)
C2 Archaeological Resources Inventory Report Dyer Reservoir and Dam and Patterson Reservoir and Dam (Confidential)
D1 Built Environment Inventory and Evaluation Report Clifton Court Forebay
D2 Built Environment Inventory and Evaluation Report Dyer Reservoir and Dam and Patterson Reservoir and Dam
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<td>Bay Area Air Quality Management District</td>
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<tr>
<td>BEIER</td>
<td>Built Environment Inventory and Evaluation Report</td>
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<tr>
<td>BMP</td>
<td>best management practice</td>
</tr>
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<td>Interstate</td>
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<td>MT</td>
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<td>NOₓ</td>
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<td>PM₁₀</td>
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<td>PM₂.₅</td>
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1 Introduction

1.1 Project Overview

The California Department of Water Resources (DWR) California State Water Project (SWP) is a water storage and delivery system that consists of many reservoirs, aqueducts, power plants, and pumping plants. The California Aqueduct is a central feature of the SWP; it begins at Clifton Court Forebay, located in the southwestern portion of Contra Costa County, and extends over 400 miles to the south. Another feature of the SWP, the South Bay Aqueduct begins at Bethany Reservoir, which is located south of Clifton Court Forebay, and carries water to communities in Alameda and Santa Clara Counties, passing through Dyer Reservoir, located west of Bethany Reservoir, and passing through Patterson Reservoir, located south of Dyer Reservoir (Figure 1, Project Location Overview).

The earthen embankment dams surrounding Clifton Court Forebay, Dyer Reservoir, and Patterson Reservoir have been subject to ongoing rodent burrowing throughout their service life. Rodent burrows are a recognized hazard to dams and levees because they can promote piping and internal erosion that can ultimately lead to dam failure. DWR proposes to undertake the Delta Dams Rodent Burrow Remediation Project (Project) to collapse/excavate and fill in existing burrows and improve the integrity of each of these dams. The Project would involve rodent burrow remediation and restoration measures, ongoing monitoring, and permanent measures to prevent future burrowing where warranted.

The proposed burrow remediation and dam restoration involves collapsing and/or excavating burrows, backfilling the dam surface, and compacting the soil. Measures to prevent future burrowing include placing wire and rock over the earthen dam face.

Each dam is unique in its design, construction, operation, downstream consequences, and severity of burrowing activity; thus, while the remediation activities are similar across all three dams, there are differences in the application of the remediation strategies to specific sections of each dam. These strategies are based on the location and density of the burrows on each dam or dam reach, complexity of burrow clusters, the phreatic surface (water level), slope stability, and other factors.

A detailed description of the Project is presented in Section 3, Initial Study Checklist.

1.2 California Environmental Quality Act Compliance

The California Environmental Quality Act (CEQA), which serves as the main framework of environmental law and policy in California, requires State and local government agencies to inform decision makers and the public about the potential environmental impacts of proposed projects, and to reduce those environmental impacts to the extent feasible. Except in cases where a project is either statutorily or categorically exempt, CEQA is applicable to any project subject to discretionary approval by a public agency. The Project does not fall under any of the statutory or categorical exemptions listed in the CEQA Statute and State of California CEQA Guidelines (CEQA Guidelines) (California Public Resources Code, Section 21000 et seq.; 14 CCR 15000 et seq.).

DWR has prepared this Initial Study (IS) to evaluate the potential physical environmental effects of the proposed Project and identify mitigation measures that would avoid, reduce, or provide compensation for any significant
adverse Project effects. As demonstrated in the analysis throughout Section 3, where the Project would result in significant or potentially significant impacts, those impacts would be reduced to a less-than-significant level with implementation of the mitigation measures identified in this IS. Thus, DWR proposes to adopt a Mitigated Negative Declaration for the Project to comply with CEQA.

1.3 Project Background

The proposed Project activities would occur at three DWR facilities—Clifton Court Forebay, Dyer Dam and Reservoir, and Patterson Dam and Reservoir. Because project activities would affect the dam embankments and surrounding land, the facilities are referred to throughout this IS as Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam, unless the text is specifically addressing the forebay or reservoir.

Clifton Court Forebay is located in Contra Costa County while Dyer Dam and Patterson Dam are located in Alameda County. Each is located within the unincorporated area of the respective county, and lands surrounding each facility are primarily in agricultural production, grazing, and/or open space. A water treatment plant is located south of Patterson Dam. All of the Project activities would occur within DWR property or rights-of-way.

More detailed information regarding the physical setting of each of the three DWR facilities is provided in Section 3. This section provides a general overview of the planning and environmental setting of the Project area.

Clifton Court Forebay and Patterson Dam and Reservoir were constructed in the 1960s as part of the early stages of development of the SWP. Dyer Dam and Reservoir were constructed between 2009 and 2012. Over time, the ability of DWR’s Division of Operations and Maintenance (O&M) to address rodent burrows (i.e., backfill) has diminished due to the difficulty in obtaining permits to fill the rodent burrows. The burrows are considered potential habitat for listed species (e.g., California red-legged frog [Rana draytonii], California tiger salamander [Ambystoma californiense], and others), and therefore could require permits under the California and federal Endangered Species Acts, which can take significant time to obtain.

As an interim measure, DWR’s Delta Field Division has implemented a rodent abatement/control plan that prescribes the placement of bait stations and the broadcasting of bait annually from, May 1 to September 1, in compliance with local county regulations. This activity is included in each dam’s annual preventative maintenance plan, but has not resulted in sufficient minimization or elimination of widespread animal burrowing on the downstream slope of these dams.

Dam safety inspections have repeatedly identified the presence of rodent burrows, highlighted the hazard presented by rodent burrows, and emphasized the need for immediate action to address the existing burrows and an ongoing solution to address or eliminate the burrows on a regular basis. A 2018 Director’s Safety Review Board report indicated the board’s belief that burrows have not been addressed in a satisfactory timeframe at Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam, and now represent a serious dam safety concern (DSRB 2018). In July 2020, DWR’s Division of Safety of Dams (DSOD) found that the severity of the dam safety issues at the dams “has increased to a level that now poses a significant dam safety concern” (DWR 2020a, p.1).

Thus, DWR proposes rodent burrow remediation and restoration measures at Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam to address ongoing deterioration of the dam embankments. DWR also proposes to implement a Rodent Burrow Maintenance and Monitoring Plan (DWR 2021), which describes a program for more frequent inspections, burrow collapse, excavation, compaction, and backfilling. In addition, permanent measures
to prevent future burrowing may be necessary in areas that have been subject to the greatest burrowing or carry the greatest consequence of failure. The increased frequency of inspections component of the Rodent Burrow Maintenance and Monitoring Plan would be implemented beginning in 2021 while remediation actions would be taken between 2022 (pending permit approval) and 2026. DWR would undertake ongoing monitoring and maintenance, as described in the Rodent Burrow Maintenance and Monitoring Plan (DWR 2021), to prevent formation of new habitat capable of supporting special-status wildlife species. The determination of whether to implement a permanent preventative measure would be based on the findings of the Rodent Burrow Maintenance and Monitoring Plan regarding burrow activity severity, as well as considerations of the consequence of dam failure. The specific permanent preventative measure applied to a given section of dam would be based on the dam engineering, design and burrow activity severity. After permanent preventative measures are installed, monitoring frequency would be reduced to the frequency defined in the Dam Safety Surveillance and Monitoring Plan for each site.

1.4 Public Review Process

This IS being circulated for public and agency review from December 3, 2021, to January 3, 2022. Copies of this document are available for review online at www.water.ca.gov/News/Public-Notices and ceqanet.opr.ca.gov, and at the following locations:

Department of Water Resources
Division of Operations and Maintenance Headquarters
715 P St, 5th Floor
Sacramento, California 94236-0001

Department of Water Resources
Delta Field Division
5280 Bruns Road
Byron, California 94514

Comments on this IS and proposed Mitigated Negative Declaration must be received by January 3, 2022. Comments should be mailed or emailed to the lead agency:

DWR O&M Environmental Assessment Branch
Attn: Sara Paiva-Lowry
P.O. Box 942836
Sacramento, California 94236-0001
Office phone: (916) 902-7709
Email: sara.paiva-lowry@water.ca.gov.
INTENTIONALLY LEFT BLANK
2 Summary of Findings

2.1 Environmental Factors Potentially Affected

This IS analyzes the environmental impacts of the Project consistent with the format and analysis prompts provided in Appendix G of the CEQA Guidelines. The analysis determined that the Project would result in potential adverse impacts associated with Biological Resources, Cultural Resources, Geology and Soils, Hydrology and Water Quality, and Tribal Cultural Resources, but that these impacts would be reduced to less-than-significant levels with implementation of mitigation measures. Detailed analyses of impacts are provided under each resource section evaluated in Section 3 of this IS.

2.2 Environmental Determination

DWR finds that the proposed Project would result in significant and potentially significant environmental impacts, but that implementing the mitigation measures identified in Table 1 would reduce those impacts to less-than-significant levels by avoiding, minimizing, compensating for, or offsetting the impacts. The proposed Project would result in no impacts that would remain significant and unavoidable following implementation of the identified mitigation measures.

Table 1. Mitigation Measures

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<td>BIO-1</td>
<td><strong>Avoid or Minimize Impacts on Native Plants and Wildlife.</strong> To avoid or minimize impacts on plants and wildlife, the following general measures shall be implemented throughout the Project site:</td>
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<td>• <strong>Approved Biologists.</strong> At least 15 days prior to start of Project activities, the California Department of Water Resources (DWR) shall submit the names and credentials of personnel seeking to act as approved biologists to the U.S. Fish and Wildlife Service (USFWS) and California Department of Fish and Wildlife (CDFW) for review. Biologists shall have appropriate training and experience with the species for which they are seeking approval. All biologists shall be approved in writing by USFWS and CDFW prior to conducting proposed Project activities.</td>
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<td>• <strong>Environmental Awareness Training.</strong> An approved biologist shall conduct environmental awareness training for all individuals working on the Project before work begins. The training shall cover the life history, habitat requirements, and conservation measures for potentially affected species. The training shall also include information on federal and state regulatory protections, restrictions, and guidelines that must be followed by crews to avoid and minimize impacts to threatened and endangered species and their habitat. Upon completion of training, crews shall sign a form stating that they attended the training and understand all conservation measures. If new personnel are added to the Project, the new personnel shall receive the training prior to starting work.</td>
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<td>• <strong>Approved Biologist Authority.</strong> An approved biologist shall be available to inspect all Project activities to ensure compliance with avoidance and minimization measures and shall monitor all ground-disturbing activities. Approved biologists shall perform weekly surveys of the Project area to ensure appropriate application of all general and species measures. Approved biologists shall have the authority to stop work if a listed species is encountered within active work areas or activities may result in take of listed species.</td>
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</tbody>
</table>
### Table 1. Mitigation Measures

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<th>Measure Number</th>
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<td></td>
<td>- <strong>Speed Limits.</strong> Project-related vehicles shall observe a daytime speed limit of 15 mph, except on county roads and state and federal highways. Emergency vehicles are exempt from these restrictions in emergency situations. Any road mortality/injury of any animal that may be a listed species observed by workers shall be reported to an approved biologist who will inspect the remains and notify the U.S. Fish and Wildlife Service and California Department of Fish and Wildlife within 24 hours if it is determined to be a listed species. At a minimum, the notification will include clear photographs that will aid in immediate identification.</td>
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<td></td>
<td>- <strong>Off-Road Traffic Prohibition.</strong> Off-road traffic outside of designated Project areas shall be prohibited.</td>
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<td></td>
<td>- <strong>Trash Abatement.</strong> All food-related trash items, such as wrappers, cans, bottles, and food scraps, shall be disposed of in a closed container and removed from the Project site daily.</td>
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<td></td>
<td>- <strong>Spill Prevention.</strong> A Spill Prevention Control and Countermeasure Plan shall be prepared prior to Project implementation. All machinery shall be properly maintained and cleaned to prevent spills and leaks. Any spills or leaks from equipment shall be reported and cleaned up in accordance with applicable local, state, and/or federal regulations.</td>
</tr>
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<td></td>
<td>- <strong>Fire Prevention.</strong> A Fire Prevention and Suppression Plan shall be prepared prior to the start of Project activities.</td>
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<td>- <strong>Reporting.</strong> A final report containing details of the construction activities and any observations of listed species shall be submitted to the U.S. Fish and Wildlife Service and California Department of Fish and Wildlife within 30 days of Project completion. The report shall document the number of each species encountered, and type and amount of any known take, as defined by the federal Endangered Species Act and California Endangered Species Act.</td>
</tr>
</tbody>
</table>

**BIO-2 Avoid, Minimize, and Mitigate Impacts to Special-Status Plants.**

Permanent and temporary impacts to long-styled sand-spurrey (California Rare Plant Rank [CRPR] 1B.2) individuals would result from implementation of the Project at Clifton Court Forebay Dam; these impacts are significant and require mitigation.

Compensatory mitigation for permanent impacts to long-styled sand-spurrey shall include one of the following:

- The protection, through land acquisition or a conservation easement, of land that supports an occurrence of equal or greater size and number of plants of similar health. Or,

- If it is not feasible to acquire and preserve a known occurrence of a special-status plant to be impacted, suitable unoccupied habitat capable of supporting the species shall be acquired, and used to create Salvage and relocation or propagation of impacted plants to create a new population on suitable unoccupied habitat or expand the existing Clifton Court Forebay population at a 1:1 ratio. For creation of an occurrence, the following considerations shall also be met: Plant relocation or propagation would be subject to the following requirements:
  - A special-status plant mitigation plan shall be prepared by a qualified biologist and include (1) seed/propagule collection methods, (2) identification of receiver sites or locations for relocated or propagated plants and rationale for their selection, (23) success criteria for population establishment, including a not-to-exceed threshold for invasive species cover, (34) 5 years of maintenance and monitoring, (45) and the adaptive management approaches that would be used.
<table>
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<tr>
<th>Measure Number</th>
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<td>to evaluate monitoring results and adjust management actions, if necessary, and (6) financial assurances for the funding of special-status plant mitigation. The special-status plant mitigation plan shall be implemented to document the success of creation of the new plant occurrence.</td>
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<td></td>
<td>Prior to unavoidable and permanent disturbance to an occurrence of the existing long-styled sand-spurrey population a special-status plant species, propagules shall be collected from the occurrence to be disturbed. This may include seed collection, cuttings, or seed-bearing topsoil salvage, and these propagules shall be used to establish a new population on suitable, unoccupied habitat or expand the existing population, as described above. Transplantation of whole plants may be attempted, but shall not be used as the primary means for creating a new occurrence or expanding an existing occurrence.</td>
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<td></td>
<td>Creation of new occurrences shall require identification of suitable locations and habitats, as well as The biologist shall conducting a literature review to determine appropriate and viable propagation or planting techniques for the species, appropriate seed-collection techniques, and seeding rates.</td>
</tr>
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<td></td>
<td>For temporary impacts to long-styled sand-spurrey, compensatory mitigation for temporary impacts to long-styled sand-spurrey shall include salvage of the affected topsoil and restoration of the temporary impact area occurrence on site at a 1:1 ratio. A restoration plan, which mayMethods for salvaging, storing, and reapplying topsoil before, during, and after construction, respectively, shall be incorporated into the special-status plant mitigation plan described above, if applicable, shall be prepared. Other plan components as described above (i.e., monitoring and adaptive management) shall also apply to the on-site restoration area. The restoration plan shall include (1) seed/propagule collection methods, (2) success criteria, and (3) 5 years of maintenance and monitoring.</td>
</tr>
<tr>
<td></td>
<td>Additionally, a qualified California Department of Water Resources (DWR) biologist (qualified biologist) shall be present prior to and during construction to ensure avoidance of impacts on special-status plant species and special-status natural communities by flagging the population or natural community areas and/or allowing adequate buffers.</td>
</tr>
<tr>
<td>BIO-3</td>
<td>Avoid, Minimize, and Mitigate Impacts to Sensitive Natural Communities. The Project would result in permanent and temporary impacts to sensitive vegetation communities at Clifton Court Forebay Dam and Dyer Dam; these impacts are significant and require mitigation.</td>
</tr>
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<td>All temporary impacts to sensitive vegetation communities shall be restored on site. Restoration shall include recontouring and seeding and/or planting with native plants that comprise the sensitive natural community impact. Prior to seeding and/or planting the temporary ground-disturbance areas, the approved biologist shall review the seeding/plant palette to ensure that seeding/planting does not contain non-native or invasive plant species, as identified in the most recent version of the California Invasive Plant Inventory for the region. The California Department of Water Resources (DWR) shall ensure recontouring and revegetation of disturbed portions of sensitive vegetation communities in areas temporarily affected by construction within 1 year of demobilization by the contractor during the appropriate seasonal period for revegetation.</td>
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<td></td>
<td>Mitigation for permanent impacts to sensitive natural communities shall occur at a mitigation bank or within an in-lieu fee program, and shall occur at a ratio no less than 1:1 for the impacts</td>
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</table>
### Table 1. Mitigation Measures

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<th>Measure Number</th>
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<tr>
<td><strong>BIO-4</strong></td>
<td><strong>Minimize Temporary Impacts on Potential Vernal Pool Fairy Shrimp Habitat.</strong> Prior to constructing the temporary toe access road adjacent to potential vernal pool fairy shrimp habitat at Clifton Court Forebay Dam (i.e., 5.36-acre wetland outboard of Stations 32 + 00 to 64 + 00), an approved biologist shall direct the placement of erosion control fencing along the downstream (southern) perimeter of the access road to avoid sedimentation of adjacent habitat. The biologist shall also direct the placement of rinsed gravel and covering with geotextile fabric over any depressions overlapping the road’s footprint to minimize damage to the soils and protect existing contours. Erosion control fencing and temporary fill shall be removed within 72 hours of the completion of burrow remediation activities at this location.</td>
</tr>
</tbody>
</table>
| **BIO-5** | **Avoid and Minimize Impacts to California Tiger Salamander and California Red-legged Frog.** This mitigation measure identifies two separate sets of requirements—one for Clifton Court Forebay Dam and the other for both Dyer Dam and Patterson Dam.  

**Clifton Court Forebay Dam:** The following measure shall be implemented to avoid take of individual California tiger salamanders in low-quality grassland and iodine bush scrub upland habitat south of at Clifton Court Forebay Dam:  
- **California Tiger Salamander Take Avoidance.** The Project shall be performed during daylight hours, and work along the southern dam embankment (Stations 3+15 to 85+00) shall begin on or after June 1 and be completed by October 31 of each year. Within 30 seven days prior to clearing existing vegetation for the staging areas in this area south of the dam (i.e., between Skinner Fish Facility and intake channel), an approved biologist shall survey for the presence of potential underground refugia for California tiger salamander (i.e., small mammal burrows). If potential refugia are observed, they shall be excavated by hand (e.g., shovels and non-powered hand tools) to confirm California tiger salamander absence covered with plywood to prevent collapse from temporary heavy equipment traffic. An approved biologist shall monitor all refugia excavation and guide the placement of plywood over burrows. All excavated burrows shall be backfilled after the biologist confirms that tiger salamanders are absent. If any California tiger salamanders are found, the approved biologist shall stop any Project activities that could potentially result in California tiger salamander take and reinitiate consultation with USFWS and CDFW. No tiger salamanders would be captured or relocated under this measure. After the completion of work and temporary exclusion fencing shall be installed around the staging areas along the boundary of the Project where burrows were excavated to prevent amphibians from entering. Exclusion fencing shall be a minimum of 2.5 feet tall and the bottom 6 inches shall be buried to prevent amphibians from crawling under the fence. During work hours, a portion of the fencing around upland staging areas may be removed to facilitate Project activities, but must be reinstalled at the end of the day and the bottom secured with sandbags or other heavy material. When sections are removed, the section shall be reviewed for resting or hiding species prior to removal. Exclusion fencing shall be removed within 72 hours of completion of work.  

**Dyer Dam and Patterson Dam:** The following measures shall be implemented to avoid and minimize impacts on California tiger salamander and California red-legged frog at Dyer Dam and Patterson Dam:  
- **Work Window.** The Project shall be performed during daylight hours, and any work in wetted areas shall occur between May 1 and October 31.  
- **Access Road Burrow Protection.** Any burrows or large cracks in the ground that may be traversed by heavy equipment traffic over unimproved access roads shall be covered with...
### Table 1. Mitigation Measures

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<td>minimum 5/8-inch-thick plywood to prevent burrow collapse.</td>
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<td><strong>Relocation Plan.</strong> Prior to implementation of this measure, a relocation plan shall be developed that outlines the specific methods for safely capturing, holding, transporting, and releasing California tiger salamanders and California red-legged frogs, including equipment sterilization techniques. The plan shall also outline where relocated individuals will be moved and a process for reducing oversaturation.</td>
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<td></td>
<td><strong>Morning Inspections.</strong> An approved biologist shall survey the work area for California red-legged frogs and California tiger salamanders each morning prior to Project activities. Any California red-legged frog or California tiger salamander found in the work area shall be captured, transported to a predetermined relocation site, and released. Only approved biologists shall capture and handle frogs or salamanders. The biologist shall monitor any relocated frog or salamander until such time that the animal is safe from any obvious or immediate hazard or danger.</td>
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<td></td>
<td><strong>Amphibian Exclusion Fencing.</strong> Exclusion fencing shall be installed between work areas and adjacent habitat for California red-legged frog and California tiger salamander. The fence shall be a minimum of 2.5 feet tall and the bottom 6 inches shall be buried to prevent amphibians from crawling under the fence. Placement and installation of fencing around drainage work areas shall be coordinated with any sediment control fencing requirements of other resource agency permits. During work hours, a portion of the fencing around upland staging areas may be removed to facilitate Project activities, but must be reinstalled at the end of the day and the bottom secured with sandbags or other heavy material. When sections are removed, the section shall be reviewed for resting or hiding species prior to removal. The exclusion fencing shall be maintained until all construction activities are completed and removed within 72 hours of the completion of work.</td>
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<td><strong>Vegetation Removal Inspections.</strong> Vegetation and sediment removed from drainages shall be carefully placed in the dump truck bed and examined for frogs and salamanders by approved biologists prior to disposal.</td>
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<td><strong>Impacts on areas determined to be habitat for California tiger salamander and California red-legged frog shall be fully mitigated, in consultation with the U.S. Fish and Wildlife Service and the California Department of Fish and Wildlife.</strong></td>
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<tr>
<td>BIO-6</td>
<td><strong>Avoid and Minimize Impacts to Western Pond Turtle.</strong> To minimize impacts on western pond turtles known to nest at the northeastern corner of Clifton Court Forebay, burrow remediation activities adjacent to the drainage along the toe access road (Stations 230+00 to 262+00, approximately) shall occur from May 1 to June 15 and September 1 to October 15 to avoid the peak nesting period (mid-June to August) and minimize mortality of hatchlings overwintering in nest sites (approximately November to April).</td>
</tr>
<tr>
<td>BIO-7</td>
<td><strong>Avoid and Minimize Impacts to Special-Status and Non-Special-Status Birds.</strong> The following measures shall be implemented throughout the Project to avoid and minimize impacts to nesting birds, including special-status species:</td>
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|                | A qualified biologist shall conduct preconstruction surveys for nesting birds no more than 7 days prior to any construction activity involving vegetation removal (i.e., grubbing of herbaceous vegetation and grass, removal of trees or shrubs) that begins between during the nesting season (March 15 to August 31) and shall resurvey if there is a four-day or more lapse in construction activities during this period. Surveys shall cover the construction footprint and suitable habitat within 100 feet for all birds, 300 feet for raptors (including white-tailed kite and northern harrier) and tricolored blackbird, and 0.25 miles for Swainson’s hawk. If the biologist does not find any nests but suitable habitat would be removed, the biologist shall conduct a final survey of such habitat and areas within 100 feet of the habitat within 48 hours of the activity to confirm the absence of nests (habitat outside
Table 1. Mitigation Measures

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<td>species is not found, no further mitigation shall be required. If badger dens are identified within the construction footprint during the surveys or afterwards, dens shall be inspected and closed as follows:</td>
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<td>• When unoccupied dens are encountered outside of work areas but within 100 feet of proposed activities, vacated dens shall be inspected to ensure they are empty and temporarily covered using plywood sheets or similar materials. If badger occupancy is determined at a given site within the work area, work activities at that site shall be halted. Depending on the den type, reasonable and prudent measures to avoid harming badgers shall be implemented and may include seasonal limitations on Project construction near the site (i.e., restricting the construction period to avoid spring–summer pupping season), and/or establishing a construction-exclusion zone around the identified site, or resurveying the den at a later time to determine species presence or absence.</td>
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<td>• Badgers may be passively relocated using burrow exclusion (e.g., installing one-way doors on burrows) or similar California Department of Fish and Wildlife (CDFW)–approved exclusion methods. In unique situations it might be necessary to actively relocate badgers (e.g., using live traps) to protect individuals from potentially harmful situations. Such relocation shall be performed with advance CDFW coordination and concurrence.</td>
</tr>
<tr>
<td>BIO-11</td>
<td>Avoid, Minimize, and Mitigate Impacts to Jurisdictional Waters. All temporary impacts to jurisdictional waters of the United States/state shall be restored on site. Restoration shall include recontouring and erosion control with a native seed mix, where applicable. Prior to seeding temporary ground-disturbance areas, the approved biologist shall review the seeding palette to ensure that no seeding of non-native or invasive plant species, as identified in the most recent version of the California Invasive Plant Inventory for the region, will occur. The California Department of Water Resources (DWR) shall ensure recontouring and revegetation of disturbed portions of jurisdictional areas in areas temporarily affected by construction prior to demobilization by the contractor at the end of Project construction.</td>
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<td></td>
<td>Compensatory mitigation for permanent impacts to prevent net loss of functions and values at Clifton Court Forebay, Dyer Reservoir, and Patterson Reservoir shall occur either at an approved mitigation bank (e.g., Cayetano Mitigation Bank [approval pending]), within an in-lieu fee program (e.g., National Fish and Wildlife Foundation’s Sacramento District California In-Lieu Fee Program), or through on-site or off-site permittee-responsible mitigation. Where on-site or off-site permittee-responsible mitigation is pursued, it and shall include establishment, restoration, or enhancement of aquatic resources occur at a ratio no less than 1:1 for the impacts to jurisdictional waters or at a ratio determined in the jurisdictional waters permits. If a mitigation bank or in-lieu fee program is not utilized and DWR proceeds with any permittee-responsible mitigation effort, a Compensatory Mitigation and Monitoring Plan waters mitigation and monitoring plan shall be prepared that outlines the compensatory mitigation to address permanent loss, including functions and values, of aquatic resources in compliance with requirements from applicable regulatory agencies (i.e., U.S. Army Corps of Engineers [USACE], Regional Water Quality Control Board [RWQCB], and California Department of Fish and Wildlife [CDFW]). Suitable mitigation lands provided for species and vegetation communities may be used for jurisdictional waters of the United States/state mitigation. If required, The Compensatory Mitigation and Monitoring Plan wetland mitigation and monitoring plan shall be developed in coordination with CDFW, USACE, and RWQCB and shall detail mitigation and monitoring obligations for impacts to wetlands and other waters as a result of construction activities. The plan shall quantify the total acreage affected; annual success criteria; mitigation sites; monitoring and reporting requirements; and site-specific plans to compensate for wetland or other waters losses resulting from the Project. Include the following:</td>
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### Table 1. Mitigation Measures

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<td>• Compensatory Description. A description of the quantity (acres and linear feet) affected by the project; aquatic resource types and amounts (acres and linear feet) for which compensatory mitigation is being provided, the type of compensation (i.e., restoration, establishment, enhancement, and/or preservation); and the process in which the resource functions of the compensatory mitigation efforts would address the needs of the watershed or ecoregion.</td>
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<td></td>
<td>• Site Selection. A description of the factors considered in the site selection process, including demonstrating that an attempt to select a site within the same watershed and documentation of the characteristics of the site that would support restoration and/or establishment of aquatic resources. A description of the final proposed mitigation site(s) and site-specific plans to compensate for aquatic resources losses resulting from the project.</td>
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<td>• Performance Standards. A description of the minimum performance standards that must be met at or before the end of monitoring to ensure no net loss of functions and values of aquatic resources. The description shall also include a description for annual success criteria, including a minimum percent cover of native vegetation within the compensatory mitigation area.</td>
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<td>• Monitoring and Reporting Specification. A description of the monitoring obligations, monitoring periods (not less than annual reports for 5 years), and reporting specifications.</td>
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<td>• Adaptive Management. A description of the adaptive management strategy to address changes in site conditions or other components of the compensatory mitigation efforts.</td>
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<td></td>
<td>• Financial Assurances. A description of financial assurances which would be provided for the success of compensatory mitigation.</td>
</tr>
<tr>
<td>CUL-1</td>
<td><strong>Unanticipated Archaeological Resources.</strong> A Worker Environmental Awareness Training for cultural resources shall be prepared and provided to all construction workers prior to initiation of work. The training shall generally summarize the protocols provided below that must be followed in the event that there is an inadvertent discovery of cultural resources and/or potential tribal cultural resources. In the event that cultural resources (e.g., sites, features, or artifacts) are exposed during construction activities, all ground disturbing work occurring within 100 feet of the find shall immediately stop until a qualified specialist, meeting the Secretary of the Interior’s Professional Qualification Standards, can evaluate the significance of the find and determine whether additional study is warranted. Prehistoric archaeological deposits may be indicated by the presence of discolored or dark soil, fire-affected material, concentrations of fragmented or whole freshwater bivalves shell, burned or complete bone, non-local lithic materials, or the characteristic observed to be atypical of the surrounding area. Common prehistoric artifacts may include modified or battered lithic materials; lithic or bone tools that appeared to have been used for chopping, drilling, or grinding; Projectile points; fired clay ceramics or non-functional items; and other items. Historic-age deposits are often indicated by the presence of glass bottles and shards, ceramic material, building or domestic refuse, ferrous metal, or old features such as concrete foundations or privies. Depending upon the significance of the find under the California Environmental Quality Act (CEQA) (14 CCR 15064.5(f); California Public Resources Code, Section 21082), the archaeologist may simply record the find and allow work to continue. If the discovery proves significant under CEQA, additional work, such as preparation of an archaeological treatment plan, testing, or data recovery, may be warranted.</td>
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<td><strong>CUL-2</strong></td>
<td><strong>Unanticipated Human Remains.</strong> In accordance with Section 7050.5 of the California Health and Safety Code, if potential human remains are found, the county coroner shall be immediately notified of the discovery. No further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent remains shall occur until the county coroner has made their determination regarding the appropriate next steps to be taken. This determination must be completed within 2 working days of notification of the discovery. If the county coroner determines that the remains are, or are believed to be, Native American, he or she shall notify the Native American Heritage Commission in Sacramento within 24 hours. In accordance with California Public Resources Code, Section 5097.98, the Native American Heritage Commission must immediately notify those persons it believes to be the most likely descendant from the deceased Native American. The most likely descendant shall complete his or her inspection within 48 hours of being granted access to the site. The designated Native American representative would then determine, in consultation with the property owner, the disposition of the human remains.</td>
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<tr>
<td><strong>GEO-1</strong></td>
<td><strong>Unanticipated Paleontological Resources.</strong> In the event that paleontological resources (e.g., fossils) are exposed during construction activities for the Project, all construction work occurring within 50 feet of the find shall immediately stop until a qualified paleontologist meeting the professional standards of the Society of Vertebrate Paleontology (SVP) can evaluate the significance of the find and determine whether additional study is warranted. If the discovery is clearly not significant, the paleontologist may document the find and allow work to continue. If the discovery may consist of or include unique paleontological resources as defined under the California Environmental Quality Act, a qualified paleontologist shall evaluate the resource and prepare a proposed mitigation plan in accordance with SVP guidelines (1995) sufficient to ensure that the project does not result in the direct or indirect destruction of any unique paleontological resources. The proposed mitigation plan may include a field survey, construction monitoring, sampling and data recovery procedures, museum storage coordination for any specimen recovered, and a report of findings.</td>
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<tr>
<td><strong>HYD-1</strong></td>
<td><strong>Avoid or Minimize Increased Erosion.</strong> To avoid or minimize the potential for increased erosion downstream of the low-level drainage outlet ditch improvements at Dyer Dam and Patterson Dam, the California Department of Water Resources (DWR) shall complete a fluvial geomorphology study for the drainage outlet each ditch that evaluates the physical shape of the outlet each ditch and the properties (e.g., velocity, volume, and flow resistance) of water and sediment transport through the drainage outlet each ditch. The fluvial geomorphology study shall also provide design criteria for the proposed drainage ditch activities improvements that will ensure the Project does not increase erosion within or downstream of the affected ditch segments.</td>
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</tbody>
</table>
3 Initial Study Checklist

3A Project Overview

Project title:
Delta Dams Rodent Burrow Remediation Project

Lead agency name and address:
California Department of Water Resources
P.O. Box 942836
Sacramento, California 94236-0001

Contact person and phone number:
Sara Paiva-Lowry
Environmental Regulatory Compliance Section Manager
Division of Operations and Maintenance
(916) 902-7709
Sara.Paiva-Lowry@water.ca.gov

Project locations:

Clifton Court Forebay Dam: State Dam No. 1-064
Contra Costa County, approximately 10 miles northwest from the City of Tracy
Township 1 South, Range 4 East, Section 7, 18, 17, 19, 20 and 30, within the 7.5-minute quadrangle
Township 1 South, Range 3 East, Section 13 and 24, within the 7.5-minute quadrangle

Dyer Dam and Reservoir: State Dam No. 1-093
Alameda County, in the Altamont Hills, approximately 13 miles west of the City of Tracy and 7 miles southeast of the Livermore
Township 2 South, Range 3 East, Section 17 and 25, within the 7.5-minute quadrangle.
Assessor’s Parcel Number: 99B-6062-5-1

Patterson Dam and Reservoir: State Dam No. 1-062
Alameda County, approximately 1 mile east of the Livermore
Township 3 South, Range 3 East, Section 6, within the 7.5-minute quadrangle
Assessor’s Parcel Number: 99B-5600-7

Project sponsor’s name and address:
California Department of Water Resources
P.O. Box 942836
Sacramento, California 94236-0001
General plan designation:

Clifton Court Forebay: Water, Public Service, and Parks and Recreation (Contra Costa County 2020)

Dyer Dam and Reservoir: Large Parcel Agriculture (Alameda County 1994a)

Patterson Dam and Reservoir: Large Parcel Agriculture (Alameda County 1994a)

Zoning:

Clifton Court Forebay: Agriculture (A-2), with A-2-X, A-4, and A3-SG adjacent

Dyer Dam and Reservoir: Agriculture (A) with a 100-acre minimum site area

Patterson Dam and Reservoir: Agriculture (A) with a 160-acre minimum site area

Description of project:

3A.1 Introduction

DWR is proposing to implement permanent rodent burrow remediation and restoration measures for the downstream faces of Patterson, Dyer, and Clifton Court Forebay Dams to prevent ongoing deterioration of the dam embankments. Work includes preventive measures to curtail future burrowing for High Hazard Patterson and Dyer Dams, and segments of the Low Hazard Clifton Court Forebay Dam that have been subject to the greatest burrowing and/or have an increased consequence of failure. The Project also includes maintenance and repair work for appurtenant facilities at each dam, such as intake and drainage channel repairs, and creation of construction staging areas and temporary access roads along the toe of the dams.

As shown in Table 2, the Project is expected to affect a total of 84.62 83.94 acres—approximately 57.49 56.79 acres would be subject to permanent impacts and approximately 27.14 23.17 acres would be subject to temporary impacts from construction staging and access roads.

Table 2. Estimated Project Footprint

<table>
<thead>
<tr>
<th>Location</th>
<th>Maximum Permanent Impact Area (acres)</th>
<th>Maximum Temporary Impact Area (acres)¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clifton Court Forebay Dam</td>
<td>48.432</td>
<td>16.15</td>
</tr>
<tr>
<td>Dyer Dam</td>
<td>6.19 5.57</td>
<td>5.624</td>
</tr>
<tr>
<td>Patterson Dam</td>
<td>2.87 2.79</td>
<td>5.374</td>
</tr>
<tr>
<td>Total</td>
<td>57.49 56.79</td>
<td>27.143</td>
</tr>
<tr>
<td>Grand Total</td>
<td>84.62 83.94</td>
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</tr>
</tbody>
</table>

Notes:

¹ Includes construction staging and temporary construction access roads.
Totals may not sum due to rounding.
3A.2  Background and Overview

The earthen embankment dams at Clifton Court Forebay, Dyer Dam, and Patterson Dam have been subject to ongoing rodent burrowing throughout their service life. Rodent burrows are a recognized hazard to dams and levees as they can be associated with potential failure modes for dams by promoting piping and internal erosion that can ultimately lead to dam of a failure. A burrow that intercepts the phreatic surface (water level) within the dam can cause erodible material from the dam embankment to migrate and be carried away. This “piping” action progresses upstream, elongating the pipe, until it reaches the reservoir. Once connection is made to the reservoir, the piping can cause a catastrophic breaching of the dam ultimately leading to dam failure.

Over time, O&M’s ability to address rodent burrows (i.e., backfill) has diminished due to the difficulty in obtaining permits to fill the rodent burrows. The burrows are considered habitat for listed species (e.g., California red-legged frog, California tiger salamander, and others) and require permits under the California and federal Endangered Species Acts, which take significant time to obtain. As an interim measure, DWR’s Delta Field Division has implemented a rodent abatement/control plan that prescribes the placement of bait stations and the broadcasting of bait annually from May 1 to September 1, in compliance with local county permitting. This activity is included in the dam’s annual preventative maintenance plan but has not sufficiently minimized or eliminated widespread animal burrowing on the downstream slope of these dams.

Dam safety inspections by O&M, DSOD, and independent Director’s Safety Review Boards have all repeatedly identified the presence of rodent burrows during dam safety inspections and have each independently highlighted the hazard the rodent burrows present, as well as the need for immediate action to address the existing burrows and the need for an ongoing solution to address or eliminate the burrows on a regular basis. A 2018 Director’s Safety Review Board report indicated that burrows had not been addressed in a satisfactory timeframe at Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam, and now represent a serious dam safety concern. See Figure 2, Existing Burrow and Erosion Conditions.

DWR’s proposed restoration and remediation activities at each of the three dams consider the location and density of the burrows on each dam or dam reach, complexity of burrow clusters, the phreatic surface, slope stability, and other factors. The specific repairs and restoration proposed by DWR were identified based on dam assessments performed by DWR Dam Safety Engineers to identify embankment distress associated with burrowing.

3A.2-1 Remediation Approach

To combat rodent burrow activity, DWR proposes to conduct remediation by collapsing burrows and/or excavating and backfilling the holes and compacting the soil. Where warranted, treated areas would be covered with sand and gravels, wire mesh, and/or rock to deter future burrowing and associated surficial dam distresses. Where rock placement is not warranted, the holes will be backfilled and compacted, and the disturbed area would be revegetated. The primary steps in this process are illustrated in Figure 3, Burrow Remediation Overview. DWR also proposes to repair shallow ruts and near-surface deformations at each of the three dams by filling these areas with native soil and compacting it. The proposed remediation program includes additional individual, site-specific work, as discussed in the detailed descriptions for each dam in Sections 3A.3, 3A.4, and 3A.5.
Initial rodent burrow remediation work to restore the dam embankments and ensure burrow prevention measures will occur in 2022 pending permitting approval. These actions would include:

- Utilizing long-reach excavators with sheepsfoot roller attachments to collapse and compact burrow holes (i.e., sheepsfoot compacting);
- Using hand tools to collapse, backfill, and compact burrow holes (i.e., hand-backfilling); and
- Track-walking the downstream dam embankment slopes using a dozer or similar heavy track-mounted equipment to collapse and compact burrow holes (i.e., track-walking).

Additional remediation work where permanent burrow prevention measures are warranted would take place between May and October in the years 2022 through 2026.

After construction, any materials not used or reused in the Project would be hauled off site and reused, disposed of in a landfill, or recycled at a recycling facility. Construction would include clearing and grubbing of trees and shrubs, including any stumps. Cleared and grubbed vegetation would be removed from the site and disposed of at a commercial green-waste disposal facility. Construction would occur continuously during daylight hours between May and October in each year that construction takes place, with no work occurring for 24 hours following a rain event.

3A.2-2 Remediation Types

Remediation is planned to occur in three stages—restoration, short-term prevention, and long-term prevention. Restoration involves collapsing and/or excavating burrows and backfilling the dam surface in one or more of the following approaches:

- Track-walking the embankment slopes using a dozer or similar heavy construction equipment to collapse and compact burrow holes
- Using long-reach excavators with sheepsfoot roller attachment to collapse and compact burrow holes
- Filling burrow holes with a soil-cement slurry (i.e., mud-packing method)
- Using hand tools to collapse and compact burrow holes (i.e., hand-backfilling)

Further, the short-term and long-term prevention measures involve applying one of the five different restoration and prevention measures summarized in Table 3. The depth and width of excavation for each individual remediation location is dependent on the site-specific conditions, as discussed further in Sections 3A.3, 3A.4, and 3A.5. The particular restoration and prevention measures applied in a specific area are based on the priority rating for each section or segment of each dam—high, medium, and low priority, as described below. The priority level is based on the severity of burrow activity, the influence of the burrow activity on dam integrity, and the potential consequences of dam failure.
Table 3. Remediation Types

<table>
<thead>
<tr>
<th>Type</th>
<th>Associated Hazard Level</th>
<th>Description</th>
<th>Short-Term Prevention</th>
<th>Long-Term Prevention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type I</td>
<td>High</td>
<td>Excavate, scarify, recompact, backfill; create or maintain 5:1 slope</td>
<td>Place prevention trenches and backfill; place wire mesh and 12-inch-thick rock layer</td>
<td>Place 18-inch-thick rock layer</td>
</tr>
<tr>
<td>Type II</td>
<td>High</td>
<td>Excavate, scarify, recompact, backfill; create or maintain 2:1 slope</td>
<td>Place wire mesh and 12-inch-thick rock layer</td>
<td>Place 18-inch-thick rock layer</td>
</tr>
<tr>
<td>Type III</td>
<td>High</td>
<td>Excavate, scarify, recompact, backfill; create or maintain 3:1 slope</td>
<td>Place wire mesh and 12-inch-thick rock layer</td>
<td>Place 18-inch-thick rock layer</td>
</tr>
<tr>
<td>Type IV</td>
<td>Medium</td>
<td>Excavate, scarify, recompact, backfill</td>
<td>Place wire mesh and 12-inch-thick rock layer</td>
<td>Monitor and place rock layer, if warranted</td>
</tr>
<tr>
<td>Type V</td>
<td>Low</td>
<td>Grout rodent holes, scarify, recompact</td>
<td>Monitor; if warranted, place wire mesh and 12-inch-thick rock layer</td>
<td>—</td>
</tr>
</tbody>
</table>

**High-Priority Areas**

Treatment in areas designated as high priority would involve the use of lightweight and heavy construction equipment to collapse burrows and/or excavate and backfill the holes depending on location, size, burrow cluster density, and depth. This includes performing track-walking using a track-mounted bulldozer or a long-reach excavator with sheepsfoot roller attachments.

This backfill soil would consist of impervious native soil, cementitious-soil slurry, low-pressure grout, and/or similar embankment material and would be compacted and smoothed to be level with the surrounding ground. Grouting may be implemented as a maintenance measure where well-defined holes that are at least 3 inches in diameter and extend beyond 18 inches in depth/penetration. This method involves filling burrow holes with a cement water slurry with a relatively small amount of bentonite (a typical mix is 15% bentonite and 85% cement, though the specific grout mix may vary somewhat). Pipes and hoses would be used to gravity fill the burrow holes to the extent possible. Native soil would then be placed and compacted to restore the embankment surface.

After compaction, a combination of bedding material (sand and gravels), wire mesh, and/or rock would be installed in the upper zones of the downstream face to deter future burrowing and associated surficial dam distresses.

**Medium-Priority Areas**

Remediation in areas designated as medium priority would involve the use of hand-tools as well as lightweight and heavy construction equipment to collapse burrows and/or excavate and backfill the holes depending on location, size, burrow cluster density, and depth. This includes performing track-walking using a track-mounted bulldozer or a long-reach excavator with sheepsfoot roller attachments. Shovels and hand tampers would also be used. Once excavated, burrow holes would be backfilled and compacted with native soil. Where burrows exhibit deep penetration, grouting
under gravity flow would be performed. The permanent armoring measures would be limited and determined on a case-by-case basis. Where rock placement is not warranted, the disturbed area would be revegetated.

**Low-Priority Areas**

Remediation in areas designated as low priority would involve filling isolated burrow clusters with native soil or similar type to that of the dam embankment and/or targeted with cementitious-soil slurry or low-pressure grout. This soil backfill would be placed as deeply as possible, compacted with hand tools, and revegetated.

### 3A.2-3 Implementation Timeline

DWR proposes to implement initial rodent burrow remediation activities at each of the three Project sites in 2022 pending permitting approval, including burrow treatment in high-priority areas, tree removal, and intake channel repairs. All other burrow treatment, repairs and maintenance activities described herein would occur between May and October in the years 2022 through 2026. After completion of burrow treatment, repairs, and maintenance activities included in the Project, DWR would undertake routine monitoring and maintenance at each of the dam sites to prevent formation of new habitat capable of supporting special-status wildlife species. The specific timeline and application of maintenance activities would be based on site-specific conditions as determined through routine and ongoing monitoring at each site, as described in DWR’s proposed Rodent Burrow Maintenance and Monitoring Plan (DWR 2021).

### 3A.2-4 Construction Equipment

The following construction equipment would be used to implement the proposed rodent burrow remediation efforts and other facility remediation and maintenance work included in the Project:

- skid-steer
- dozer
- backhoe
- skip-loader
- mobile grout mixing plant
- truck
- soil compactor
- excavator
- concrete pump truck
- scraper
- water truck
- dump trucks
- flatbed trucks
- concrete

### 3A.3 Clifton Court Forebay Dam

#### 3A.3-1 Background

As shown in Figure 1, Clifton Court Forebay is located at the southwestern edge of the Sacramento–San Joaquin River Delta (Delta), approximately 10 miles northwest of the City of Tracy and adjacent to Byron Road.

Clifton Court Forebay Dam is a low, earthen dam that was constructed inside the levee of the Clifton Court Tract. The dam was constructed between 1967 and 1969 and provides storage for off-peak pumping and permits regulation of flows into the Harvey O. Banks Pumping Plant (Banks Pumping Plant).
Clifton Court Forebay Dam is approximately 8 miles long and impounds 28,653-acre-feet. It serves as the intake point and northernmost terminus of the California Aqueduct. As shown in Figure 4, Clifton Court Forebay Overview, water from the Delta enters the forebay through a gated intake control structure at the southeast end of the reservoir. This structure connects the forebay to the West Canal, which is a channel of the Old River. Water leaves the forebay through a designed opening in the east levee of the Banks Pumping Plant intake channel just north of the Delta Fish Protective Facility (also known as the Skinner Fish Facility). The Banks Pumping Plant lifts water from the intake channel into the California Aqueduct. As shown in Figure 5, Clifton Court Forebay Dam Typical Section, the dam embankment has a maximum height of 30 feet and a crest width of 20 feet. The overall crest length of the dam is 36,500 feet (6.9 miles).

3A.3-2 Site Access

As shown in Figure 6, Clifton Court Forebay Access, the primary access to the dam is via Byron Highway to Clifton Court Road and a secondary access is provided by Byron Highway via the Skinner Fish Facility entrance. The primary access point provides access to the west, north, and east dam segments. Typical access to the south dam segment is also from Clifton Court Road, but this access point is subject to traffic load restrictions because it passes over the intake control structure bridge. Thus, the additional access point through the Skinner Fish Facility entrance would provide access to the southern dam embankment and intake channel for heavy haul trucks or equipment. There is a potential alternative access point from Byron Highway via Herdlyn Road, but this alternative would require access through private farmland and would only be used if access through the Skinner Fish Facility would interfere with ongoing O&M operations. Additionally, this alternative would require a temporary entry permit for evaluation of the existing farm road if needed as site access for construction. Additionally, new temporary and permanent toe access roads covering up to 5.75 and 10.64 acres, respectively, may be necessary for construction and long-term operations and maintenance.

3A.3-3 Remediation Program

Burrow Treatment

Remediation is needed at Clifton Court Forebay Dam to address animal burrowing that occurs throughout most of the dam at varying levels of severity and density. Clifton Court Forebay Dam is classified by DSOD as a low-hazard dam because failure of this dam is not expected to result in loss of human life, but would result in economic and environmental impacts, with property damage and losses expected to be principally limited to the adjacent private property. Specifically, failure of Clifton Court Forebay Dam would disrupt the principal intake for the SWP, which would adversely affect water deliveries. Failure along Clifton Court Forebay Dam’s north, west, and east segments would result in inundation of a narrow, low-lying area between the dam and nearby Delta levees, which could result in damage to DWR’s seepage pump equipment and maintenance roads. Failure of the dam’s southern segment would result in flooding of private farmland. Although DSOD has classified the facility as a low-hazard dam based on property loss, disruption of SWP water deliveries could result in substantial adverse effects to residential, agricultural, and industrial land uses throughout Central and Southern California.

Burrowing activity has been identified at locations in all portions of the dam embankment. DWR’s Dam Safety engineers have categorized areas of high, medium, and low burrow density/activity, as shown in Figure 7, Clifton Court Forebay Rodent Burrow Damage Severity. The most extensive burrowing—and therefore most severe damage—occurs mostly along three segments (in the northwest corner, along the central portion of the western side, and along central and eastern portions of the southern side), while less widespread individual burrow holes and burrow clusters occur throughout all reaches of the dam.
Remediation within high-priority and medium-priority areas would include collapsing and/or excavating burrows; backfilling the holes with impervious native soil, cementitious-soil slurry, low-pressure grout, and/or similar embankment material; and compacting and smoothing the resulting surface to be level with the surrounding ground. Following compaction and smoothing, all high-priority areas in the upper zones of the downstream face would receive permanent armoring using a combination of bedding material (sand and gravels), wire mesh, and/or rock. Controlled low-strength material–filled trenches would be installed in the high-density burrow areas to prevent rodent burrowing beyond the armoring measures. The maximum repair area for high-priority areas is estimated at 17.0 acres. Medium-priority areas would receive permanent armoring similar to that of the high-priority areas, but would generally use small rock and require a thinner cross section. The maximum repair area for medium-priority areas is estimated at 9.2 acres.

Low-priority areas are those with more localized clumping of burrows. These burrows would be filled with native soil or soil similar to that of the dam embankment and/or targeted with cementitious-soil slurry or low-pressure grout. Soil backfill would be placed as deeply as possible and compacted with hand tools. The fill soil would be compacted and smoothed to be level with the surrounding surface. The maximum repair area for low-priority areas is estimated at 11.2 acres.

DWR has identified staging areas around the dam perimeter totaling approximately 10.4 acres. The locations where remediation would occur and staging areas are shown in Figure 8, Clifton Court Forebay Proposed Activities. Burrow remediation activities are expected to affect a total of 37.46 acres of the downstream face of the Clifton Court Forebay Dam.

**Shallow Near-Surface Ruts and Deformations**

Where shallow ruts and near-surface deformations occur, DWR would fill and compact these areas with native soil of similar type to that of the downstream dam embankment slope. This would require use of lightweight and heavy construction equipment such as skid-steer, scraper, dozer, backhoe, skip-loader, soil compactor, excavator, and water trucks. Fill material would be delivered to the site from a stockpile location using dump trucks or concrete trucks.

**3A.3-4 Tree Removal at Sump No. 4**

Clifton Court Forebay Dam has a seepage collection system consisting of perimeter drainage channels and several collection sumps. The drainage channels capture seepage water and convey it into the sumps, which continuously pump water back into the forebay. As shown on Figure 8, Sump No. 4 is located at the northwest end of the dam and several large trees within its footprint are proposed to be removed in the fall of one of the project implementation years (2022 through 2026) to prevent leaves and limbs from obstructing the intake pump screens.

**3A.3-5 Intake Channel Repair**

DWR has identified a high-priority repair area at the Clifton Court Forebay intake channel to restore the slope and install permanent improvement measures to prevent animal burrowing. The repairs are expected to occur between 2022 (pending permitting approval) and 2023, using the Type III remediation described in Table 2. This includes excavation, grouting, backfill, and recompaction; installation of PVC-coated steel wire mesh and bedding material; and permanent armoring. This work would occur over an approximately 0.67-acre area between the downstream crest and the downstream slope within the intake channel. In this location, the downstream crest is
at an elevation of approximately 16.5 feet above mean sea level, and work would extend into the intake channel to an elevation of approximately 4 feet and be performed during low flow conditions to avoid working directly within waters.

Clearing and grubbing would occur on the downstream slope to remove debris, vegetation, and existing riprap remains from original construction of the dam. Restoration of the dam intake channel slope will require excavating to a depth of approximately 2 feet. After excavation has exposed subgrade, any holes or cavities that remain would be grouted as needed. Grouting is expected to be performed on a limited basis and as determined by the field engineer. Once grouting is complete, the excavated areas would be backfilled and recompacted in lifts, restoring the original design slope. The embankment slope would be backfilled with a combination of impervious native soil and/or material similar to the existing embankment material. It is anticipated that any excavation and recompaction of the dam’s face would result in minor import of materials.

Following the recompaction effort, a layer of bedding material (6 inches thick) and wire mesh would be placed over the restored embankment slope. The bedding material and PVC-coated steel wire mesh would be placed on the entire remediation area. An 18-inch-thick layer of permanent armoring would be placed over the bedding material and PVC wire mesh to deter future animal burrowing and prevent erosion within the intake channel slope due to wave action.

3A.3-6 Construction Logistics

Staging Areas

As noted above and shown on Figure 8, DWR has identified staging areas around the perimeter of the dam totaling approximately 10.4 acres. This includes existing maintenance staging areas between the dam and surrounding Delta levees and areas that are presently undisturbed. Staging areas would be used to stockpile material needed to implement the burrow remediation, and for filling ruts and deformations. The materials would include rock, bedding material, wire mesh, or other materials required for armoring and/or backfilling the burrow holes.

In addition to the access provided by the dam’s paved crest roadway, existing and new maintenance roads along the dam toe may be used. The project includes construction of up to 10.64 acres of new permanent toe access roads to support construction, long-term operations, and maintenance. Rock, bedding material, wire mesh, or other materials required for armoring and/or backfilling the burrow holes, will be imported to the site via the existing crest and maintenance access roads. Placement of materials will be achieved from the dam crest and toe.

Schedule

DWR anticipates initial burrow treatment within the high-priority burrow areas, and intake channel repairs at Clifton Court Forebay will occur in 2022, pending permitting approval. Burrow treatment within the medium-priority and low-priority areas would occur between May and October in the years 2022 through 2026. Tree removal would occur outside of the nesting season during one of the project implementation years. In following years, DWR would undertake ongoing monitoring and maintenance to prevent formation of new habitat capable of supporting special-status wildlife species. The specific timeline and application of maintenance activities would be based on site-specific conditions as determined through routine and ongoing monitoring at each site, as described in DWR’s proposed Rodent Burrow Maintenance and Monitoring Plan (DWR 2021). As described in that
plan, before remediation actions are implemented, monitoring is expected to occur 5 days per week, with 4 days of monitoring observations made by DWR personnel driving along the crest and/or toe roads and one day of monitoring observations made by DWR personnel walking along the dam embankments to identify any changes in rodent burrow activity and evidence of seepage, internal erosion, and instability. Once remediation actions have been implemented, monitoring would occur on a monthly basis. Where permanent armoring measures are installed, the frequency for monitoring the armored areas may be reduced to an annual schedule, consistent with the Clifton Court Forebay Dam Safety Surveillance and Monitoring Plan (DWR 2018).

Grading

It is estimated that completing the remediation program and intake channel repair would require excavations ranging from 0.5 feet to 3 feet in depth, with a net removal of approximately 112,500 cubic yards of soil. The tree removal would not require grading. Provision of construction access as well as implementation of the remediation program and intake channel repair would require compaction of soil in an approximately 48.43-acre area (see Table 4).

**Table 4. Clifton Court Forebay Dam Estimated Grading Impacts**

<table>
<thead>
<tr>
<th>Impact Area</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burrow remediation area</td>
<td>37.46</td>
</tr>
<tr>
<td>Toe road</td>
<td>10.64</td>
</tr>
<tr>
<td>Tree removal</td>
<td>0.33</td>
</tr>
</tbody>
</table>

Estimated Materials Quantities

No export of soil is anticipated for excavation and recompack of the dam face, but import would be needed while armoring the dam. Rock, bedding material, mesh, grout, concrete, controlled low-strength material, or other suitable materials required for armoring would be imported to the site via the existing or proposed construction access roads and staged in staging areas or access roads. The estimated quantity of materials needed to complete the proposed improvements at Clifton Court Forebay Dam are identified in Table 5.

**Table 5. Clifton Court Forebay Dam Estimated Materials Quantities**

<table>
<thead>
<tr>
<th>Item</th>
<th>Estimated Quantity Imported</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clearing and grubbing</td>
<td>65.2 Acres</td>
<td>Acres</td>
</tr>
<tr>
<td>Rock</td>
<td>39,900 Tons</td>
<td>Tons</td>
</tr>
<tr>
<td>Bedding material</td>
<td>40,400 Tons</td>
<td>Tons</td>
</tr>
<tr>
<td>PVC-coated wire mesh</td>
<td>1,255,000 Square feet</td>
<td>Square feet</td>
</tr>
<tr>
<td>Import soil</td>
<td>11,000 Cubic yards</td>
<td>Cubic yards</td>
</tr>
<tr>
<td>Controlled low strength material</td>
<td>3,100 Cubic yards</td>
<td>Cubic yards</td>
</tr>
<tr>
<td>Miscellaneous concrete</td>
<td>3,000 Cubic yards</td>
<td>Cubic yards</td>
</tr>
<tr>
<td>Grout</td>
<td>9,500 Cubic yards</td>
<td>Cubic yards</td>
</tr>
</tbody>
</table>

Construction Traffic

During construction, it is expected that the proposed activities at Clifton Court Forebay Dam would require of 10 worker trips per day, 2 vendor trips per day, and up to 6,259 hauling trips in total throughout project
implementation. Hauling trucks would be needed to import and export material from the Project site. Hauling trucks would typically have a capacity of 16 cubic feet. Project activities at Clifton Court Forebay Dam are estimated to require no export of material and import of up to 26,600 cubic feet of material and 80,300 tons of rock.

3A.4 Dyer Dam

3A.4-1 Background

As shown in Figure 1, Dyer Dam is located in Altamont Hills in Alameda County, approximately 13 miles west of the City of Tracy and approximately 7 miles northeast of Livermore.

Dyer Reservoir provides an active storage capacity of 425 acre-feet, and total storage capacity of 515 acre-feet. It has a surface area of approximately 20 acres and the dam is approximately 0.75 miles long. As shown in Figure 9, Dyer Reservoir Overview, the reservoir receives water from Bethany Reservoir via the South Bay Aqueduct and the Brushy Creek Pipeline and discharges water back to the South Bay Aqueduct via Dyer Canal. Additionally, there is a 25-acre-foot settling pond east of the northeast end of the reservoir. The South Bay Aqueduct conveys water to Alameda and Santa Clara Counties. Water from the South Bay Aqueduct flows into Dyer Reservoir via a 78-inch-diameter steel pipe at the northwest corner. This intake is the terminus of the Brushy Creek Pipeline that extends from the South Bay Pumping Plant, which is located at the upper end of Bethany Reservoir east of Dyer Dam, and lifts water from Bethany Reservoir into the first reach of the South Bay Aqueduct. Water from Dyer Reservoir is discharged to Dyer Canal through a reinforced concrete outlet control structure at the southern end of the reservoir and flows by gravity from the reservoir into the South Bay Aqueduct to provide water supply for Bay Area communities. The spillway is located on the southeast end of the reservoir.

Dyer Dam is an earthen embankment dam with a height that ranges from 20 to 30 feet. The dam has upstream slope protection/lining and a downstream blanket drain for seepage control. It was constructed between 2009 and 2011, and an emergency liner repair project was completed in 2018. The dam is 2,100 feet long, with a slope of 3.5:1 between the crest road and the reservoir, 2:1 on the downstream slope (western side), and 2.5:1 on the upstream slope (eastern side). The dam crest has an elevation of 810 feet, with a maximum height of approximately 30 feet above the streambed. The crest is 20 feet wide and 1,850 feet long. The upstream and downstream dam embankments schematics are shown in Figure 10, Dyer Dam Typical Sections.

Under normal operating conditions, the reservoir elevation fluctuates between 785 feet and 805 feet, which is the maximum operating water surface elevation. Dyer Reservoir provides off-peak storage for the SWP by receiving up to 525 acre-feet of water from the South Bay Pumping Plant at night.

3A.4-2 Site Access

Dyer Dam is located in Altamont Hills, north of Altamont Pass Road. As shown in Figure 11, Dyer Dam Access, this site can be accessed from Dyer Road via the existing entrance road serving the reservoir facility. Access to the entire toe of the dam and the dam facility is provided by an existing gravel road, which provides access to a paved roadway atop the crest of the dam via ramps on the north and south side of the reservoir. Existing gravel access roads and the paved crest road would provide access to the western embankment slope while the eastern embankment slope would be accessed from the paved crest road and from the upper settling pond maintenance road. The Project includes construction of a temporary construction road connected to the existing maintenance
road near the spillway to minimize impacts to existing traffic on the north access road. The temporary construction road would be 20 feet wide and 0.29 miles long, with a gravel surface. Construction of the temporary road would result in 0.45 acres of disturbance.

3A.4-3 Remediation Program

Burrow Treatment

Dyer Dam is a relatively small dam, and rodent burrowing within its downstream embankment is relatively dense. As noted in the Background and Overview discussion above, routine rodent baiting has not reduced burrowing activity. DSOD classifies Dyer Dam as a high-hazard dam, indicating that its failure is likely to result in the loss of at least one human life. As such, Dyer Dam is a candidate for restoration and improvement measures, including excavation, recompaction, and permanent armoring. Significant burrowing also has compromised embankments outside of the dam prism; this adversely affects existing drainage facilities that have required recurring emergency maintenance repairs.

As shown in Figure 12, Dyer Dam Rodent Burrow Damage Severity, burrowing occurs on all sides of Dyer Dam, with the west side – fill embankment section – categorized as high priority and the north, east, and south sides – in cut or ascending embankment – categorized as medium priority. In addition, significant burrowing has been observed along the east side of the dam in a slope above the crest roadway. While this area is not within the dam prism, repairs are warranted to remediate burrowing activity that could ultimately result in instability, potential embankment failure, and increased annual maintenance. DWR has identified three staging areas to facilitate the remediation work, as identified in Section 3A.4-56. The areas where remediation, and construction staging, and drainage ditch improvements described in this section would occur are shown in Figure 13, Dyer Reservoir Proposed Activities.

Remediation is expected to be required on approximately 5.54 acres of the dam, with approximately 2.07 acres on the downstream dam face (western side) and 3.47 acres on the upstream dam face (eastern side). The permanent armoring area includes a buffer area around the areas with the highest density of burrow activity. Depending on location, size, burrow cluster density, and depths, burrow holes may alternatively be excavated and backfilled. Then native soil, cementitious-soil slurry, low-pressure grout, and/or similar embankment material would be used to backfill holes and would be compacted level with the surrounding ground. For zones where heavy construction equipment cannot be used, burrows may be filled by hand and/or lightweight equipment. Permanent armoring with wire mesh and rock would be placed on the dam embankment to deter future rodent burrowing.

Shallow Near-Surface Ruts and Deformations

Where shallow ruts and near-surface deformations occur outside of the Dyer Dam prism, the proposed Project includes filling these areas with native soil of similar type to that of the downstream dam embankment slope and this soil would be compacted. Equipment for these activities would include lightweight and heavy construction equipment such as skid-steer, scraper, dozer, backhoe, skip-loader, soil compactor, excavator, and water trucks. Some fill material would be needed to offset shrinkage of the excavated and recompacted material. Imported fill materials would be delivered to the site using dump trucks or light-duty trucks.
3A.4-4 North Access Road Drainage Ditch

Surface runoff is collected by a V-shaped ditch and stormwater control feature that runs parallel to the north access road west of Dyer Dam and Reservoir. This runoff is conveyed downstream of Dyer Dam. The V-shaped ditch has an unlined segment that runs along the western dam toe road adjacent to Dyer Canal. The embankment between the unlined V-shaped ditch and aqueduct has been breached in recent storm events. These stormwater control features have been subject to ongoing failure that can be attributed to high drainage velocities focused on the unlined segments of the V-shaped ditch, poor foundation/embankment material, and rodent burrowing along the reach. There are two areas near existing Pacific Gas and Electric Company (PG&E) power poles that have failed and required temporary repair measures to contain the drainage ditch flows. Emergency repairs were performed using corrugated metal pipes and backfill material to stabilize the V-shaped ditch and reduce internal erosion/instability of the adjacent embankment slope. The failures allowed eroded material to flow into Dyer Canal, which severely degraded water quality.

Approximately 1,300 linear feet of the existing V-shaped ditch and stormwater control features are proposed for improvements that include regrading and concrete lining to improve drainage and structural integrity and to reduce erosion, as shown in Figure 13. Remediation of the existing embankment slope includes limited excavation, backfilling, compaction, and concrete lining. Backfill, grouting, and/or soil-cement slurry would be imported and used to backfill cavities, cracks, or holes. The embankment slope would be restored where it shows signs of instability and where recent internal erosion occurred during the V-shaped ditch failures and stormwater control feature failures. The improvement area is estimated at 0.62 acres and the adjacent access road provides sufficient construction access to perform improvements.

3A.4-45 Entrance Road

Directly south of these ditch and stormwater control features, ongoing erosion is also occurring along a portion of the south side of Entrance Road, which intersects with the South Bay Aqueduct. At this location, erosion along Entrance Road is evident from deep furrows developing within interspersed areas of riprap. Similar to the original stabilization methods, the bank slope along the southern side of Entrance Road would be stabilized using riprap, as shown in Figure 13. Fill and riprap material would be delivered using dump trucks or light-duty trucks staged in staging areas or access roads. A combination of soil fill and riprap will be placed in between the existing riprap at this location to repair and stabilize the eroding slope. Additionally, accumulated sediment downstream of the culvert pipes under the road would be excavated and removed to an upland disposal location.

3A.4-65 Construction Logistics

Staging Areas

DWR has identified three staging areas for remediation activities at Dyer Dam, as shown in Figure 13. The staging areas would be located on both existing improved areas and undisturbed areas totaling approximately 5.11 acres. Staging Area 1 is an approximately 0.31-acre rectangular area along the western side of the South Bay Aqueduct; Staging Area 2 is an approximately 0.34-acre roughly triangular area south of the southeast corner of the dam and southwest of the spillway; and Staging Area 3 is an approximately 4.46-acre roughly triangular area east of the settling pond. Staging Areas 2 and 3 would be located on undisturbed areas and would require grubbing, minor grading, and laying of a gravel surface.
Schedule

DWR anticipates completing initial burrow treatment as described in the Rodent Burrow Maintenance and Monitoring Plan (DWR 2021) in 2022 pending permitting approval. Additional burrow treatment, drainage ditch repair, and entrance road repair would be completed between May and October in the years 2022 through 2026. The initial burrow treatment would include minimal backfill and collapse of burrow holes. In following years, DWR would undertake ongoing monitoring and maintenance to prevent formation of new habitat capable of supporting special-status wildlife species. The specific timeline and application of maintenance activities would be based on site-specific conditions as determined through routine and ongoing monitoring at each site, as described in DWR’s proposed Rodent Burrow Maintenance and Monitoring Plan (DWR 2021), which anticipates monthly monitoring after initial burrow treatment is completed. If permanent armoring measures are installed, the frequency for monitoring the armored areas could be reduced to an annual schedule, consistent with the Dyer Dam and Reservoir Safety Surveillance and Monitoring Plan (DWR 2019).

Grading

It is estimated that completing the remediation program would require excavations ranging from 0.5 feet to 3 feet deep, affecting approximately 9,000 cubic yards of dirt. Excavated material would be reused on site to backfill holes and restore the dam embankment. Excavation and grading for the drainage ditch repairs would be a maximum of one foot deep, with a net removal of approximately 3,600 cubic yards of dirt. The burrow remediation program, drainage ditch repairs, and entrance road repairs would also require compaction of soil in an approximately 6.19 5.57-acre area.

Estimated Materials Quantities

Small quantities of soil import is anticipated for backfilling and recompressing the dam face after excavation, while armoring the dam and improvements to the drainage ditch and entrance road would require import of rock, bedding material, mesh, or other suitable materials required for armoring. Imported materials would be brought to the site via the existing access roads and staged on established maintenance roads or temporary construction access roads. The estimated quantity of materials needed to complete the proposed improvements at Dyer Dam are identified in Table 6.

Table 6. Dyer Dam Estimated Materials Quantities

<table>
<thead>
<tr>
<th>Item</th>
<th>Estimated Quantity Imported</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Armoring rock</td>
<td>5,500</td>
<td>Tons</td>
</tr>
<tr>
<td>Bedding material</td>
<td>13,000</td>
<td>Tons</td>
</tr>
<tr>
<td>PVC-coated wire mesh</td>
<td>203,000</td>
<td>Square feet</td>
</tr>
<tr>
<td>Riprap</td>
<td>150</td>
<td>Tons</td>
</tr>
<tr>
<td>Aggregate base</td>
<td>4,750</td>
<td>Tons</td>
</tr>
<tr>
<td>Concrete or shotcrete</td>
<td>400</td>
<td>Cubic yards</td>
</tr>
<tr>
<td>Grout</td>
<td>2,100</td>
<td>Cubic yards</td>
</tr>
<tr>
<td>Miscellaneous concrete</td>
<td>200</td>
<td>Cubic yards</td>
</tr>
</tbody>
</table>

Construction Traffic

During construction, it is expected that the proposed activities at Dyer Dam would require a total of 10 worker trips per day, 2 vendor trips per day, and 1,813 hauling trips in total. Hauling trucks would be needed to import
material to the Project site. Hauling trucks would typically have a capacity of 16 cubic feet. Project activities at Dyer Dam are estimated to require import of 2,550 cubic feet of material and 18,500 tons of rock.

3A.5  Patterson Dam

3A.5-1  Background

As shown in Figure 1, Patterson Dam is located about 4 miles east of Livermore, California, on the east side of Livermore Valley. Patterson Reservoir is a 104-acre-foot off-stream storage facility along the South Bay Aqueduct at the terminus of the Livermore Valley Canal. This reservoir, which was constructed between 1960 and 1962, provides off-line storage for the Alameda County Flood Control and Water Conservation District, Zone 7 Water Agency (Zone 7) Patterson Pass Water Treatment Plant. As shown in Figure 14, Patterson Reservoir Overview, water enters the reservoir by flowing over a 175-foot-long reinforced concrete ogee-crest weir from the adjoining South Bay Aqueduct. Flow is controlled by regulation of the canal water surface elevation with Check Structure No. 3. Typically, water is delivered from the reservoir to the Zone 7 Patterson Pass Water Treatment Plant through a 42-inch-diameter outlet pipe located at the southern corner of the reservoir. Additionally, water may be delivered through a 30-inch-diameter reinforced concrete bypass pipeline directly from the canal to the treatment plant. The facility also includes a 4,000 cubic yard settling basin for storage of sediment removed from Patterson Reservoir. Downstream of Patterson Reservoir, the South Bay Aqueduct continues to deliver water to Lake Del Valle and to its terminus at the Santa Clara Terminal Reservoir in San Jose.

Patterson Dam has compacted earth embankment on three sides of Patterson Reservoir; the fourth side is formed by the adjacent South Bay Aqueduct. The reservoir invert and interior slopes are lined with a 3-inch-thick layer of permeable asphalt concrete. The reservoir can be drained via a 12-inch-diameter reinforced concrete drain line that is controlled with a 12-inch butterfly valve. Figure 15, Patterson Dam Typical Section, shows the typical height, slope, and materials that comprise the Patterson Dam embankment.

3A.5-2  Site Access

As shown in Figure 16, Patterson Dam Access, the site is accessed from Patterson Pass Road. Approximately 1 mile to the west, Patterson Pass Road intersects with Greenville Road, which then provides access to Interstate (I) 580. Existing paved and gravel access roads within the Patterson Dam facility would provide access to most of the construction areas within this site. As shown in Figure 16, a temporary construction access area would be constructed north of the proposed staging area and existing settling pond on the east side of the reservoir, and a second temporary construction access area would be provided through the existing maintenance yard. Construction of these temporary access areas would result in approximately 0.37 acres of temporary disturbance.

3A.5-3  Remediation Program

Burrow Treatment

Similar to Dyer Dam, Patterson Dam is a relatively small dam with relatively dense rodent burrowing within its downstream embankment. As previously stated, regular rodent baiting has not reduced burrowing activity. DSOD classifies Patterson Dam as high hazard, indicating that its failure is likely to result in the loss of at least one
human life. As such, Patterson Dam is a candidate for restoration and improvement measures, including permanent armoring using wire mesh and rock.

As shown in Figure 17, Patterson Dam Rodent Burrow Damage Severity, all areas of Patterson Dam are subject to high-severity burrow damage. DWR has identified four staging areas to facilitate the remediation work, as identified in Section 3A.5-6. The locations where remediation treatments would be applied and staging areas are shown in Figure 18, Patterson Reservoir Proposed Activities. Remediation is expected to be required for the downstream dam face and the ascending slope in the east side of the facility, adjacent to the crest road access ramp. Depending on location, size, burrow cluster density, and depths, burrow holes may alternatively be excavated and backfilled. Then native soil, cementitious-soil slurry, low-pressure grout, and/or similar embankment material would be used to backfill holes and would be compacted level with the surrounding ground. For zones where heavy construction equipment cannot be used, burrows may be filled by hand and/or lightweight equipment. Permanent armoring with wire mesh and rock would be placed on the dam embankment to deter future rodent burrowing. Due to steep downstream slopes (1.5:1 to 2:1), other suitable materials may be required for armoring. Large disturbed areas would be revegetated by hydroseeding or hand-seeding using native seed mix if areas are not armored.

The permanent armoring area is estimated at 2,553 acres for the downstream dam embankment face at Patterson Dam. The permanent armoring area includes a buffer area around the areas with the highest density of burrowing activity, as well as a cut-off trench wall that uses controlled low-strength material beyond the dam toe.

**Shallow Near-Surface Ruts and Deformations**

The proposed Project would entail filling shallow ruts and near-surface deformations near the ground surface with native soil of similar type to that of the downstream dam embankment slope and compacting and smoothing the fill material to be level with the surrounding ground. Larger ruts may use larger-diameter fill material and would be similarly compacted and smoothed to surface level. This work would occur in limited areas outside of the Patterson Dam prism. Equipment for this activity would include lightweight and heavy construction equipment such as skid-steer, scraper, dozer, backhoe, skip-loader, soil compactor, excavator, and water trucks. If needed, fill material would be delivered to the site from a stockpile location using dump trucks or concrete trucks. This work is expected to occur between May and October 2022 and/or between May and October 2023.

**3A.5-4 Low-Level Outlet Drainage Channel**

In order to comply with a DSOD recommendation, this component of the proposed Project would involve improvements to the low-level outlet drainage channel, as shown on Figure 18. Currently, dense vegetation within this channel limits/impedes the seepage flow and any discharges through the outlet works that may be required in an emergency. Proposed improvements include vegetation removal, minor regrading of channel invert slope, and placement of permanent vegetation barriers and erosion control. This work is expected to occur between May and October 2022 and/or between May and October 2023.

Permanent vegetation control (e.g., rock and geofabric) is proposed for approximately 135,180 linear feet of the trapezoidal channel downstream of the concrete outfall structure. A one-time vegetation clearing and removal is proposed for approximately 500-550 linear feet of the downstream drainage channel beyond the permanent drainage channel improvements within DWR’s right-of-way. Minor concrete repairs are also proposed for spalled concrete and exposed rebar at the wingwall outfall structure. This component of the Project would result in approximately 0.51 0.43 acres of disturbance of the drainage channel, of which 0.0516 acres would support the permanent vegetation control and outfall repairs while the one-time vegetation clearing would affect 0.375 acres. A permanent maintenance road would be constructed adjacent to the permanently improved drainage channel to...
provide better access for annual maintenance. The maintenance road would include a vehicle turnaround area and have a gravel surface; the road would result in 0.196 acres of disturbance. The one-time vegetation clearing within this drainage channel would also require construction of a temporary construction access road, as noted in Section 3A.5-2. Creation of this temporary construction access road would require disturbance on an additional 0.12 acres.

3A.5-5  Surface Drainage Improvements

The proposed Project includes minor modifications and improvements to drainage features in upland areas northwest of Patterson Dam that currently experience sheet flow, as shown on Figure 18. This work is expected to occur between May and October in the years 2022 through 2026. A damaged 18-inch diameter corrugated metal pipe culvert crossing near the toe access road and a second 12-inch diameter corrugated metal pipe culvert crossing near the maintenance building would both be replaced with improved high-density polyethylene culverts. Existing drainage features upstream and downstream of the culverts would be modified to convey water more efficiently to the main western drainage channel. The improvements may include excavating, regrading, and/or lining of the drainage features and culverts.

3A.5-6  Construction Logistics

Staging Areas and Access

DWR has identified four staging areas at Patterson Dam, as shown on Figure 18. These staging areas include 0.48 acres at the existing maintenance yard south of the reservoir, 3.47 acres of currently undisturbed land surrounding the existing settling pond east of the reservoir, and 0.68 acres east of the temporary construction access area. These staging areas have a combined acreage of approximately 4.63 acres. Access to the staging areas would be from Patterson Pass Road on the existing paved and gravel access roads and from two new temporary construction access roads, as shown on Figure 16. The paved toe and crest roads may be used to repair the downstream dam embankment slope; however, the crest road is narrow and would only be accessible to smaller vehicles and equipment. As noted previously, if this limitation of the crest road prevents use of heavy construction equipment in certain areas, burrows may be filled by hand and/or lightweight equipment.

Schedule

DWR anticipates completing initial burrow treatment in 2022 pending permitting approval, and completing additional burrow remediation, and outlet drainage channel improvements, and surface drainage improvements as indicated in Figure 18 between May and October in the years 2022 through 2026. The initial burrow treatment in 2022 would include minimal backfill and collapse of burrow holes. Between 2022 and 2026, DWR would undertake regular monitoring inspections and additional maintenance measures as described in the Rodent Burrow Maintenance and Monitoring Plan (DWR 2021). The specific timeline and application of maintenance measures would be based on site-specific conditions as determined through routine and ongoing monitoring at each site, as described in the proposed Rodent Burrow Maintenance and Monitoring Plan (DWR 2021), which anticipates monthly monitoring once initial burrow treatment is completed. If permanent armoring measures are installed, the frequency for monitoring the armored areas could be reduced to an annual schedule, consistent with the Patterson Dam Safety Surveillance and Monitoring Plan.
Grading

It is estimated that completing the remediation program and outlet drainage channel maintenance would require excavations ranging from 0.5 feet to 3 feet in depth, with a net removal of 4,100 cubic yards of soil. The remediation program and drainage feature improvements would also require compaction of soil in an approximately 2.5567-acre area.

Estimated Materials Quantities

Rock, bedding material, mesh, or other suitable materials required for armoring would be imported to the site via the existing access roads and staged on established maintenance roads or temporary construction access roads. Minor import of soil and vegetation would be needed to accommodate excavation and recompaction of the dam face and implementation of the outlet drainage channel and surface drainage improvements. The estimated quantity of materials needed to complete the proposed improvements at Patterson Dam are identified in Table 7.

Table 7. Patterson Dam Estimated Materials Quantities

<table>
<thead>
<tr>
<th>Item</th>
<th>Estimated Quantity Imported</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Armoring rock</td>
<td>8,300</td>
<td>Tons</td>
</tr>
<tr>
<td>Bedding material</td>
<td>5,500</td>
<td>Tons</td>
</tr>
<tr>
<td>PVC-coated wire mesh</td>
<td>95,000</td>
<td>Square feet</td>
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<tr>
<td>Geofabric</td>
<td>5,000</td>
<td>Square feet</td>
</tr>
<tr>
<td>Aggregate base</td>
<td>3,525</td>
<td>Tons</td>
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<tr>
<td>Grout</td>
<td>1,000</td>
<td>Cubic yards</td>
</tr>
<tr>
<td>Fill</td>
<td>4,500</td>
<td>Cubic yards</td>
</tr>
<tr>
<td>Asphalt</td>
<td>140</td>
<td>Tons</td>
</tr>
<tr>
<td>Riprap</td>
<td>350</td>
<td>Tons</td>
</tr>
<tr>
<td>Miscellaneous concrete</td>
<td>150</td>
<td>Cubic yards</td>
</tr>
<tr>
<td>Concrete or shotcrete</td>
<td>200</td>
<td>Cubic yards</td>
</tr>
<tr>
<td>18-inch-diameter high-density polyethylene pipe</td>
<td>150</td>
<td>Linear feet</td>
</tr>
</tbody>
</table>

Construction Traffic

During construction, it is expected that the proposed activities at Patterson Dam would require a total of 10 worker trips per day, 2 vendor trips per day, and 1,263 hauling trips in total. Hauling trucks would be needed to import and export material from the Project site. Hauling trucks would typically have a capacity of 16 cubic feet. Project activities at Patterson Dam are estimated to require import of 5,850 cubic feet of material and 14,290 tons of rock/asphalt.

3A.6 Ongoing Maintenance

It is expected that Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam would require ongoing maintenance to address rodent activity and its deleterious impacts on the dams. The Rodent Burrow Maintenance and Monitoring Plan (DWR 2021) proposes monitoring to occur five days per week before remediation actions are implemented. After those actions are implemented, DWR proposes that where permanent armoring is not
installed, sites will be monitored with monthly inspections, and maintenance actions would be implemented as needed. Where permanent armoring measures are installed, the frequency for monitoring the armored areas may be reduced to an annual schedule, consistent with the Dam Safety Surveillance and Monitoring Plan for each site.

3A.6-1 Rodent Control Bait Stations

As noted in the Background and Overview discussion above, as part of DWR’s existing maintenance program, DWR implements a rodent abatement/control plan that prescribes the placement of bait stations and the broadcasting of bait annually, from May 1 to September 1, in compliance with local county regulations. This activity is included in each dam’s annual preventative maintenance plan and would continue to be implemented to minimize further rodent burrowing into the dam faces.

3A.6-2 Armoring Maintenance

Armoring material would require annual inspection and localized maintenance due to disturbance through vandalism, animal activity, and incidental disturbance from vehicles, consistent with each facility’s Dam Safety Surveillance and Monitoring Plan. An estimated 10.64 acres of permanent toe access road would be required at Clifton Court Forebay Dam where downstream armoring is placed, for periodic maintenance.

3A.6-3 Rodent Burrow Repairs for Areas Without Armoring

Once the initial burrow repairs are completed, DWR anticipates that areas without armoring would be subject to some degree of ongoing rodent activity, which would warrant ongoing monitoring, maintenance, and repairs. As described in the Rodent Burrow Maintenance and Monitoring Plan, monitoring and maintenance would occur monthly after initial burrow treatment is completed in areas where permanent armoring is not installed. Any new rodent burrow damage that is deemed to be a risk to dam safety would be addressed in accordance with the treatment protocol described in the Remediation Approach discussion above.

3A.6-4 Access Roads

Access roads at each facility would be restored to their original condition after construction is completed. Access road repairs would be confined to the original road footprint and materials. This includes the dam crest road and improved gravel maintenance access roads.

Surrounding land uses and setting:

Clifton Court Forebay Dam: Agricultural land

Dyer Dam and Reservoir: Agricultural land

Patterson Dam and Reservoir: Zone 7 Patterson Pass Water Treatment Plant to the south and agricultural land to the east, west, and north

Other public agencies whose approval is required:

Implementation of the proposed Project is expected to require the following permits and approvals:

- U.S. Army Corps of Engineers Clean Water Act Section 404 Permit
- U.S. Fish and Wildlife Service Biological Opinion
• California Department of Fish and Wildlife Lake or Streambed Alteration Agreement and California Endangered Species Act Incidental Take Permit
• Regional Water Quality Control Board Clean Water Act Section 401 Water Quality Certification
• Regional Water Quality Control Board National Pollutant Discharge Elimination System permit/Waste Discharge Requirements
• State Office of Historic Preservation National Historic Preservation Act Section 106 Finding

Have California Native American tribes traditionally and culturally affiliated with the Project area requested consultation pursuant to Public Resources Code section 21080.3.1? If so, is there a plan for consultation that includes, for example, the determination of significance of impacts to tribal cultural resources, procedures regarding confidentiality, etc.?

In compliance with Assembly Bill (AB) 52, DWR sent notification of the Project to the Ione Band of Miwok Indians on 2/25/21 and 3/3/21. No response has been received, thus there was no request for consultation pursuant to Public Resources Code section 21080.3.1 and no known tribal cultural resources have been identified in any of the Project locations.
3B Environmental Factors Potentially Affected

The environmental factors checked below would be potentially affected by this Project, involving at least one impact that is a “Potentially Significant Impact.” However, the analysis in this IS demonstrates that with implementation of mitigation measures included herein, all such impacts would be reduced to less-than-significant levels, and thus DWR proposes to adopt a Mitigated Negative Declaration for this Project.

| ☐ Aesthetics | ☐ Agriculture and Forestry Resources | ☐ Air Quality |
| ☒ Biological Resources | ☒ Cultural Resources | ☐ Energy |
| ☒ Geology and Soils | ☐ Greenhouse Gas Emissions | ☐ Hazards and Hazardous Materials |
| ☒ Hydrology and Water Quality | ☐ Land Use and Planning | ☐ Mineral Resources |
| ☐ Noise | ☐ Population and Housing | ☐ Public Services |
| ☐ Recreation | ☐ Transportation | ☐ Tribal Cultural Resources |
| ☐ Utilities and Service Systems | ☐ Wildfire | ☐ Mandatory Findings of Significance |
3C Determination

On the basis of this initial evaluation:

☐ I find that the proposed Project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

☒ I find that although the proposed Project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the Project have been made by or agreed to by the Project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

☐ I find that the proposed Project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

☐ I find that the proposed Project MAY have a “potentially significant impact” or “potentially significant unless mitigated” impact on the environment, but at least one effect (1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and (2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed Project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier ENVIRONMENTAL IMPACT REPORT or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier ENVIRONMENTAL IMPACT REPORT or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed Project, nothing further is required.

Gerald Snow
Environmental Assessment Branch Manager
Division of Operations and Maintenance
California Department of Water Resources

December 2, 2021
Date
## 3.1 Aesthetics

<table>
<thead>
<tr>
<th>Setting</th>
<th>Potentially Significant Impact</th>
<th>Less-Than-Significant Impact With Mitigation Incorporated</th>
<th>Less-Than-Significant Impact</th>
<th>No Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. AESTHETICS – Except as provided in Public Resources Code Section 21099, would the Project:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Have a substantial adverse effect on a scenic vista?</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>b) Substantially damage scenic resources including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>c) In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the Project is in an urbanized area, would the Project conflict with applicable zoning and other regulations governing scenic quality?</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
</tbody>
</table>

### Setting

**Clifton Court Forebay Dam**

Clifton Court Forebay, located in the southwestern edge of the Delta, about 10 miles northwest of the city of Tracy, is a shallow reservoir at the head of the California Aqueduct. Lands surrounding the forebay support agricultural production and grazing. Topography is generally flat to gently sloping. The earthen embankment around the forebay is visible from Byron Highway as a gentle rise in topography; the water surface within the forebay is also visible. Where the California Aqueduct passes under Byron Highway, the water within the aqueduct is visible. The Skinner Fish Facility is located adjacent to Byron Highway and the California Aqueduct. The facility consists of one-story buildings with a utilitarian appearance, equipment, and storage areas. Byron Highway is designated by Contra Costa County as a scenic route (Contra Costa County 2005).

**Dyer Dam and Patterson Dam**

Dyer Dam and Patterson Dam are located in the unincorporated area of Alameda County. Properties surrounding Dyer Dam include large parcels for agricultural uses, including several agricultural/residential parcels located on the west side of Dyer Road. Properties north and east of Patterson Dam include agricultural production and open space. The property immediately south of Patterson Dam supports the Zone 7 Patterson Pass Water Treatment Plant. Industrial uses are present west of Patterson Dam.
Impact Analysis

a) Would the Project have a substantial adverse effect on a scenic vista?

A vista is a view from a particular location or composite views along a roadway or trail. Scenic vistas are often views of natural lands, but may also be compositions of natural and/or developed areas. The features that comprise a scenic vista are visual resources. Adverse impacts to individual visual resources or the addition of structures or developed areas may or may not adversely affect a vista. Determining the level of impact to a scenic vista requires analyzing the changes to the vista as a whole and to individual visual resources.

Clifton Court Forebay Dam

Contra Costa County identifies the two primary types of scenic resources as “(1) scenic ridges, hillsides, and rock outcroppings; and (2) the San Francisco Bay/Delta estuary system” (Contra Costa County 2005). As shown in the Contra Costa General Plan, Figure 9-1, Scenic Ridges and Waterways, there are no scenic ridgelines identified near Clifton Court Forebay Dam, but the forebay is identified as a scenic waterway. Thus views of Clifton Court Forebay can be considered a scenic vista.

Byron Highway is approximately 0.33 miles west of the Project site at Clifton Court Forebay Dam. Views from Byron Highway predominantly consist of flat agricultural land in the foreground, with rolling hills in the background. As noted above, Clifton Court Forebay is visible from Byron Highway and thus is a feature within the scenic corridor associated with this scenic route.

The proposed burrow remediation and restoration work would not substantially change views of Clifton Court Forebay because the dam embankment would be restored to the existing conditions. The proposed activities include excavating to a maximum depth of 2 feet, compacting the soil, placing new soil, restoring the embankment slope to match existing conditions, and, in some locations, installing rock and other materials to prevent animal burrowing. The height and slope of the embankment would not be altered. When remediation and restoration occurs on the south and west portions of the embankment, equipment and activity (e.g., vegetation removal and changes in soil color due to excavation and grading) would be visible from Byron Highway. However, these effects would be temporary in nature, with work in specific reaches of the embankment generally lasting less than 3 months at a time. Therefore, this impact would be less than significant.

Dyer Dam

Dyer Dam is located in the Altamont Hills, approximately 7 miles southeast of Livermore. The Alameda County General Plan Scenic Route Element does not identify Dyer Road as a scenic route.

The Alameda County General Plan Open Space Element identifies agricultural land as one of four types of primary open space and recognizes that open space is an important visual resource that enhances communities. Views from Dyer Road include rural residential properties to the west, and agricultural land and rolling hills on both sides of the road. Views to the east from Dyer Road also include wind turbines. On the segment of Dyer Road west of Dyer Dam, views include the uppermost portion of the Dyer Dam embankment. While there are no officially identified scenic vistas in the vicinity and Dyer Road is not
identified as a scenic route, the views from Dyer Road can be considered scenic vistas due to the combination of open space and varied vegetation and topography.

The proposed burrow remediation and restoration work would be limited to the existing Dyer Dam property and would have no effect on views of the surrounding lands from Dyer Road. Further, the proposed work would not substantially change views of Dyer Dam and Reservoir because the dam embankment would be restored to its existing contours. The height and slope of the embankment would not be altered. When remediation and restoration occurs on the south and west portions of the embankment, equipment and activity (e.g., vegetation removal and changes in soil color due to excavation and grading) would be visible from Dyer Road. However, these effects would be temporary in nature, with work in specific reaches of the embankment generally lasting less than 3 months at a time. Therefore, this impact would be less than significant.

Patterson Dam

Patterson Dam is approximately 1 mile east of Livermore and immediately north of the Zone 7 Patterson Pass Water Treatment Plant. Primary access to Patterson Dam is from Patterson Pass Road, which is identified as a scenic route in the Alameda County General Plan Scenic Route Element. Flynn Road, which extends northerly from Patterson Pass Road approximately 800 feet east of Patterson Dam, is also identified as a scenic route (Alameda County 1994b). Views of Patterson Dam and the water surface within Patterson Reservoir are available from one segment of Flynn Road—the segment immediately north of Patterson Pass Road until Flynn Road turns easterly. The vertical and horizontal curves in Flynn Road preclude views of the reservoir from all other portions of this roadway. The Zone 7 Patterson Pass Water Treatment Plant obscures views of Patterson Dam from Patterson Pass Road.

Similar to the conditions around Dyer Dam, lands surrounding Patterson Dam include agricultural production, rural residential properties, and rolling hills. While there are no officially identified scenic vistas in the vicinity, Patterson Pass Road and Flynn Road are identified as scenic routes, and the views from both roads can be considered scenic vistas due to the combination of open space and varied vegetation and topography.

The proposed burrow remediation and restoration work would occur only within the existing Patterson Dam property and would have no effect on views of the surrounding lands from Patterson Pass Road or Flynn Road. Further, the proposed work would not substantially change views of Patterson Dam and Reservoir that are available from Flynn Road because the dam embankment would be restored to the existing conditions and the water surface elevation would not change. The height and slope of the dam embankment would not be altered. When remediation and restoration occurs on the eastern portions of the embankment, equipment and activity (e.g., vegetation removal and changes in soil color due to excavation and grading) would be visible from a short segment of Flynn Road. However, these effects would be confined to a very limited viewpoint from Flynn Road and would be temporary in nature, with work in specific reaches of the embankment generally lasting less than 3 months at a time. Therefore, this impact would be less than significant.

b) Would the Project substantially damage scenic resources including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?

There are no state-designated or eligible scenic routes that offer views of Clifton Court Forebay Dam, Dyer Dam, or Patterson Dam. The nearest state-designated or eligible scenic route to any of these facilities is I-580 in Alameda County to the San Joaquin County border, which passes approximately 2.4 miles from
Dyer Dam and 1.6 miles from Patterson Dam, and ends approximately 5.5 miles south of Clifton Court Forebay Dam. However, as discussed in Section 3.1(a), views of Clifton Court Forebay and of Patterson Dam and Reservoir are available from locally designated scenic routes. There are few trees and no rock outcroppings or historic buildings visible from these scenic routes in the same views that include Clifton Court Forebay and Patterson Dam and Reservoir, although the California Aqueduct, Clifton Court Forebay, South Bay Aqueduct, and Patterson Dam and Reservoir are all eligible for designation as historical resources, as discussed in Section 3.5, Cultural Resources.

**Clifton Court Forebay Dam**

The closest designated state scenic highway to Clifton Court Forebay Dam is I-580, located approximately 5.5 miles south of the southernmost portion of the forebay. No views of Clifton Court Forebay Dam or the forebay water surface are available from I-580. Accordingly, no impacts would occur to scenic resources within view of a state scenic highway as a result of the proposed Project.

Byron Highway, which is designated by Contra Costa County as a scenic route, but is not identified as a scenic highway under Caltrans’s “Designated and Eligible Routes” (Caltrans 2020; Contra Costa County 2005), is located approximately 0.25 miles southwest of the Project site at Clifton Court Forebay Dam.

Views of Clifton Court Forebay are visible from Byron Highway. These views consist of flat agricultural land in the foreground, the southwestern side of the dam embankment and the water surface in the mid-ground, and trees in the background. As discussed in Section 3.1(a), the proposed burrow remediation and restoration work would not substantially change views of Clifton Court Forebay because the dam embankment would be restored to the existing conditions and the water surface elevation would not change. During implementation of the proposed Project, equipment and activity would be temporarily visible from Byron Highway. However, these effects would be temporary in nature, with work in specific reaches of the embankment generally lasting less than 3 months at a time.

The Project includes removal of several trees from Sump No. 4, which is located near the northwestern corner of the forebay, approximately 2 miles from Byron Highway. Removal of these trees would not be discernible from Byron Highway. The Project does not involve any work within or changes to the California Aqueduct. The Project would not result in a significant change in the views available from this scenic route and this impact would be **less than significant**.

**Dyer Dam**

The closest designated state scenic highway to Dyer Dam is I-580, located approximately 2.4 miles south of the site. Existing topography north of I-580 blocks views of Dyer Dam and the reservoir water surface.

The closest roadway to the Project site is Dyer Road, which is located approximately 567 feet west of the Project site at Dyer Dam, and is not an officially designated state scenic highway (Caltrans 2020) or a designated scenic route by Alameda County. Accordingly, no impacts would occur to scenic resources within a state scenic highway as a result of the proposed Project.

**Patterson Dam**

The closest designated state scenic highway to Patterson Dam is I-580, located approximately 1.6 miles north of the site. Existing topography south of I-580 blocks views of Patterson Dam and the reservoir
As discussed in Section 3.1(a), Patterson Pass Road and Flynn Road are the nearest scenic routes to Patterson Dam. Views of Patterson Dam and the reservoir water surface are not available from Patterson Pass Road but are available from one segment of Flynn Road. These views consist of flat agricultural land in the foreground, rolling hills, the Zone 7 Patterson Pass Water Treatment Plant, the eastern side of the dam embankment, a sliver of the reservoir water surface, the water storage tanks north of the reservoir, and trees in the background. The South Bay Aqueduct is not visible from Flynn Road.

As discussed in Section 3.1(a), the proposed burrow remediation and restoration work would not substantially change views of Patterson Dam and Reservoir because the dam embankment would be restored to existing contours and the water surface elevation would not change. During implementation of the proposed Project, equipment and activity would be visible from Flynn Road. However, these effects would be temporary in nature, with work in specific reaches of the embankment generally lasting less than 3 months at a time. The proposed Project would not involve the removal of any trees. The Project would include removal of vegetation from a drainage channel that runs north–south on the west side of Patterson Dam, but this vegetation is not visible from Flynn Road. Thus, the Project would result in less-than-significant impacts due to changes in scenic resources visible from this locally designated scenic route.

c) **In non-urbanized areas, would the Project substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the Project is in an urbanized area, would the Project conflict with applicable zoning and other regulations governing scenic quality?**

**Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam**

Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam are predominantly surrounded by land used for agricultural purposes and livestock grazing. Rolling hillsides are present in the background of the three Project sites. As stated in Section 3.1(a), there are few trees, no rock outcroppings, and few other scenic resources within the vicinity of the Project sites. Buildings adjacent to Clifton Court Forebay Dam are maintenance and facility structures to serve the SWP. Buildings and facilities adjacent to Patterson Dam are associated with the Zone 7 Paterson Pass Water Treatment Plant. A storage facility and outdoor paint ball facility are located approximately 0.13 miles west and industrial land uses are located approximately 0.65 miles west of Patterson Dam. Several rural-residential and residential–agricultural properties are located on the west side of Dyer Road, approximately 0.14 miles west of Dyer Dam.

Views of the DWR facilities included in this Project are available from Byron Highway, located southwest of Clifton Court Forebay Dam; Dyer Road, located west of Dyer Dam; and Flynn Road, located east of Patterson Dam. As discussed in Section 3.1(a), the proposed burrow remediation and restoration work would not substantially change views of each of the three DWR facilities because the dam embankments would be restored to the existing conditions and water surface elevations would not change. During implementation of the Project, equipment and activity would be visible from public viewpoints. However, these effects would be temporary in nature, with work in specific reaches of the embankment generally lasting less than 3 months at a time. The proposed Project would not involve the removal or alteration of
scenic resources. Thus, the Project would result in less-than-significant impacts due to the temporary degradation of the existing visual character of public views of each site and its surroundings.

d) **Would the Project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?**

**Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam**

The proposed Project would not include installation of any new light sources or the use of reflective materials. The proposed Project sites are predominantly surrounded by agricultural land and open space. Existing sources of lighting in the vicinity of each site include lighting around building exteriors, headlights from vehicles, and utility development in the area. The proposed Project would not involve creating additional lighting at Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam. Thus, the Project would result in no impact due to an increase in light or glare.

### 3.2 Agriculture and Forestry Resources

<table>
<thead>
<tr>
<th>Potential Impact</th>
<th>Less-Than-Significant Impact With Mitigation Incorporated</th>
<th>Less-Than-Significant Impact</th>
<th>No Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?</td>
<td>☑</td>
<td>☑</td>
<td>☑</td>
</tr>
<tr>
<td>b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?</td>
<td>☑</td>
<td>☑</td>
<td>☑</td>
</tr>
<tr>
<td>c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?</td>
<td>☑</td>
<td>☑</td>
<td>☑</td>
</tr>
<tr>
<td>d) Result in the loss of forest land or conversion of forest land to non-forest use?</td>
<td>☑</td>
<td>☑</td>
<td>☑</td>
</tr>
</tbody>
</table>
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?


Setting

Clifton Court Forebay Dam

The Contra Costa County General Plan designates the lands surrounding Clifton Court Forebay Dam for agricultural use. These properties support agricultural production, viticulture, pasture grazing, and agricultural preserves.

Dyer Dam and Patterson Dam

Dyer Dam and Patterson Dam are both located in the unincorporated area of Alameda County. Properties surrounding Dyer Dam include large parcels for agricultural uses, including several agricultural/residential parcels located on the west side of Dyer Road. Properties north and east of Patterson Dam include agricultural production and open space. The property immediately south of Patterson Dam supports the Zone 7 Patterson Pass Water Treatment Plant. Industrial uses are present west of Patterson Dam.

Impact Analysis

a) Would the Project convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?

Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam

The proposed Project would be located entirely within DWR property associated with Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam. According to the Farmland Mapping and Monitoring Program, Clifton Court Forebay Dam is surrounded by Prime Farmland, Farmland of Statewide Importance, and Grazing Land; Patterson Dam is surrounded by Non-Irrigated Farmland; and Dyer Dam is surrounded by Grazing Land (DOC 2021).

The remediation and maintenance activities included in the proposed Project would all occur within DWR property and would not convert the surrounding farmland into non-agricultural uses. No off-site improvements, such as to existing roads or other infrastructure, would be required. As such, the Project would result in no impacts due to conversion of farmland. Additionally, the purpose of the proposed Project is to remediate existing rodent burrows to improve the integrity of each Project dam. Thus, implementation of the Project would result in a reduced potential for dam failure that could result in flooding of the agricultural land surrounding each of these DWR facilities.
b) Would the Project conflict with existing zoning for agricultural use, or a Williamson Act contract?

Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam

The remediation and maintenance activities included in the proposed Project would all occur within DWR property. At Clifton Court Forebay Dam, use of an existing private farm road as a temporary construction access route may be necessary for a portion of the remediation activities. No off-site improvements, such as to existing roads or other infrastructure, are required. Dyer Dam and Patterson Dam are zoned by Alameda County as Agriculture; Clifton Court Forebay Dam is zoned by Contra Costa County as Agriculture. Properties surrounding each of the sites are also designated Agriculture.

The Project would not involve altering the land uses of DWR facilities or any of the surrounding land uses, which include agricultural production, viticulture, pasture for livestock, and agricultural reserves (Alameda County 2021a; City of Livermore 2021; Contra Costa County 2021). Implementation of the Project would result in no impacts due to conflicts with existing agricultural zoning. Additionally, the purpose of the proposed Project is to remediate existing rodent burrows to improve the integrity of each dam. Thus, the Project would result in a reduced potential for dam failure that could result in flooding of the agricultural land surrounding each of the DWR facilities included in this Project.

c) Would the Project conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?

Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam

As shown in Figures 4, 9, and 14, no forest land or timberland exists within or adjacent to the Project sites. No forest land or timberland would be impacted by Project activities, therefore, there would be no impact.

d) Would the Project result in the loss of forest land or conversion of forest land to non-forest use?

Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam

As noted above in Section 3.2(c), the Project sites and surrounding properties do not include any forest land; therefore, there would be no impact.

e) Would the Project involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?

Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam

The proposed Project activities would not alter the existing land use of the Project sites or adjacent lands and no impacts to farmland or forestland would occur. As stated in Section 3.2(b), the objective of the proposed Project is to remediate existing rodent burrows to lower the risk of dam failure, and thus lower risks of adverse effects to surrounding lands, including surrounding agricultural activities. The proposed Project would not involve altering existing land use, rather the Project activities would protect existing land use from the risk of dam failure. Therefore, there would be no impact.
### 3.3 Air Quality

#### III. AIR QUALITY – Where available, the significance criteria established by the applicable air quality management district or air pollution control district may be relied upon to make the following determinations. Would the Project:

<table>
<thead>
<tr>
<th></th>
<th>Potentially Significant Impact</th>
<th>Less-Than-Significant Impact With Mitigation Incorporated</th>
<th>Less-Than-Significant Impact</th>
<th>No Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Conflict with or obstruct implementation of the applicable air quality plan?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
</tr>
<tr>
<td>b) Result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is non-attainment under an applicable federal or state ambient air quality standard?</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
</tr>
<tr>
<td>c) Expose sensitive receptors to substantial pollutant concentrations?</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
</tr>
<tr>
<td>d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
</tr>
</tbody>
</table>

#### Setting

The Bay Area Air Quality Management District (BAAQMD) adopted updated CEQA Air Quality Guidelines, including new thresholds of significance in June 2010 (BAAQMD 2010), which were revised in May 2011. The CEQA Air Quality Guidelines advise lead agencies on how to evaluate potential air quality impacts, including establishing quantitative and qualitative thresholds of significance. The BAAQMD resolutions adopting and revising the significance thresholds in 2011 were set aside by a judicial writ of mandate on March 5, 2012. In May 2012, the BAAQMD updated its CEQA Air Quality Guidelines to continue to provide direction on recommended analysis methodologies, but without recommended quantitative significance thresholds (BAAQMD 2012). On August 13, 2013, the First District Court of Appeal ordered the trial court to reverse the judgment and upheld the BAAQMD’s CEQA thresholds. The BAAQMD CEQA Air Quality Guidelines were re-released in May 2017 and include the same thresholds as in the 2010 and 2011 guidelines for criteria air pollutants, toxic air contaminants (TACs), and greenhouse gases (GHGs) (BAAQMD 2017a). The CEQA Air Quality Guidelines also address the December 2015 Supreme Court’s opinion (California Building Industry Association v. Bay Area Air Quality Management District (2015) 62 Cal. 4th 369). These BAAQMD significance thresholds are summarized in Table 8.

In general, the BAAQMD significance thresholds for reactive organic gases (ROGs), oxides of nitrogen (NO\textsubscript{x}), particulate matter less than or equal to 10 microns in diameter (PM\textsubscript{10}), particulate matter less than or equal to 2.5 microns in diameter (PM\textsubscript{2.5}), and carbon monoxide (CO) address the first three CEQA air quality significance criteria. The BAAQMD determined that reliance on these thresholds would maintain ambient air quality concentrations of these criteria air pollutants below state and federal standards and prevent a cumulatively considerable contribution to regional nonattainment with ambient air quality standards. The TAC thresholds (cancer and noncancer risks) and local CO thresholds address the fourth CEQA significance criterion, and the BAAQMD odors threshold addresses the fifth CEQA significance criterion.
### Table 8. Thresholds of Significance

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Construction Thresholds</th>
<th>Operational Thresholds</th>
<th>Maximum Annual Emissions (tons/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average Daily Emissions (pounds/day)</td>
<td>Average Daily Emissions (pounds/day)</td>
<td></td>
</tr>
<tr>
<td>ROG</td>
<td>54</td>
<td>54</td>
<td>10</td>
</tr>
<tr>
<td>NOx</td>
<td>54</td>
<td>54</td>
<td>10</td>
</tr>
<tr>
<td>PM$_{10}$ (exhaust)</td>
<td>82</td>
<td>82</td>
<td>15</td>
</tr>
<tr>
<td>PM$_{2.5}$ (exhaust)</td>
<td>54</td>
<td>54</td>
<td>10</td>
</tr>
<tr>
<td>PM$<em>{10}$/PM$</em>{2.5}$ (fugitive dust)</td>
<td>Best Management Practices</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Local CO</td>
<td>None</td>
<td>9.0 ppm (8-hour average, 20.0 ppm (1-hour average))</td>
<td></td>
</tr>
</tbody>
</table>

- **Risks and Hazards (Individual Project)**
  - Compliance with Qualified Community Risk Reduction Plan
  - Increased cancer risk of >10.0 in a million
  - Increased noncancer risk of >1.0 Hazard Index (Chronic or Acute)
  - Ambient PM$_{2.5}$ increase >0.3 μg/m$^3$ annual average
  - Zone of Influence: 1,000-foot radius from property line of source or receptor

- **Risks and Hazards (Cumulative)**
  - Compliance with Qualified Community Risk Reduction Plan
  - Cancer risk of >100 in a million (from all local sources)
  - Noncancer risk of >10.0 Hazard Index (chronic, from all local sources)
  - Ambient PM$_{2.5}$ >0.8 μg/m$^3$ annual average (from all local sources)
  - Zone of Influence: 1,000-foot radius from property line of source or receptor

- **Accidental Release of Acutely Hazardous Air Pollutants**
  - None
  - Storage or use of acutely hazardous material located near receptors or new receptors located near stored or used acutely hazardous materials considered significant

- **Odors**
  - None
  - Five confirmed complaints to BAAQMD per year averaged over 3 years

**Source:** BAAQMD 2017a.

**Notes:** ROG = reactive organic gas; NO$_x$ = oxides of nitrogen; PM$_{10}$ = particulate matter less than or equal to 10 microns in diameter; PM$_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter; CO = carbon monoxide; ppm = parts per million; mg/m$^3$ = micrograms per cubic meter; BAAQMD = Bay Area Air Quality Management District.

### Impact Analysis

**a) Would the Project conflict with or obstruct implementation of the applicable air quality plan?**

**Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam**

An area is designated as “in attainment” when it is in compliance with the federal and/or state standards. These standards are set by the U.S. Environmental Protection Agency or California Air Resources Board for the maximum level of a given air pollutant that can exist in the outdoor air without unacceptable effects on human health or public welfare with a margin of safety. The Project sites are located within the San Francisco Bay Area Air Basin, which is designated nonattainment for the federal 8-hour ozone (O$_3$) and 24-hour PM$_{2.5}$ standards. The area is in attainment or unclassified for all other federal standards.
The area is designated nonattainment for state standards for 1-hour and 8-hour O₃, 24-hour PM₁₀, annual PM₁₀, and annual PM₂.₅. On April 19, 2017, the BAAQMD adopted the Spare the Air: Cool the Climate Final 2017 Clean Air Plan (2017 Clean Air Plan) (BAAQMD 2017b). The 2017 Clean Air Plan provides a regional strategy to protect public health and protect the climate. To protect public health, the 2017 Clean Air Plan includes all feasible measures to reduce emissions of O₃ precursors (ROG and NOₓ) and reduce O₃ transport to neighboring air basins. In addition, the 2017 Clean Air Plan builds upon the BAAQMD efforts to reduce fine particulate matter and TACs. To protect the climate, the 2017 Clean Air Plan defines a vision for transitioning the region to a post-carbon economy needed to achieve ambitious GHG reduction targets for 2030 and 2050, and provides a regional climate protection strategy that will put the Bay Area on a pathway to achieve those GHG reduction targets.

The BAAQMD CEQA Air Quality Guidelines identify a three-step methodology for determining a project’s consistency with the current Clean Air Plan. If the responses to these three questions can be concluded in the affirmative and those conclusions are supported by substantial evidence, then the BAAQMD considers the project to be consistent with air quality plans prepared for the Bay Area.

The first question to be assessed in this methodology is “does the project support the goals of the Air Quality Plan?” The BAAQMD-recommended measure for determining project support for these goals is consistency with BAAQMD thresholds of significance. If a project would not result in significant and unavoidable air quality impacts, after the application of all feasible mitigation measures, the project would not conflict with goals outlined within the 2017 Clean Air Plan. As indicated in the following discussion, with regard to CEQA air quality impact questions b) and c), the proposed Project would result in less-than-significant construction emissions. Therefore, the Project would be consistent with the current Clean Air Plan.

The second question to be assessed in this consistency methodology is “does the project include applicable control measures from the Clean Air Plan?” The 2017 Clean Air Plan contains 85 control measures aimed at reducing air pollution in the Bay Area. Projects that incorporate all feasible air quality plan control measures are considered consistent with the Clean Air Plan. The Project would involve rodent burrow remediation and restoration measures, as well as permanent measures to prevent future burrowing. The control strategies of the 2017 Clean Air Plan include measures in the categories of stationary sources, the transportation sector, the buildings sector, the energy sector, the agriculture sector, natural and working lands, the waste sector, the water sector, and super-GHG pollutant measures, most of which are not applicable to the Project. Many of these measures will be implemented by BAAQMD and therefore, are not suited for implementation through local planning efforts or project approval actions. The 2017 Clean Air Plan measures that may apply to the proposed Project include MSM-C1, Construction and Farming Equipment, which calls for incentives to retrofit construction equipment with diesel particulate matter filters or upgrade to Tier 3 or 4 engines and use renewable alternative fuels in applicable equipment. In addition, the measure MSM-B2, Low NOₓ Retrofits in Heavy-Duty On-Road Vehicles, would be applicable to the proposed Project. Measure MSM-B2 provides incentives to install abatement equipment to reduce NOₓ emissions. The Project would be consistent with these applicable control measures from the 2017 Clean Air Plan.

The third question to be assessed in this consistency methodology is “does the Project disrupt or hinder implementation of any control measures from the Clean Air Plan?” Examples of how a project may cause the disruption or delay of control measures include a project that precludes an extension of a transit line or bike path or proposes excessive parking beyond parking requirements. The proposed Project includes construction activities, but would not create any barriers or impediments to planned or future
improvements to transit or bicycle facilities in the Project areas, and would not create any new parking. Therefore, the Project would not hinder implementation of 2017 Clean Air Plan control measures.

In summary, the Project would not conflict with or obstruct implementation of the 2017 Clean Air Plan. Therefore, the proposed Project would result in no impact.

b) Would the Project result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is non-attainment under an applicable federal or state ambient air quality standard?

Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam

Air pollution is largely a cumulative impact. The nonattainment status of regional pollutants is a result of past and present development, and the BAAQMD develops and implements plans for future attainment of ambient air quality standards. Based on these considerations, project-level thresholds of significance for criteria pollutants are used in the determination of whether a project’s individual emissions would have a cumulatively considerable contribution on air quality. If a project’s emissions would exceed the BAAQMD significance thresholds, it would have a cumulatively considerable contribution. Conversely, projects that do not exceed the project-specific thresholds are generally not considered to be cumulatively significant (BAAQMD 2017a). A quantitative analysis was conducted to determine whether the proposed Project would result in a cumulatively considerable net increase in emissions of criteria air pollutants for which the San Francisco Bay Area Air Basin is designated as nonattainment under the National Ambient Air Quality Standards or California Ambient Air Quality Standards.

Appendix G of the CEQA Guidelines indicates that, where available, the significance criteria established by the applicable air district may be relied upon to determine whether a project would have a significant impact on air quality. The BAAQMD has established air quality significance thresholds that set forth quantitative emissions significance thresholds below which a project would not have a significant impact on ambient air quality (BAAQMD 2017a). The quantitative air quality analysis provided herein applies the BAAQMD thresholds, as listed in Table 8, to determine the potential for the proposed Project to result in a significant impact under CEQA.

Proposed construction activities would result in the temporary addition of pollutants to the local airshed caused by on-site sources (i.e., off-road construction equipment and soil disturbance) and off-site sources (i.e., on-road delivery trucks and worker vehicle trips). Construction emissions can vary substantially from day to day, depending on the level of activity; the specific type of operation; and, for dust, the prevailing weather conditions. Therefore, such emission levels can only be approximately estimated with a corresponding uncertainty in precise ambient air quality impacts.

The California Emissions Estimator Model (CalEEMod) Version 2016.3.2 was used to estimate emissions from construction of the Project (CAPCOA 2017). CalEEMod is a statewide computer model developed in cooperation with air districts throughout the state to quantify criteria air pollutant and GHG emissions associated with construction activities and operation of a variety of land use projects, such as residential, commercial, and industrial facilities. CalEEMod input parameters, including the land use type representing the Project and its size, construction schedule, and anticipated use of construction equipment, were based on default model assumptions where Project specifics were unavailable.

For the purposes of estimating the Project construction emissions, the CalEEMod modeling inputs assumed that construction activities in 2021 would occur over 2 months and would focus on the high-
priority repairs at Clifton Court Forebay Dam. To ensure a conservative analysis, the CalEEMod modeling inputs assumed that the rest of the work at Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam would occur between May and October 2022. Average daily emissions were computed by dividing the total construction emissions by the number of active construction days. To the extent that construction activities continue between May and October in the years 2023 through 2026, this would reduce the average daily amount of construction activities during 2022 and thus would not result in any increases in average daily emissions.

The average daily emissions computed based on the CalEEMod modeling outputs were compared to the BAAQMD construction thresholds of significance. Table 9 shows average daily construction emissions of O₃ precursors (ROG and NOₓ), PM₁₀ exhaust, and PM₂.₅ exhaust during the assumed Project construction period reflected in the CalEEMod modeling for years 2021 and 2022. Details of the emission calculations are provided in Appendix A.

Table 9. Average Daily Unmitigated Construction Emissions

<table>
<thead>
<tr>
<th>Year</th>
<th>ROG</th>
<th>NOₓ</th>
<th>PM₁₀ Exhaust</th>
<th>PM₂.₅ Exhaust</th>
</tr>
</thead>
<tbody>
<tr>
<td>2021–2022</td>
<td>4.0</td>
<td>49.0</td>
<td>1.8</td>
<td>0.7</td>
</tr>
<tr>
<td>BAAQMD Construction Thresholds</td>
<td>54</td>
<td>54</td>
<td>82</td>
<td>54</td>
</tr>
</tbody>
</table>

| Exceed Threshold? | No | No | No | No |

Source: Appendix A.
Notes: ROG = reactive organic gas; NOₓ = oxides of nitrogen; PM₁₀ = coarse particulate matter; PM₂.₅ = fine particulate matter.
The values shown are average daily emissions based on total overall tons of construction emissions, converted to pounds, and divided by 218 active work days.

As shown in Table 9, construction of the Project would not exceed BAAQMD significance thresholds. Thus, the Project would have a less-than-significant cumulative impact in relation to regional emissions.

c) Would the Project expose sensitive receptors to substantial pollutant concentrations?

Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam

The BAAQMD has adopted project and cumulative thresholds for three risk-related air quality indicators for sensitive receptors, including (1) cancer risks, (2) noncancer health effects, and (3) increases in ambient air concentrations of PM₂.₅. These impacts are addressed on a localized rather than regional basis and are specific to the sensitive receptors identified for a specific Project. Sensitive receptors are groups of individuals—including children, the elderly, the acutely ill, and the chronically ill—that may be more susceptible to health risks due to chemical exposure. Sensitive receptor population groups are likely to be located at hospitals, medical clinics, schools, playgrounds, childcare centers, residences, and retirement homes (BAAQMD 2017a). The closest existing sensitive receptors to the Project facilities are a small residential subdivision immediately north of the northeast corner of Clifton Court Forebay; the residential–agricultural properties located west of Dyer Dam, with the residence nearest to the Project work area being approximately 0.2 miles away; and a residential property located south of Patterson Pass Road and east of the South Bay Aqueduct, approximately 0.28 miles from Patterson Dam.
**Toxic Air Contaminants**

“Incremental cancer risk” is the net increased likelihood that a person continuously exposed to concentrations of TACs resulting from a project over a 9-, 30-, and 70-year exposure period would contract cancer based on the use of standard Office of Environmental Health Hazard Assessment risk-assessment methodology (OEHHA 2015). In addition, some TACs have non-carcinogenic effects. TACs that would potentially be emitted during construction activities would be diesel particulate matter, emitted from heavy-duty construction equipment and heavy-duty trucks. Heavy-duty construction equipment and diesel trucks are subject to California Air Resources Board air toxic control measures to reduce diesel particulate matter emissions. According to the Office of Environmental Health Hazard Assessment, health risk assessments, which determine the exposure of sensitive receptors to toxic emissions, should be based on a 30-year exposure period for the maximally exposed individual resident; however, such assessments should be limited to the period/duration of activities associated with a project (OEHHA 2015). Thus, the duration of proposed construction activities (no more than 6 months per year over 7 years) would constitute less than 12 percent of the total 30-year exposure period. Project-related health risk impacts associated with construction activities would therefore be less than significant.

**Local Carbon Monoxide Concentrations**

Mobile source impacts occur on two scales of motion. Regionally, Project-related travel would add to regional trip generation and increase the vehicle miles traveled within the local airshed and the San Francisco Bay Area Air Basin. Locally, Project-generated traffic would be added to the local roadway system near the Project site. If such traffic occurs during periods of poor atmospheric ventilation, consists of a large number of vehicles “cold-started” and operating at pollution-inefficient speeds, and/or is operating on roadways already crowded with non-Project traffic, there is a potential for the formation of microscale CO hotspots in the area immediately around points of congested traffic. Because of continued improvement in vehicular emissions at a rate faster than the rate of vehicle growth and/or congestion, the potential for CO hotspots in the San Francisco Bay Area Air Basin is steadily decreasing.

The BAAQMD thresholds of significance for local CO emissions is the 1-hour and 8-hour California Ambient Air Quality Standards of 20 parts per million and 9 parts per million, respectively. By definition, these represent levels that are protective of public health. According to the BAAQMD, a project would result in a less-than-significant impact to localized CO concentrations if the following screening criteria are met (BAAQMD 2017a):

- The project is consistent with an applicable congestion management program established by the county congestion management agency for designated roads or highways, regional transportation plan, and local congestion management agency plans.
- The project traffic would not increase traffic volumes at affected intersections to more than 44,000 vehicles per hour.
- The project traffic would not increase traffic volumes at affected intersections to more than 24,000 vehicles per hour where vertical and/or horizontal mixing is substantially limited (e.g., tunnel, parking garage, bridge underpass, natural or urban street canyon, below-grade roadway).

After completion of the burrow remediation, dam restoration, and other Project activities, new traffic trips would not be generated as a result of the Project. Accordingly, the Project would not result in the exceedance of CO standards and therefore, no further analysis was conducted for CO impacts. Thus, the CO emissions impact would be less than significant on a Project-level and cumulative basis.
d) **Would the Project result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?**

**Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam**

Odors would be potentially generated from vehicles and equipment exhaust emissions during Project construction. Potential odors produced during construction would be attributable to concentrations of unburned hydrocarbons from tailpipes of construction equipment. However, the proposed activities are in remote areas located away from substantial numbers of residences and other occupied facilities, so a limited number of people would be affected. In addition, Project implementation activities would occur in various locations within each of the DWR facilities, with work in each location or dam segment generally lasting for 3 months or less. This would limit the exposure period of the nearest residents. The potential release of odors associated with construction equipment would be minor, temporary, and unlikely to impact a substantial number of people; therefore, Project impacts would be less than significant.

### 3.4 Biological Resources

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>c) Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?</td>
<td>Potentially Significant Impact</td>
<td>Less-Than-Significant Impact With Mitigation Incorporated</td>
<td>Less-Than-Significant Impact</td>
<td>No Impact</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?</td>
<td>Potentially Significant Impact</td>
<td>Less-Than-Significant Impact With Mitigation Incorporated</td>
<td>Less-Than-Significant Impact</td>
<td>No Impact</td>
</tr>
</tbody>
</table>

Setting

Information presented here is summarized from the Biological Resources Existing Conditions Report for the Delta Dams Rodent Burrow Remediation Project, attached to this IS as Appendix B. Details on methodology, profiles of each of the special status species considered in this analysis, species occurrence information, vegetation community composition, aquatic resource types, and other resource information are available in the report.

Methods

Three DWR facilities are included in the overall Project—Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam. For each site, a biological resources study area was defined as including the area of disturbance for each of the Project components as well as a buffer extending 300 feet from the edge of disturbance, but within DWR property, easements, and/or right-of-way, to create a biological resources study area. The DWR right-of-way and easement land within this 300-foot buffer area was surveyed to map vegetation communities, potential aquatic resources, rare plants, and wildlife species; wildlife movement was also studied. Because biological resources on each site differ, the sites are analyzed separately in this document.

The following existing information on biological resources was reviewed by Dudek biologists:

- U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation online tool (USFWS 2020)
- California Department of Fish and Wildlife (CDFW) California Natural Diversity Database (CDFW 2021a, 2021b, 2020c)
- California Native Plant Society Online Inventory of Rare and Endangered Vascular Plants (CNPS 2021)
- Soil Survey Geographic Database for California (USDA 2021) (to identify potentially occurring special-status plants based upon known soil associations)

Biological surveys were conducted from December 2020 to August 2021. Vegetation mapping and aquatic resource delineations were performed from December 2020 to January 2021. Wildlife biologists conducted a reconnaissance-level field survey on January 11, 2021; multispecies burrow assessment in February 2021; focused surveys for nesting Swainson’s hawks (*Buteo swainsoni*) from March to July 2021; focused surveys for burrowing owls (*Athene cunicularia*) from February to July 2021; and camera trap surveys for San Joaquin kit fox (*Vulpes macrotis mutica*) from March to August 2021. Spring botanical surveys were conducted in March, May, and April 2021 and summer botanical surveys were conducted in July 2021. The results of these surveys, mapping, and
delineations are reported in detail in the Biological Resources Existing Conditions Report for the Delta Dams Rodent Burrow Remediation Project (Appendix B) and summarized in the following discussions and impact analyses.

**Vegetation Communities and Land Cover Types**

The acreages of the mapped vegetation associations and/or alliances and other land covers within the Project sites are presented in Table 10, including those that are considered sensitive biological resources by CDFW under CEQA per the California Natural Community List (CDFW 2020); sensitive natural communities are included in Table 10 in bold text. The term “semi-natural stands” is used to distinguish between natural vegetation communities and vegetation types dominated by non-native plant species (Sawyer et al. 2009). The alliances and other land covers are grouped in Table 10 by the generalized habitat. The locations of the vegetation community alliances and land covers within the Project sites are shown on Figures 19A through 19J, Impacts to Vegetation Communities – Clifton Court Forebay Dam, Figure 20, Impacts to Vegetation Communities – Dyer Dam, and Figure 21, Impact to Vegetation Communities – Patterson Dam, and are described by generalized habitat type in Appendix B.

**Sensitive Natural Communities**


**Jurisdictional Aquatic Resources**

Aquatic resources include waters (i.e., wetlands and non-wetland waters) of the United States under the jurisdiction of U.S. Army Corps of Engineers (USACE), waters of the state under the jurisdiction of the Regional Water Quality Control Board (RWQCB), and streams and lakes under the jurisdiction of the CDFW. The agencies tend to have overlapping jurisdiction over many resources; however, waters of the state extend beyond USACE waters of the United States/state.

Aquatic resources delineation reports were prepared for the Project sites, including the biological resources study areas for Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam and submitted to the USACE, CDFW, and RWQCB for verification. The following is a summary of the potential jurisdictional aquatic resources by agency.

**U.S. Army Corps of Engineers**

Potential waters of the United States within the Project sites total 85,613.36 acres (23,926 linear feet [LF]) and are composed of 20,422.42 acres (4,884 LF) of wetlands and 65,190.94 acres (19,042 LF) of non-wetlands (Appendix B). Table 11 summarizes the potential USACE waters of the United States by each Project facility (Figures 22A through 22J, USACE – Impacts to Delineated Aquatic Resources – Clifton Court Forebay Dam, Figure 23, Impacts to USACE-Jurisdictional Areas – Dyer Dam, and Figure 24, Impacts to USACE-Jurisdictional Areas – Patterson Dam).

November 2021, revised June 2022
Table 10. Vegetation Communities within the Project Site (acres)

<table>
<thead>
<tr>
<th>General Category</th>
<th>Alliance Name</th>
<th>Vegetation Community</th>
<th>Clifton Court Forebay Dam</th>
<th>Dyer Dam</th>
<th>Patterson Dam</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bog and Marsh</td>
<td>Alkali heath marsh</td>
<td><em>Frankenia salina</em> Association</td>
<td>1.9</td>
<td>—</td>
<td>—</td>
<td>1.9</td>
</tr>
<tr>
<td></td>
<td>American bulrush marsh</td>
<td><em>Schoenoplectus americanus</em> Association</td>
<td>1.8</td>
<td>—</td>
<td>—</td>
<td>1.8</td>
</tr>
<tr>
<td></td>
<td>Baltic and Mexican rush marshes</td>
<td><em>Juncus arcticus</em> var. <em>balticus</em> – (var. <em>mexicanus</em>) Association</td>
<td>0.3</td>
<td>—</td>
<td>—</td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td>Cattail marshes</td>
<td><em>Typha (latifolia, angustifolia)</em> Association</td>
<td>—</td>
<td>0.6</td>
<td>0.7</td>
<td>1.3</td>
</tr>
<tr>
<td></td>
<td>Common and giant reed marshes</td>
<td><em>Arundo donax</em> Semi-Natural Association</td>
<td>0.9</td>
<td>—</td>
<td>—</td>
<td>0.9</td>
</tr>
<tr>
<td></td>
<td>Hardstem and California bulrush marshes</td>
<td><em>Schoenoplectus acutus</em> Association</td>
<td>0.2</td>
<td>—</td>
<td>0.0(^1)</td>
<td>0.2</td>
</tr>
<tr>
<td></td>
<td>Iodine bush scrub</td>
<td><em>Allenrolfea occidentalis/Distichlis spicata</em> provisional Association</td>
<td>5.4</td>
<td>—</td>
<td>—</td>
<td>5.4</td>
</tr>
<tr>
<td></td>
<td>Perennial pepper weed patches</td>
<td><em>Lepidium latifolium</em> Semi-Natural Association</td>
<td>21.5</td>
<td>—</td>
<td>—</td>
<td>21.5</td>
</tr>
<tr>
<td></td>
<td>Quailbush scrub</td>
<td><em>Atriplex lentiformis</em> Association</td>
<td>7.3</td>
<td>0.1</td>
<td>—</td>
<td>7.4</td>
</tr>
<tr>
<td></td>
<td>Salt grass flats</td>
<td><em>Distichlis spicata</em> Association</td>
<td>0.6</td>
<td>1.3</td>
<td>0.5</td>
<td>2.3</td>
</tr>
<tr>
<td></td>
<td>Smartweed – cocklebur patches</td>
<td><em>Polygonum (amphibium, lapathifolium)</em> Association</td>
<td>7.1</td>
<td>—</td>
<td>—</td>
<td>7.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Bog and Marsh Subtotal</strong></td>
<td>54.5</td>
<td>2.0</td>
<td>1.2</td>
<td>57.7</td>
</tr>
<tr>
<td>Disturbed and Developed</td>
<td>N/A</td>
<td>Disturbed habitat</td>
<td>13.9</td>
<td>3.9</td>
<td>0.4</td>
<td>18.2</td>
</tr>
<tr>
<td></td>
<td>N/A</td>
<td>General agriculture</td>
<td>0.0(^1)</td>
<td>—</td>
<td>—</td>
<td>0.0(^1)</td>
</tr>
<tr>
<td></td>
<td>N/A</td>
<td>Open water</td>
<td>60.6</td>
<td>—</td>
<td>0.0(^1)</td>
<td>60.7</td>
</tr>
<tr>
<td></td>
<td>N/A</td>
<td>Urban/developed</td>
<td>109.6</td>
<td>21.5</td>
<td>15.4</td>
<td>146.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Disturbed and Developed Total</strong></td>
<td>184.2</td>
<td>25.3</td>
<td>15.8</td>
<td>225.3</td>
</tr>
<tr>
<td>Dune</td>
<td>Ice plant mats</td>
<td><em>Carpobrotus (edulis)</em> Semi-Natural Association</td>
<td>1.9</td>
<td>—</td>
<td>—</td>
<td>1.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Dune Subtotal</strong></td>
<td>1.9</td>
<td>—</td>
<td>—</td>
<td>1.9</td>
</tr>
<tr>
<td>Grass and Herb Dominated</td>
<td>California brome – blue wildrye prairie</td>
<td><em>Elymus glaucus</em> association</td>
<td>2.6</td>
<td>—</td>
<td>—</td>
<td>2.6</td>
</tr>
<tr>
<td></td>
<td>Needle grass – Melic grass grassland</td>
<td><em>Nassella spp. – Melica spp.</em> Alliance</td>
<td>—</td>
<td>17.2</td>
<td>0.7</td>
<td>17.9</td>
</tr>
<tr>
<td></td>
<td>Perennial rye grass fields</td>
<td><em>Lolium perenne</em> – <em>Hordeum marinum</em> – <em>Ranunculus californicus</em> Semi-Natural Association</td>
<td>22.3</td>
<td>1.1</td>
<td>—</td>
<td>23.4</td>
</tr>
</tbody>
</table>
Table 10. Vegetation Communities within the Project Site (acres)

<table>
<thead>
<tr>
<th>General Category</th>
<th>Alliance Name</th>
<th>Vegetation Community</th>
<th>Clifton Court Forebay Dam</th>
<th>Dyer Dam</th>
<th>Patterson Dam</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poison hemlock or fennel patches</td>
<td>Conium maculatum Semi-Natural Association</td>
<td>12.7</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>12.7</td>
</tr>
<tr>
<td>Upland mustards or star-thistle fields</td>
<td>Brassica nigra Semi-Natural Association</td>
<td>18.4</td>
<td>3.6</td>
<td>5.8</td>
<td>27.9</td>
<td></td>
</tr>
<tr>
<td>Wild oats and annual brome grasslands</td>
<td>Wild oats and annual brome grasslands (Avena spp. – Bromus spp.) Semi-Natural Alliance</td>
<td>45.6</td>
<td>6.9</td>
<td>9.2</td>
<td>61.7</td>
<td></td>
</tr>
<tr>
<td>Riparian</td>
<td>Arroyo willow thickets</td>
<td>Salix lasiolepis association</td>
<td>–</td>
<td>0.01</td>
<td>–</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>Button willow thickets</td>
<td>Cephalanthus occidentalis association</td>
<td>1.4</td>
<td>–</td>
<td>–</td>
<td>1.4</td>
</tr>
<tr>
<td></td>
<td>Goodding's willow – red willow riparian woodland and forest</td>
<td>Salix gooddingi association</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>7.6</td>
</tr>
<tr>
<td></td>
<td>Himalayan blackberry – rattlebox edible fig riparian scrub</td>
<td>Rubus armeniacus Semi-Natural Association</td>
<td>4.1</td>
<td>–</td>
<td>–</td>
<td>4.1</td>
</tr>
<tr>
<td></td>
<td>Hinds’s walnut and related stands</td>
<td>Juglans hindsii Semi-Natural Association</td>
<td>1.2</td>
<td>–</td>
<td>–</td>
<td>1.2</td>
</tr>
<tr>
<td></td>
<td>Red alder forest</td>
<td>Alnus rubra/Salix lasiolepis/Rubus spp. Association</td>
<td>0.3</td>
<td>–</td>
<td>–</td>
<td>0.3</td>
</tr>
<tr>
<td>Riparian Subtotal</td>
<td></td>
<td></td>
<td>14.6</td>
<td>0.0</td>
<td>14.7</td>
<td></td>
</tr>
<tr>
<td>Scrub</td>
<td>Coyote brush scrub</td>
<td>Baccharis pilularis/annual grass – herb Association</td>
<td>2.4</td>
<td>–</td>
<td>–</td>
<td>2.4</td>
</tr>
<tr>
<td>Scrub Subtotal</td>
<td></td>
<td></td>
<td>2.4</td>
<td>–</td>
<td>–</td>
<td>2.4</td>
</tr>
<tr>
<td>Grand Total</td>
<td></td>
<td></td>
<td>359.3</td>
<td>58.7</td>
<td>35.0</td>
<td>452.9</td>
</tr>
</tbody>
</table>

Notes: An alliance and/or association is considered sensitive (bolded above) if indicated with a state rarity rank of S1–S3 or indicated as sensitive without a rarity ranking in the California Natural Community List (CDFW 2020). Totals may not sum due to rounding.  
1 0.0 are values that are less than 0.05 acres.
Table 11. Acres (and Linear Feet) of USACE Potential Waters of the United States by Project Facility

<table>
<thead>
<tr>
<th>Feature Type</th>
<th>Clifton Court Forebay Dam</th>
<th>Dyer Dam</th>
<th>Patterson Dam</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wetland</td>
<td>18.2 (559 LF)</td>
<td>1.2 (2,206 LF)</td>
<td>1.0 (2,120 LF)</td>
<td>20.4 (4,884 LF)</td>
</tr>
<tr>
<td>Non-wetland waters</td>
<td>64.1 (16,649 LF)</td>
<td>0.45 (2,032 LF)</td>
<td>0.0 (362 LF)</td>
<td>64.6 (19,042 LF)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>82.4</strong></td>
<td><strong>1.6 (4,237 LF)</strong></td>
<td><strong>1.0</strong> (2,482 LF)</td>
<td><strong>85.0</strong> (23,926 LF)</td>
</tr>
</tbody>
</table>

Notes: USACE = U.S. Army Corps of Engineers.
1 0.0 are values that are less than 0.05 acres.
2 Totals may not sum due to rounding.

Regional Water Quality Control Board

Potential waters of the state within the Project sites total 87.6 63.9 acres (24,524 LF) and are composed of 2.540 acres (4,884 LF) of wetlands and 67.2 61.5 acres (19,640 LF) of non-wetlands (Appendix B). Table 12 summarizes the potential RWQCB waters of the state by each Project facility (Figures 25A through 25J, RWQCB – Impacts to Delineated Aquatic Resources – Clifton Court Forebay Dam, Figure 26, Impacts to RWQCB-Jurisdictional Areas – Dyer Dam, and Figure 27, Impacts to RWQCB-Jurisdictional Areas – Patterson Dam).

Table 12. Acres (and Linear Feet) of RWQCB-Jurisdictional Waters of the United States/State by Project Facility

<table>
<thead>
<tr>
<th>Feature Type</th>
<th>Clifton Court Forebay Dam</th>
<th>Dyer Dam</th>
<th>Patterson Dam</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wetland</td>
<td>18.2 (559 LF)</td>
<td>1.2 (2,206 LF)</td>
<td>1.0 (2,120 LF)</td>
<td>2.40 (4,884 LF)</td>
</tr>
<tr>
<td>Non-wetland waters</td>
<td>64.6 (17,247 LF)</td>
<td>2.4 (2,032 LF)</td>
<td>0.2 (362 LF)</td>
<td>67.2 (19,640 LF)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>82.8</strong></td>
<td><strong>3.6 (4,237 LF)</strong></td>
<td><strong>1.2</strong> (2,482 LF)</td>
<td><strong>87.6</strong> (24,524 LF)</td>
</tr>
</tbody>
</table>

Notes: RWQCB = Regional Water Quality Control Board. Additional aquatic resources may be present outside of impact areas.
1 Totals may not sum due to rounding.

California Department of Fish and Wildlife

CDFW-jurisdictional waters within the Project site total 65.7 acres (30,398 LF) and consist of 4.1 acres (10,248 LF) of riparian habitat and 61.6 acres (20,150 LF) of streambed (Appendix B). Table 13 summarizes the CDFW waters of the state by each Project facility (Figures 28A through 28J, Impacts to CDFW-Jurisdictional Areas – Clifton Court Forebay Dam, Figure 29, Impacts to CDFW-Jurisdictional Areas – Dyer Dam, and Figure 30, Impacts to CDFW-Jurisdictional Areas – Patterson Dam).

Table 13. Acres (and Linear Feet) of CDFW-Jurisdictional Waters by Project Facility

<table>
<thead>
<tr>
<th>Feature Type</th>
<th>Clifton Court Forebay Dam</th>
<th>Dyer Dam</th>
<th>Patterson Dam</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Riparian</td>
<td>1.9 (5,923 LF)</td>
<td>1.2 (2,206 LF)</td>
<td>1.0 (2,120 LF)</td>
<td>4.1 (10,248 LF)</td>
</tr>
<tr>
<td>Streambed</td>
<td>58.9 (17,247 LF)</td>
<td>2.5 (2,541 LF)</td>
<td>0.2 (362 LF)</td>
<td>61.6 (20,150 LF)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>60.8</strong></td>
<td><strong>3.7 (4,747 LF)</strong></td>
<td><strong>1.2</strong> (2,482 LF)</td>
<td><strong>65.7</strong> (30,398 LF)</td>
</tr>
</tbody>
</table>

Note: CDFW = California Department of Fish and Wildlife.
Special-Status Species

Special-status species are plants and wildlife that are legally protected under state and/or federal regulations. Special-status species also include species considered sufficiently rare by regulatory agencies and the scientific community to warrant consideration in environmental impact analysis. For the purposes of this analysis, special-status species include the following:

- Plants or wildlife (including fish) listed, proposed for listing, or candidates for listing as threatened or endangered under the federal Endangered Species Act
- Plants or wildlife (including fish) listed as threatened or endangered, or proposed for listing, under the California Endangered Species Act
- Wildlife or fish designated by CDFW as a California Species of Special Concern Wildlife designated as fully protected species under Sections 3511, 4700, 5050, and 5515 the California Fish and Game Code
- Plants designated as rare under the California Native Plant Protection Act of 1977
- Plants with a California Rare Plant Rank (CRPR) of 1 or 2
- Plants or wildlife that meet the definition of rare, threatened, or endangered as described in the CEQA Guidelines, Section 15380

Special-Status Plant Species

Based on the review of the above-listed information sources, biologists evaluated 58 special-status plant species for potential to occur in the biological resources study areas (Appendix C in Appendix B). Of these, six special-status species were observed within the Clifton Court Forebay Dam biological resources study area—long-styled sand-spurrey (Spergularia macrotheca var. longistyla; CRPR 1B.2), woolly rose-mallow (Hibiscus lasiocarpos var. occidentalis; CRPR 1B2), brittlescale (Atriplex depressa; CRPR 1B.2), heartscale (Atriplex cordulata var. cordulata; CRPR 1B.2); Mason's lilaeopsis (Lilaeopsis masonii; CRPR 1B.1), and Suisun Marsh aster (Symphyotrichum lentum; CRPR 1B.2) (Appendix B). Profiles of each of these species are presented in Appendix B. Crownscale (Atriplex coronata var. coronata) was observed within the Clifton Court Forebay Dam biological resources study area (DWR, unpubl. data), but this species has a CRPR of 4.2, which is not considered special-status because this occurrence is not significant locally,² and impacts to this occurrence would not be considered significant. Figure 31, Impacts to Special-Status Plants – Clifton Court Forebay Dam, shows the location of special-status plant species observed within the Clifton Court Forebay Dam biological resources study area.

No special-status plants were observed within the Dyer Dam and Patterson Dam biological resources study areas (Appendix B). Special-status plant species that are not expected to occur or have a low potential to occur are not discussed further because no significant direct, indirect, or cumulative impacts to those species are expected to result from the proposed Project (see Appendix C in Appendix B). Due, in part, to the extensive surveys conducted in each of the study areas, there are no special-status plants with a moderate or high potential to occur in any of the three study areas.

¹ Plants with a CRPR of 4 that may be considered significant locally are: (1) the type locality; (2) populations at the periphery of a species’ range; (3) areas where the taxon is especially uncommon; (4) areas where the taxon has sustained heavy losses; and (5) populations exhibiting unusual morphology or occurring on unusual substrates.
Special-Status Wildlife Species

Based on the review of the above-listed information sources, biologists evaluated 51 special-status wildlife species for potential to occur in the biological resources study areas (Appendix D in Appendix B). Of these, 15 species have been observed or are considered to have high potential to occur based on the presence of suitable habitat. Table 14 includes a list of these species and summary of their potential to occur by dam. Profiles of each of these species are presented in Appendix B. Listed fish species known to occur in or near Clifton Court Forebay and San Joaquin kit fox are also included in Table 14 because of their legal status.

Detailed information on habitat suitability at each dam, as well as rationale for the exclusion of other special-status plant species from further analysis, is provided in Appendix D in Appendix B.

Table 14. Special-Status Wildlife Species Observed or with High Potential to Occur in Biological Resources Study Areas

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Status</th>
<th>Potential to Occur</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vernal pool fairy shrimp</td>
<td>Branchinecta lynchii</td>
<td>FT/None</td>
<td>High Known, Moderate, None</td>
</tr>
<tr>
<td>Green sturgeon (southern DPS)</td>
<td>Acipenser medirostris</td>
<td>FT/SSC</td>
<td>Moderate, None, None</td>
</tr>
<tr>
<td>Steelhead (Central Valley DPS)</td>
<td>Oncorhynchus mykiss irideus pop. 11</td>
<td>FT/None</td>
<td>Moderate, None, None</td>
</tr>
<tr>
<td>Chinook salmon (Sacramento winter-run ESU)</td>
<td>Oncorhynchus tshawytscha</td>
<td>FE/SE</td>
<td>Moderate, None, None</td>
</tr>
<tr>
<td>Chinook salmon (Central Valley River spring-run ESU)</td>
<td>Oncorhynchus tshawytscha</td>
<td>FT/ST</td>
<td>Moderate, None, None</td>
</tr>
<tr>
<td>Delta smelt</td>
<td>Hypomesus transpacificus</td>
<td>FT/SE</td>
<td>Moderate, None, None</td>
</tr>
<tr>
<td>Longfin smelt</td>
<td>Spirinchus thaleichthys</td>
<td>FC/ST</td>
<td>Moderate, None, None</td>
</tr>
<tr>
<td>California tiger salamander</td>
<td>Ambystoma californiense</td>
<td>FT/ST</td>
<td>Moderate Low, High, High</td>
</tr>
<tr>
<td>California red-legged frog</td>
<td>Rana draytonii</td>
<td>FT/SSC</td>
<td>Moderate, High, Observed</td>
</tr>
<tr>
<td>Western pond turtle</td>
<td>Actinemys marmorata</td>
<td>None/SSC</td>
<td>Observed, Moderate, High</td>
</tr>
<tr>
<td>San Joaquin coachwhip</td>
<td>Masticophis flagellum ruddocki</td>
<td>None/SSC</td>
<td>High, Low, Moderate</td>
</tr>
</tbody>
</table>
Table 14. Special-Status Wildlife Species Observed or with High Potential to Occur in Biological Resources Study Areas

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Status</th>
<th>Clifton Court Forebay Dam</th>
<th>Dyer Dam</th>
<th>Patterson Dam</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Birds</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Golden eagle (nesting and wintering)</td>
<td>Aquila chrysaetos</td>
<td>BCC/FP</td>
<td>Moderate (wintering)</td>
<td>High (wintering)</td>
<td>High (wintering)</td>
</tr>
<tr>
<td>Swainson’s hawk (nesting)</td>
<td>Buteo swainsoni</td>
<td>None/ST</td>
<td>Observed</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Northern harrier (nesting)</td>
<td>Circus hudsonius</td>
<td>None/SSC</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>White-tailed kite (nesting)</td>
<td>Elanus leucurus</td>
<td>None/FP</td>
<td>High</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Bald eagle (nesting and wintering)</td>
<td>Haliaeetus leucocephalus</td>
<td>FDL, BCC/FP, SE</td>
<td>Observed</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Burrowing owl (burrow sites and some wintering sites)</td>
<td>Athene cunicularia</td>
<td>None/SSC</td>
<td>Observed</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Loggerhead shrike (nesting)</td>
<td>Lanius ludovicianus</td>
<td>BCC/SSC</td>
<td>High</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>Song sparrow (“Modesto” population)</td>
<td>Melospiza melodia (“Modesto” population)</td>
<td>None/SSC</td>
<td>Observed</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Tricolored blackbird (nesting colony)</td>
<td>Agelaius tricolor</td>
<td>None/SSC, ST</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td><strong>Mammals</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>American badger</td>
<td>Taxidea taxus</td>
<td>None/SSC</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>San Joaquin kit fox</td>
<td>Vulpes macrotis mutica</td>
<td>FE/ST</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
</tbody>
</table>

Notes: DPS = distinct population segment; ESU = evolutionarily significant unit.

**Status Legend**

**Federal**
- BCC: USFWS—Birds of Conservation Concern
- FC: Candidate for federal listing as threatened or endangered
- FD: Federally delisted; monitored for 5 years
- FE: Federally listed as endangered
- FT: Federally listed as threatened
- FPE: Federally proposed for listing as endangered
- FPT: Federally proposed for listing as threatened
- FPD: Federally proposed for delisting

**State**
- FP: CDFW Fully Protected species
- SE: State listed as endangered
- ST: State listed as threatened
- SCE: State candidate for listing as endangered
- SCT: State candidate for listing as threatened
- SCD: State candidate for delisting
- SSC: California Species of Special Concern
- WL: CDFW Watch List species
Wildlife Movement

The following summarizes wildlife movement patterns and habitat connectivity within the Project site for each of the biological resource study areas at the three dams. Additional information is provided in Appendix B (Section 4.5.4, Wildlife Movement).

**Clifton Court Forebay Dam**

The Clifton Court Forebay Dam study area is located at the western edge of the San Joaquin Valley near its transition to the rolling foothills of the Diablo Range west of the Byron Highway. Clifton Court Forebay and the surrounding waterways—the California Aqueduct, the Old River, Italian Slough, and the West Canal—effectively block most wildlife movement potential in the vicinity of the study area. Some movement potential exists within the study area between Clifton Court Forebay Dam and Bethany Reservoir to the southwest, but it is constrained by DWR support facilities and roads, leaving canal termini, overchutes (e.g., bridges, siphons), and underchutes (e.g., culverts), available for wildlife to use. Land is available to the north but is generally fragmented by multiple canals and other wide waterways.

The study area is not readily identifiable as a regional wildlife corridor or habitat linkage because wildlife is not anticipated to normally move through the area due to existing human-made features. The forebay and canal system likely serve as barriers to movement of small, ground-based wildlife from the surrounding ranchlands, and the Byron Highway likely serves as a barrier to such movement from the Diablo foothills to the west. While the Byron Highway, other roads, and canals represent a significant barrier to larger mammal (e.g., coyote [Canis latrans], bobcat [Lynx rufus], mule deer [Odocoileus hemionus]) movement, it is possible that wildlife may occasionally cross canals by using any of multiple overchutes, underchutes, and road crossings present along the California Aqueduct within the study area.

The study area is located within the Pacific Flyway, which is a major north–south migration route for birds that travel between North and South America. The longest and most important migration route of the Pacific Flyway is that originating in northeastern Alaska. This route, which includes most waterfowl and shorebirds, passes through the interior of Alaska and then branches such that large flights continue southeast into the Central and Mississippi Flyways, or they turn in a southwesterly direction and pass through the interior valleys of California, ending or passing through the Salton Sea. The Clifton Court Forebay Dam study area is on the western edge of the Central Valley routes and the forebay and nearby waterways attract migrating waterbirds. Evidence of this is provided by the large rafts of migratory waterfowl observed during Dudek’s field surveys from December 2020 to March 2021.

**Dyer Dam**

The Dyer Dam study area is in the Altamont Hills of the Diablo Range in eastern Alameda County, approximately 7 miles northeast of Livermore and 2.3 miles north of Interstate 580. It is located in a large expanse of annual grassland with various land uses such as wind energy facilities, private ranchland, and waste management (i.e., Altamont Landfill approximately 0.5 miles to the east) through which most wildlife can move freely, although local movements are constrained by the fence around the reservoir, the South Bay Aqueduct, and fencing associated with other human land uses. Some movement potential exists within the study area at canal terminuses, overchutes, and underchutes available for wildlife to use to navigate over and around the South Bay Aqueduct. The Dyer Dam study area is in the “Mt. Diablo-Diablo Range” critical
linkage mapped by the Critical Linkages: Bay Area and Beyond project (Penrod et al. 2013). Like Clifton Court Forebay, Dyer Reservoir provides habitat for migratory waterbirds that use the Pacific Flyway.

**Patterson Dam**

The Patterson Dam study area is located on the eastern edge of the Livermore Valley approximately 1 mile east of Livermore. Local wildlife movement is constrained by the South Bay Aqueduct. Additionally, wildlife movement in the vicinity of Patterson Dam is constrained by development to the west, Patterson Pass Road to the south, and Interstate 580 to the north. Combined, these facilities can be a substantial barrier to California tiger salamander, large mammals, and smaller wildlife, though some movement is possible across the South Bay Aqueduct overchutes in the vicinity. The Patterson Dam study area is also in the “Mt. Diablo-Diablo Range” critical linkage mapped by the Critical Linkages: Bay Area and Beyond project (Penrod et al. 2013) as described above for Dyer Dam. Patterson Reservoir does not support the large numbers of migratory waterbirds known to occur at Clifton Court Forebay and Dyer Reservoir because of its smaller size, but still has habitat value for such species, as evidenced by the observation of several species of migratory waterfowl (e.g., northern shoveler [*Spatula clypeata*], ring-necked duck [*Aythya collaris*], bufflehead [*Bucephala albeola*], common merganser [*Mergus merganser*]) during the wildlife reconnaissance survey conducted on January 11, 2021.

**Impact Analysis**

Like the other IS sections, the following impact analysis is organized by CEQA significance threshold. In contrast to other sections, however, the analysis under each threshold is organized first by resource type (e.g., special-status plants, special-status amphibians and reptiles) then by location (i.e., Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam). Within each discussion, a clear statement about the potential impact to each resource type as it relates to the Project is provided. Organization of the impact analysis in this manner helps streamline the analysis and eliminate the need for repetition of text that could apply to multiple dams.

The following terms are used in this impact analysis to describe the areas studied and potentially impacted by the Project, from least to most inclusive:

- The Project site refers to the area that would be physically affected by proposed construction activities (including temporary disturbance) and the location of permanent structures. The Project site also includes all staging areas.
- The biological resource study area (or study area) includes the Project site and adjacent lands in which indirect impacts on biological resources could occur, including disturbance from construction-related noise, vibration, and lighting. It is identical to the biological resource study area used in the Biological Resources Existing Conditions Report for the Delta Dams Rodent Burrow Remediation Project (Appendix B).
a) Would the Project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?

Special-Status Plant Species

Clifton Court Forebay Dam

Direct Impacts

Permanent impacts to approximately 102 long-styled sand-spurrey (CRPR 1B.2) individuals and temporary impacts to approximately 3,609 long-styled sand-spurrey (CRPR 1B.2) individuals would result from implementation of the Project at Clifton Court Forebay Dam. Permanent impacts to approximately 1 Suisun Marsh aster (CRPR 1B.2) individual would result from implementation of the Project at Clifton Court Forebay Dam. The woolly rose-mallow, brittlescale, heartscale, and Mason’s lilaeopsis at Clifton Court Forebay Dam would be avoided (Appendix B). Figure 31 shows the location of the impacts in relationship to the special-status species observed within the Clifton Court Forebay Dam biological resources study area.

Implementation of Mitigation Measure BIO-2 would avoid, minimize, and/or mitigate for direct impacts to long-styled sand spurrey at the Clifton Court Forebay Dam study area. Additionally, permanent impacts to one Suisun marsh aster is less than significant. Therefore, the Project would result in a less-than-significant impact with mitigation incorporated.

Indirect Impacts

Construction-related indirect impacts could affect special-status plants and habitat where special-status plants have at least a moderate potential to occur. Potential short-term or temporary indirect impacts to special-status plants resulting from construction activities include the generation of fugitive dust; changes in hydrology resulting from construction, including sedimentation and erosion; the release of chemical pollutants; and adverse effects of invasive plant species. Potential short-term or temporary indirect impacts to special-status plants would be significant absent mitigation. Implementation of Mitigation Measure BIO-1 and the Stormwater Pollution Prevention Plan (SWPPP) required under the State Water Resources Control Board (SWRCB) General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (Construction General Permit) would reduce indirect impacts to special-status plant species and their habitat at the Clifton Court Forebay Dam study area; therefore, the Project would result in a less-than-significant impact with mitigation incorporated.

Dyer Dam

No special-status plant species were observed during surveys in March, May, and July 2021. Due, in part, to the extensive surveys conducted in the Dyer Dam biological study area, there are no special-status plants with a moderate or high potential to occur. The remainder of the special-status species evaluated are either not expected to occur or have a low potential to occur (Appendix B). No significant direct, indirect, or cumulative impacts to special-status plants are expected to result from the proposed Project at Dyer Dam.
Patterson Dam

No special-status plant species were observed during surveys in March, May, and July 2021. Due, in part, to the extensive surveys conducted in the Patterson Dam biological study area, there are no special-status plants with a moderate or high potential to occur. The remainder of the special-status species evaluated are either not expected to occur or have a low potential to occur (Appendix B). No significant direct, indirect, or cumulative impacts to special-status plants are expected to result from the proposed Project at Patterson Dam.

Special-Status Wildlife Species

Invertebrates

Clifton Court Forebay Dam

The Project would not result in direct impacts on vernal pool fairy shrimp (Branchinecta lynchi) and but could therefore result in indirect impacts on potential habitat to the south this species. Construction of the temporary toe access road adjacent to would involve the placement of temporary fill within the northern edge of the 5.36-acre wetland. Although the wetland was confirmed as unoccupied by vernal pool fairy shrimp during January 2022 surveys, the temporary fill could modify the wetland's hydrology and indirectly affect other potential vernal pool fairy shrimp habitat to the south (i.e., within 80 meters of the two pools) by altering the ponding duration and causing pools to evaporate before fairy shrimp have completed their life cycle that may support the species could may alter downstream hydrology and ponding duration from the placement of fill, causing pools to evaporate before fairy shrimp have completed their life cycle; this impact would be potentially significant. However, implementation of Mitigation Measure BIO-3 would minimize indirect impacts to downstream habitat; therefore, the Project would result in a less-than-significant impact with mitigation incorporated.

Dyer Dam and Patterson Dam

No special-status invertebrate species are expected to occur at Dyer Dam and at Patterson Dam (Appendix B). Therefore, these components of the Project would result in no impacts to special-status invertebrates.

Fish

Clifton Court Forebay Dam

Six listed fish species occur in Delta waterways in the Clifton Court Forebay Dam study area (i.e., the Old River, the West Canal, intake channel) at various times of the year—green sturgeon (Acipenser medirostris), Central Valley steelhead (Oncorhynchus mykiss irideus pop. 11), Sacramento River winter-run and Central Valley spring-run Chinook salmon (Oncorhynchus tshawytscha), delta smelt (Hypomesus transpacificus), and longfin smelt (Spirinchus thaleichthys) (see Appendix D in Appendix B). Proposed slope restoration at the intake channel could result in direct and indirect impacts on these species, if present, at the time of construction.

The only potential direct impact on listed fish would be temporary disruption of normal behaviors if individuals present in the intake channel at the time of construction avoid any sudden increases in turbidity and suspended sediment. Both juvenile and adult fish would also be able to detect areas of
disturbance and would typically actively avoid areas where equipment is operating in or at the edge of open water or where a turbidity plume occurs. Occasionally, foraging juvenile salmonids may be attracted to activities that disturb bottom sediment, although if immediate danger is detected, they can quickly move away from the area. Injury or mortality of individual fish is not expected because work would be conducted during low flow conditions to avoid working within waters. Additionally, the area disturbed by embankment excavation and associated turbidity and the placement of structural materials along the bank is expected to only affect a small portion of the channel width; as a result, juveniles would be able to move to other areas of the channel to avoid potential injury or mortality.

Potential indirect impacts on listed fish include temporary habitat degradation from short-term increases in turbidity and suspended sediment, and chemical contamination from equipment fluids. Short-term localized increases in turbidity and suspended sediment levels associated with bank restoration activities may negatively affect fish temporarily through reduced availability of food, reduced feeding efficiency, and exposure to sediment released into the water column. However, based on the limited extent of bank restoration areas relative to the abundance of suitable habitat within the West Canal and the intake channel that would not be affected, such effects are expected to be less than significant. Equipment refueling and fluid leakage associated with construction within and near the channel pose some risk of contamination and could result in potential take of any listed fish species that encounter toxic chemicals inadvertently released into the water. As described in Section 3.10, Hydrology and Water Quality, however, the Project would be subject to the SWRCB Construction General Permit. The Construction General Permit requires preparation and implementation of a SWPPP, which must include best management practices designed to reduce potential impacts to surface water quality throughout construction and operation of the Project, including introduction of pollutants. DWR would be required to submit a Notice of Intent to the SWRCB to be covered by a National Pollutant Discharge Elimination System permit and prepare the SWPPP prior to the beginning of construction. Specifically, the SWPPP must identify the erosion and pollutant control measures that would be implemented to protect water quality and avoid significant adverse effects from erosion, siltation, and introduction of water pollutants. With implementation of the SWPPP required for the Project, proposed activities at the Project would result in less-than-significant impacts on special-status fish species and their habitat.

**Dyer Dam and Patterson Dam**

No special-status fish species are expected to occur at Dyer Dam or at Patterson Dam (Appendix B). Therefore, these components of the Project would result in no impacts to special-status fish.

**Amphibians and Reptiles**

The Project would occur in habitat for California tiger salamander, California red-legged frog, western pond turtle, and San Joaquin coachwhip and could therefore result in direct and indirect impacts on these species (Appendix B). Direct impacts include permanent and temporary habitat loss and potential injury or mortality of individuals. Potential indirect impacts are effects from noise and vibration, increased human presence, and trash and food items. Noise, vibration, and increased human presence from construction could disrupt normal behavioral patterns of any special-status amphibians and reptiles that regularly use or move through affected areas. Trash and food items at work areas could attract bird species that prey on amphibians and reptiles (e.g., American crow [Corvus brachyrhynchos]), thus exposing special-status amphibians and reptiles to increased risk of
predation. These indirect impacts would be the same for any special-status amphibians and reptiles occurring at or near proposed work areas throughout the Project.

In contrast, potential direct impacts at each dam would be slightly different because of variation in habitat conditions within each study area and slight differences in proposed activities. Therefore, direct impacts on these species at each dam are discussed below.

**Clifton Court Forebay Dam**

California tiger salamander and California red-legged frog are not expected to occur in most of the Clifton Court Forebay Dam study area (including proposed burrow remediation areas), but the staging areas south of the dam are connected to grassland habitat within dispersal distance of potential California tiger salamander aquatic habitat between the California Aqueduct and Bruns Road (seasonal pool showing on March 2017 aerial imagery), approximately 0.9 miles southwest of the proposed staging area east of the Skinner Fish Facility (Appendix B). If this feature were occupied by tiger salamanders, there is some potential that individuals could cross Byron Highway and venture into the southern staging areas during rain events. It is unlikely that such movements would occur during the Project because staging activities would occur outside the rainy season. Nevertheless, additional species protection measures during construction would be required to completely avoid direct impacts on California tiger salamander individuals (*Mitigation Measure BIO-5*).

Western pond turtle is known to occur in the Clifton Court Forebay Dam study area and has been observed nesting in the northeastern dam embankment where burrow remediation activities would occur (i.e., grassland and disturbed habitat west of linear open water feature in Figures 19F and 19G). If conducted during the nesting period, collapse and excavation of burrows in this area could crush, entomb, or physically disturb individual turtles or hatchlings. The likelihood of such impacts during the initial construction period is relatively low because Project activities would occur after the peak nesting activity period for most pond turtles in the northern part of their range (June to July) (*Buskirk 2002*). Nevertheless, additional species protection measures during construction would be required to completely avoid direct impacts on western pond turtle individuals (*Mitigation Measure BIO-6*).

San Joaquin coachwhip has high potential to occur in grassland and scrub communities in the southern portion of the Clifton Court Forebay Dam study area where staging activities and temporary construction access would occur. If present, individual coachwhips could be injured or killed during clearing of staging areas or by equipment movement during construction, although protection measures for California tiger salamander and California red-legged frog (*Mitigation Measure BIO-5*) would minimize the likelihood of such mortality.

In summary, impacts to California tiger salamander, California red-legged frog, western pond turtle, and San Joaquin coachwhip at Clifton Court Forebay Dam would be potentially significant. However, implementation of *Mitigation Measures BIO-5* and *BIO-6* would avoid, minimize, or mitigate for direct impacts to these special-status species at the Clifton Court Forebay Dam study area; therefore, the Project would result in a **less-than-significant impact with mitigation incorporated**.

**Dyer Dam**

The Project is likely to directly impact California tiger salamanders and California red-legged frogs at the Dyer Dam study area. Ground disturbance associated with the collapse and excavation of burrows
could cause injury or mortality of individual California tiger salamanders and California red-legged frogs using such burrows for refugia. Permanent backfilling of burrows and armoring of portions of the dam faces could also bury or entomb individual California tiger salamanders and California red-legged frogs when rodent burrows are sealed and the face of the dams are armored. Project activities or personnel may also disturb California tiger salamanders and California red-legged frogs that are present in the study area, which may disrupt their normal behavioral patterns, cause the individuals to disperse to different habitat, or prevent dispersal through the study area making them more likely to be predated upon or desiccate. Finally, the Project would result in the loss and modification of existing habitat for both California tiger salamanders and California red-legged frogs to the extent shown in Table 15 and Figure 33, Impacts on California Red-legged Frog and California Tiger Salamander Habitat at Dyer Dam. Impacts on these species would be potentially significant and protection measures would be required (Mitigation Measure BIO-5).

Table 15. Project Impacts on California Tiger Salamander and California Red-Legged Frog Habitat

<table>
<thead>
<tr>
<th>Project Component</th>
<th>Acres Affected</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Permanent</td>
<td>Temporary</td>
</tr>
<tr>
<td><strong>Dyer Dam</strong></td>
<td></td>
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<tr>
<td>Construction Access</td>
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<tr>
<td>Sediment Removal Drainage Channel Work</td>
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<td><strong>Patterson Dam</strong></td>
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<tr>
<td><strong>Total</strong></td>
<td>6.38</td>
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</table>

**Note:** 1 No impacts. 2 Totals may not sum due to rounding.

Marginally suitable aquatic habitat for western pond turtle is present in the drainages within the Dyer Dam study area, and the reservoir is also suitable. If these aquatic features are used by pond turtles, nearby uplands with loose soils and low disturbance levels could be used for nesting and/or overwintering. Proposed burrow remediation in the slope east of the reservoir could result in the same direct impacts on individual turtles and hatchlings as described above for Clifton Court Forebay Dam if the species is present at the time of such activities. No pond turtles have been observed in the study area to date, however, (DWR, unpubl. data), and there are no recent California Natural Diversity Database occurrences nearby. The likelihood of direct impacts on this species is therefore low. Moreover, although
impacts on nesting or overwintering individuals of this species would be potentially significant, Mitigation Measure BIO-6 requires that species protection measures be implemented during construction to completely avoid direct impacts on western pond turtle individuals. Further, Mitigation Measure BIO-5 requires implementation of protection measures for California tiger salamander and California red-legged frog, which would also protect western pond turtles.

Direct impacts on San Joaquin coachwhip at the Dyer Dam study area are unlikely. The study area is on the periphery of the species’ range and there are no nearby California Natural Diversity Database occurrences.

In summary, impacts to California tiger salamander, California red-legged frog, and western pond turtle at Dyer Dam would be potentially significant. However, implementation of Mitigation Measures BIO-5 and BIO-6 would avoid, minimize, or mitigate for direct impacts to these special-status species at the Dyer Dam study area; therefore, the Project would result in a less-than-significant impact with mitigation incorporated.

**Patterson Dam**

The Project is likely to directly impact California tiger salamander and California red-legged frog at Patterson Dam. The impacts would be the same as those described above for Dyer Dam except for the lower amount of affected acreage (see Table 15). In addition, there is slightly higher potential for injury or mortality of individual California red-legged frogs than at Dyer Dam because they are known to occur in the low-outlet drainage affected by proposed channel improvements and require moist areas during the nonbreeding season. In contrast, any breeding adult California tiger salamanders or metamorphosed larvae would have moved to underground refugia in upland areas during the Project and therefore would not be affected by Project activities in or near aquatic habitat (Appendix B). The Project would also result in the loss and modification of existing habitat for both California tiger salamander and California red-legged frog to the extent shown in Table 15 and Figure 34, Impacts on California Red-Legged Frog and California Tiger Salamander Habitat at Patterson Dam. Impacts to these species would be potentially significant and protection measures would be required (Mitigation Measure BIO-5).

Marginally suitable aquatic habitat for western pond turtle is present in the drainages within the Patterson Dam study area, and the reservoir is also suitable (Appendix B). If these aquatic features are used by pond turtles, nearby uplands with loose soils and low disturbance levels could be used for nesting and/or overwintering. Proposed drainage channel improvements west of the reservoir and staging activities east of the reservoir could result in the same direct impacts on individual turtles and hatchlings as described above for Clifton Court Forebay Dam if the species is present at the time of such activities. No pond turtles have been observed in the study area to date, however, (DWR, unpubl. data), and there are no recent California Natural Diversity Database occurrences nearby (Appendix B). The likelihood of direct impacts on this species is therefore low. Moreover, although impacts on nesting or overwintering individuals of this species would be potentially significant, species protection measures during construction would be required to completely avoid direct impacts on western pond turtle individuals (Mitigation Measure BIO-6). Further, protection measures for California tiger salamander and California red-legged frog (Mitigation Measure BIO-5) would also protect western pond turtles.

Direct impacts on San Joaquin coachwhip at Patterson Dam are unlikely. Suitable grassland habitat is present within the study area north of the South Bay Aqueduct, but this habitat would not be impacted by proposed activities (Appendix B).
In summary, direct impacts to California tiger salamander, California red-legged frog, and western pond turtle at Patterson Dam would be potentially significant. However, implementation of Mitigation Measures BIO-5 and BIO-6 would avoid, minimize, and/or mitigate for direct impacts to these special-status species at the Patterson Dam study area; therefore, the Project would result in a less-than-significant impact with mitigation incorporated.

**Birds**

The Project would occur in or near habitat for nine special-status bird species—golden eagle (*Aquila chrysaetos*), Swainson’s hawk, northern harrier (*Circus hudsonius*), white-tailed kite (*Elanus leucurus*), bald eagle (*Haliaeetus leucocephalus*), burrowing owl, loggerhead shrike (*Lanius ludovicianus*), song sparrow (*Melospiza melodia*; “Modesto” population), and tricolored blackbird (*Agelaius tricolor*). Golden eagle and bald eagle are not expected to nest in the Project site due to lack of suitable trees, but there is a known golden eagle nest approximately 0.5 miles north of Patterson Dam. These species may occasionally forage over the Project site (especially at Dyer and Patterson Dams), but given the availability of high-quality foraging habitat in the region and relatively small amount of foraging habitat that would be affected by the Project, the loss of grassland foraging habitat for golden eagle would be less than significant (the Project would not remove any open-water foraging habitat for bald eagle) (Appendix B). Except for the golden eagle nest north of Patterson Dam, these species are not discussed further in this section. Potential direct impacts on the remaining species include temporary and permanent habitat loss and removal of active nests during Project activities conducted during the nesting season (i.e., removal of trees or shrubs supporting nests or clearing of herbaceous vegetation for staging areas). Potential indirect impacts include disturbance of active nests from construction-related noise and increased human activity, which could cause adults to abandon eggs or recently hatched young if they perceive such activities as a threat. Potential direct and indirect impacts on special-status birds at each Project site are discussed below.

**Clifton Court Forebay Dam**

Suitable nesting habitat for Swainson’s hawk, white-tailed kite, and loggerhead shrike in the Project site at Clifton Court Forebay Dam is limited to the trees near Sump No. 4 at the northwest end of the dam. There are many trees and shrubs suitable for nesting in the immediate Project vicinity, but none would be removed by Project activities. The trees at Sump No. 4 would be removed in one of the fall seasons during project implementation, outside the nesting season (Appendix B). Therefore, no direct impacts on these species are expected. Indirect impacts on these species could occur in the future if Project activities are initiated during the nesting season and adults nesting nearby perceive such activities as a threat and abandon eggs or recently hatched young. These impacts would be significant and protection measures would be required (Mitigation Measure BIO-7).

Burrows suitable for use by burrowing owl occur throughout the Project site within existing grassland habitats and along dam embankments and roadsides. Although focused surveys have not yet resulted in any observations of burrowing owls or their sign (e.g., whitewash, pellets, feathers, and/or bone fragments in or around burrow entrances) within the Project site, owls may occur during the future (Appendix B). In the event that burrowing owls are present on the site at the time of construction, burrow remediation and staging activities could result in mortality to owls through entombment in burrows or could result in abandonment of nests and destruction of eggs, nests, or nestlings. These impacts would be potentially significant and protection measures would be required (Mitigation Measure BIO-8).
Suitable nesting habitat for northern harrier, Modesto song sparrow, and tricolored blackbird is abundant in the biological resources study area but relatively limited in the Project site. Grassland, marsh, and ruderal thickets (e.g., perennial pepperweed, mustard, and poison hemlock patches) provide nesting habitat for northern harrier. Mixed stands of freshwater and brackish marsh, riparian thickets (e.g., Himalayan blackberry \( \text{Rubus armeniacus} \)) and scrub, and ruderal thickets provide high-quality nesting habitat for Modesto song sparrow and tricolored blackbird. Most of this habitat occurs outside the footprint of proposed activities but some would be affected by Project construction (Appendix B). If conducted during the nesting season, clearing and grubbing of vegetation could result in the loss of active nests of these species. Impacts would be potentially significant and protection measures would be required (Mitigation Measure BIO-7).

In summary, impacts to special-status birds potentially nesting in the Clifton Court Forebay Dam study area would be potentially significant. However, implementation of Mitigation Measure BIO-7 would avoid and minimize impacts to Swainson’s hawk, white-tailed kite, loggerhead shrike, northern harrier, Modesto song sparrow, and tricolored blackbird and Mitigation Measure BIO-8 would avoid, minimize, and/or mitigate for impacts to burrowing owl; therefore, the Project would result in a less-than-significant impact with mitigation incorporated.

**Dyer Dam**

The Project site at Dyer Dam contains limited habitat for most of the above-listed special-status bird species. There are no trees or shrubs suitable for nesting by Swainson’s hawk, golden eagle, loggerhead shrike, or white-tailed kite in the Project site at Dyer Dam, and there are not any large stands of freshwater emergent or ruderal vegetation suitable for nesting by tricolored blackbirds. Suitable Swainson’s hawk nesting habitat is present within 0.5 miles of the Project site, but Dudek did not observe any Swainson’s hawks nesting or foraging in this area during 2021 field surveys (Appendix B). Grassland suitable for northern harrier nesting is present in the biological resources study area, but is limited to the northeastern staging area (due to dense groundcover) in the Project site at Dyer Dam (Appendix B). Use of the staging area during the nesting season could result in direct impacts. Any harriers nesting on surrounding grassland during such activities could be indirectly impacted. These impacts would be significant and protection measures would be required (Mitigation Measure BIO-7).

Burrows suitable for use by burrowing owl occur throughout the Project site within existing grassland habitats and along dam embankments and roadways. Although focused surveys did not detect burrowing owls or their sign (e.g., whitewash, pellets, feathers, and/or bone fragments in or around burrow entrances) within the Project site, owls may occur during the future (Appendix B). In the event that burrowing owls are present on the site at the time of construction, burrow remediation and staging activities could result in mortality to owls through entombment in burrows or could result in abandonment of nests and destruction of eggs, nests, or nestlings. These impacts would be significant and protection measures would be required (Mitigation Measure BIO-8).

In summary, impacts to northern harriers potentially nesting and burrowing owls potentially using burrows in the Dyer Dam study area would be potentially significant. However, implementation of Mitigation Measure BIO-7 would avoid, minimize, and/or mitigate for impacts to northern harrier, and Mitigation Measure BIO-8 would avoid, minimize, and/or mitigate for impacts to burrowing owl; therefore, the Project would result in a less-than-significant impact with mitigation incorporated.
**Patterson Dam**

The Project site at Patterson Dam contains limited habitat for most of the above-listed special-status bird species. There are no trees or shrubs suitable for nesting by golden eagle, Swainson’s hawk, loggerhead shrike, or white-tailed kite in the Project site at Patterson Dam, and there are not any large stands of freshwater emergent or ruderal vegetation suitable for nesting by tricolored blackbirds. Golden eagles are known to nest 0.5 miles north of the Project site, but construction would be initiated after the February egg-laying period and the adults would not be able to see or hear Project construction because of intervening hills. Therefore, indirect disturbance impacts on nesting golden eagles are not expected. Suitable Swainson's hawk nesting habitat is present within 0.5 miles of the Project site, but Dudek did not observe any Swainson's hawks nesting or foraging in this area during 2021 field surveys. Northern harrier nesting habitat is present in the eastern staging area (due to dense groundcover) in the Project site at Patterson Dam (Appendix B). Use of the staging area during the nesting season could result in direct impacts. Any harriers nesting on surrounding grassland during such activities could be indirectly impacted. These impacts would be significant and protection measures would be required (Mitigation Measure BIO-7).

Burrows suitable for use by burrowing owl occur in the eastern dam embankment and staging area within the Project site. Although focused surveys did not detect burrowing owls or their sign (e.g., whitewash, pellets, feathers, and/or bone fragments in or around burrow entrances) within the Project site, owls may occur during the future (Appendix B). In the event that burrowing owls are present on the site at the time of construction, burrow remediation and staging activities could result in mortality to owls through entombment in burrows or could result in abandonment of nests and destruction of eggs, nests, or nestlings. These impacts would be significant and protection measures would be required (Mitigation Measure BIO-8).

In summary, impacts to northern harriers potentially nesting and burrowing owls potentially using burrows in the Patterson Dam study area would be potentially significant. However, implementation of Mitigation Measure BIO-7 would avoid, minimize, and/or mitigate for impacts to northern harrier, and Mitigation Measure BIO-8 would avoid, minimize, and/or mitigate for impacts to burrowing owl; therefore, the Project would result in a less-than-significant impact with mitigation incorporated.

**Mammals**

The Project would occur in habitat for San Joaquin kit fox and American badger (*Taxidea taxus*). Wildlife surveys in 2021 did not detect either species in the Project site, although several burrows with American badger sign have been observed within the Clifton Court Forebay Dam and Patterson Dam study areas and game cameras recorded a single badger near the South Bay Aqueduct over chute approximately 0.4 miles south of Dyer Reservoir in April 2021. Future detection of kit fox during ongoing game camera surveys for DWR's Delta Field Division is unlikely due to the rarity of the species in this part of its range, but their potential presence cannot be discounted until the survey effort is finished. American badger presence within the Project site similarly cannot be discounted, especially during future burrow remediation activities, without additional field confirmation. The Project could therefore result in direct and indirect impacts on these species, if found during future surveys (Appendix B).
**Clifton Court Forebay Dam**

Habitat and burrows suitable for use by San Joaquin kit fox and American badger occur throughout the Project site at Clifton Court Forebay Dam within existing grassland habitats and along dam embankments and roadsides. Although these species are highly mobile and can avoid construction equipment, any individuals occupying dens at the time of construction—including kit fox pups in natal dens—could be injured or killed by construction activities (Appendix B). These impacts would be significant and protection measures would be required (Mitigation Measures BIO-9 and BIO-10).

Potential indirect impacts on San Joaquin kit fox and American badger are effects from noise, vibration, increased human presence, and trash and food items. Noise, vibration, and increased human presence from construction could disturb these species when denning near construction areas, disrupt breeding activities where natal dens are present, and reduce reproductive success. Trash and food items at construction sites could attract San Joaquin kit foxes, thus exposing them to dangers such as increased risk of predation from other carnivores (e.g., coyotes) that may also be attracted by these items. These impacts would be significant and protection measures would be required (Mitigation Measures BIO-9 and BIO-10).

**Dyer Dam and Patterson Dam**

Potential impacts on San Joaquin kit fox and American badger at Dyer Dam and Patterson Dam would be the same as those described above for Clifton Court Forebay Dam. The likelihood of indirect impacts on American badger is higher at Patterson Dam because of the presence of several burrows with badger sign within 100 feet of the Project boundary (Appendix B).

In summary, impacts to San Joaquin kit fox and American badger potentially denning in the study area at all three dams would be potentially significant. However, implementation of Mitigation Measure BIO-9 would avoid, minimize, and/or mitigate for impacts to San Joaquin kit fox, and Mitigation Measure BIO-10 would avoid, minimize, and/or mitigate for impacts to American badger; therefore, the Project would result in a less-than-significant impact with mitigation incorporated.

**Mitigation Measures**

The Project could have a substantial adverse effect on special-status species by removing special-status plant occurrences or causing mortality of special-status wildlife species that contributes to ongoing population declines; these impacts would be significant. Mitigation Measures BIO-1 through BIO-10, listed below, would reduce impacts on special-status species to below a level of significance. Impacts would be less than significant with mitigation incorporated.

**BIO-1:** Avoid or Minimize Impacts on Native Plants and Wildlife. To avoid or minimize impacts on plants and wildlife, the following general measures shall be implemented throughout the Project site:

- **Approved Biologists.** At least 15 days prior to start of Project activities, the California Department of Water Resources (DWR) shall submit the names and credentials of personnel seeking to act as approved biologists to the U.S. Fish and Wildlife Service (USFWS) and California Department of Fish and Wildlife (CDFW) for review. Biologists shall have appropriate training and experience with the species for which they are seeking approval. All
biologists shall be approved in writing by USFWS and CDFW prior to conducting proposed Project activities.

- **Environmental Awareness Training.** An approved biologist shall conduct environmental awareness training for all individuals working on the Project before work begins. The training shall cover the life history, habitat requirements, and conservation measures for potentially affected species. The training shall also include information on federal and state regulatory protections, restrictions, and guidelines that must be followed by crews to avoid and minimize impacts to threatened and endangered species and their habitat. Upon completion of training, crews shall sign a form stating that they attended the training and understand all conservation measures. If new personnel are added to the Project, the new personnel shall receive the training prior to starting work.

- **Approved Biologist Authority.** An approved biologist shall be available to inspect all Project activities to ensure compliance with avoidance and minimization measures and shall monitor all ground-disturbing activities. Approved biologists shall perform weekly surveys of the Project area to ensure appropriate application of all general and species measures. Approved biologists shall have the authority to stop work if a listed species is encountered within active work areas or activities may result in take of listed species.

- **Speed Limits.** Project-related vehicles shall observe a daytime speed limit of 15 mph, except on county roads and state and federal highways. Emergency vehicles are exempt from these restrictions in emergency situations. Any road mortality/injury of any animal that may be a listed species observed by workers shall be reported to an approved biologist who will inspect the remains and notify the U.S. Fish and Wildlife Service and California Department of Fish and Wildlife within 24 hours if it is determined to be a listed species. At a minimum, the notification will include clear photographs that will aid in immediate identification.

- **Off-Road Traffic Prohibition.** Off-road traffic outside of designated Project areas shall be prohibited.

- **Trash Abatement.** All food-related trash items, such as wrappers, cans, bottles, and food scraps, shall be disposed of in a closed container and removed from the Project site daily.

- **Spill Prevention.** A Spill Prevention Control and Countermeasure Plan shall be prepared prior to Project implementation. All machinery shall be properly maintained and cleaned to prevent spills and leaks. Any spills or leaks from equipment shall be reported and cleaned up in accordance with applicable local, state, and/or federal regulations.

- **Fire Prevention.** A Fire Prevention and Suppression Plan shall be prepared prior to the start of Project activities.

- **Reporting.** A final report containing details of the construction activities and any observations of listed species shall be submitted to the U.S. Fish and Wildlife Service and California Department of Fish and Wildlife within 30 days of Project completion. The report shall document the number of each species encountered, and type and amount of any known take, as defined by the federal Endangered Species Act and California Endangered Species Act.
BIO-2: Avoid, Minimize, and Mitigate Impacts to Special-Status Plants.

Permanent and temporary impacts to long-styled sand-spurrey (California Rare Plant Rank [CRPR] 1B.2) individuals would result from implementation of the Project at Clifton Court Forebay Dam; these impacts are significant and require mitigation.

Compensatory mitigation for permanent impacts to long-styled sand-spurrey shall include the following:

a. The protection, through land acquisition or a conservation easement, of land that supports an occurrence of equal or greater size and number of plants of similar health. Or,

b. If it is not feasible to acquire and preserve a known occurrence of a special-status plant to be impacted, suitable unoccupied habitat capable of supporting the species shall be acquired, and used to create Salvage and relocation or propagation of impacted plants to create a new population on suitable unoccupied habitat or expand the existing Clifton Court Forebay population at a 1:1 ratio. For creation of an occurrence, the following considerations shall also be met: Plant relocation or propagation would be subject to the following requirements:

- A special-status plant mitigation plan shall be prepared by a qualified biologist and include (1) seed/propagule collection methods, (2) identification of receiver sites or locations for relocated or propagated plants and rationale for their selection, (23) success criteria for population establishment, including a not-to-exceed threshold for invasive species cover, (34) 5 years of maintenance and monitoring, (45) and the adaptive management approaches that would be used to evaluate monitoring results and adjust management actions, if necessary, and (6) financial assurances for the funding of special-status plant mitigation. The special-status plant mitigation plan shall be implemented to document the success of creation of the new plant occurrence.

- Prior to unavoidable and permanent disturbance to an occurrence of the existing long-styled sand-spurrey population, a special-status plant species, propagules shall be collected from the occurrence to be disturbed. This may include seed collection, cuttings, or seed-bearing topsoil salvage, and these propagules shall be used to establish a new population on suitable, unoccupied habitat or expand the existing population, as described above. Transplantation of whole plants may be attempted, but shall not be used as the primary means for creating a new occurrence or expanding an existing occurrence.

- Creation of new occurrences shall require identification of suitable locations and habitats, as well as the biologist shall conducting a literature review to determine appropriate and viable propagation or planting techniques for the species, appropriate seed-collection techniques, and seeding rates.

For temporary impacts to long-styled sand-spurrey, compensatory mitigation for temporary impacts to long-styled sand-spurrey shall include salvage of the affected topsoil and restoration of the temporary impact area occurrence on site at a 1:1 ratio. A restoration plan, which may include Methods for salvaging, storing, and reapplying topsoil before, during, and after construction, respectively, shall be incorporated into the special-status plant mitigation plan described above, if applicable, shall be prepared. Other plan components as described above (i.e., monitoring and adaptive management) shall also apply to the on-site restoration area. The restoration plan shall include (1) seed/propagule collection methods, (2) success criteria, and (3) 5 years of maintenance and monitoring.
Additionally, a qualified California Department of Water Resources (DWR) biologist (qualified biologist) shall be present prior to and during construction to ensure avoidance of impacts on special-status plant species and special-status natural communities by flagging the population or natural community areas and/or allowing adequate buffers.

BIO-3  **Avoid, Minimize, and Mitigate Impacts to Sensitive Natural Communities.** The Project would result in permanent and temporary impacts to sensitive vegetation communities at Clifton Court Forebay Dam and Dyer Dam; these impacts are significant and require mitigation.

All temporary impacts to sensitive vegetation communities shall be restored on site. Restoration shall include recontouring and seeding and/or planting with native plants that comprise the sensitive natural community impact. Prior to seeding and/or planting the temporary ground-disturbance areas, the approved biologist shall review the seeding/plant palette to ensure that seeding/planting does not contain non-native or invasive plant species, as identified in the most recent version of the California Invasive Plant Inventory for the region. The California Department of Water Resources (DWR) shall ensure recontouring and revegetation of disturbed portions of sensitive vegetation communities in areas temporarily affected by construction within 1 year of demobilization by the contractor during the appropriate seasonal period for revegetation.

Mitigation for permanent impacts to sensitive natural communities shall occur either at a mitigation bank, within an in-lieu fee program, or through on-site or off-site mitigation, and shall occur at a ratio no less than 1:1 for the impacts to sensitive natural communities. If a mitigation bank or in-lieu fee program is not utilized and DWR proceeds with on-site or off-site mitigation, a sensitive natural communities mitigation plan shall be prepared that outlines the mitigation. This mitigation plan shall include (1) mitigation site selection, (2) seeding and/or planting palette, (3) success criteria, and (3) 5-year maintenance and monitoring plan.

BIO-4  **Minimize Temporary Impacts on Potential Vernal Pool Fairy Shrimp Habitat.** Prior to constructing the temporary toe access road adjacent to potential vernal pool fairy shrimp habitat at Clifton Court Forebay (i.e., 5.36-acre wetland outboard of Stations 32 + 00 to 64 + 00), an approved biologist shall direct the placement of erosion control fencing along the downstream (southern) perimeter of the access road to avoid sedimentation of adjacent habitat. The biologist shall also direct the placement of rinsed gravel and covering with geotextile fabric over any depressions overlapping the road’s footprint to minimize damage to the soils and protect existing contours. Erosion control fencing and temporary fill shall be removed within 72 hours of the completion of burrow remediation activities at this location.

BIO-5  **Avoid and Minimize Impacts to California Tiger Salamander and California Red-legged Frog.** This mitigation measure identifies two separate sets of requirements—one for Clifton Court Forebay Dam and the other for both Dyer Dam and Patterson Dam.

**Clifton Court Forebay Dam:** The following measure shall be implemented to avoid take of individual California tiger salamanders in low-quality grassland and iodine bush scrub upland habitat south of at Clifton Court Forebay Dam:

- **California Tiger Salamander Take Avoidance.** The Project shall be performed during daylight hours, and work along the southern dam embankment (Stations 3+15 to 85+00) shall begin
on or after June 1 and be completed by October 31 of each year. Within 20 seven days prior to clearing existing vegetation for the staging areas in this area south of the dam (i.e., between Skinner Fish Facility and intake channel), an approved biologist shall survey for the presence of potential underground refugia for California tiger salamander (i.e., small mammal burrows). If potential refugia are observed, they shall be excavated by hand (e.g., shovels and non-powered hand tools) to confirm California tiger salamander absence covered with plywood to prevent collapse from temporary heavy equipment traffic. An approved biologist shall monitor all refugia excavation and guide the placement of plywood over burrows. All excavated burrows shall be backfilled after the biologist confirms that tiger salamanders are absent. If any California tiger salamanders are found, the approved biologist shall stop any Project activities that could potentially result in California tiger salamander take and reinitiate consultation with USFWS and CDFW. No tiger salamanders would be captured or relocated under this measure. After the completion of If no tiger salamanders are found during burrow excavation protection measures, temporary exclusion fencing shall be installed around the staging areas along the boundary of the Project where burrows were excavated to prevent amphibians from entering. Exclusion fencing shall be a minimum of 2.5 feet tall and the bottom 6 inches shall be buried to prevent amphibians from crawling under the fence. During work hours, a portion of the fencing around upland staging areas may be removed to facilitate Project activities, but must be reinstalled at the end of the day and the bottom secured with sandbags or other heavy material. When sections are removed, the section shall be reviewed for resting or hiding species prior to removal. Exclusion fencing shall be removed within 72 hours of completion of work.

Dyer Dam and Patterson Dam: The following measures shall be implemented to avoid and minimize impacts on California tiger salamander and California red-legged frog at Dyer Dam and Patterson Dam:

- **Work Window.** The Project shall be performed during daylight hours, and any work in wetted areas shall occur between May 1 and October 31.
- **Access Road Burrow Protection.** Any burrows or large cracks in the ground that may be traversed by heavy equipment traffic over unimproved access roads shall be covered with minimum 5/8-inch-thick plywood to prevent burrow collapse.
- **Relocation Plan.** Prior to implementation of this measure, a relocation plan shall be developed that outlines the specific methods for safely capturing, holding, transporting, and releasing California tiger salamanders and California red-legged frogs, including equipment sterilization techniques. The plan shall also outline where relocated individuals will be moved and a process for reducing oversaturation.
- **Morning Inspections.** An approved biologist shall survey the work area for California red-legged frogs and California tiger salamanders each morning prior to Project activities. Any California red-legged frog or California tiger salamander found in the work area shall be captured, transported to a predetermined relocation site, and released. Only approved biologists shall capture and handle frogs or salamanders. The biologist shall monitor any relocated frog or salamander until such time that the animal is safe from any obvious or immediate hazard or danger.
• **Amphibian Exclusion Fencing.** Exclusion fencing shall be installed between work areas and adjacent habitat for California red-legged frog and California tiger salamander. The fence shall be a minimum of 2.5 feet tall and the bottom 6 inches shall be buried to prevent amphibians from crawling under the fence. Placement and installation of fencing around drainage work areas shall be coordinated with any sediment control fencing requirements of other resource agency permits. During work hours, a portion of the fencing around upland staging areas may be removed to facilitate Project activities, but must be reinstalled at the end of the day and the bottom secured with sandbags or other heavy material. When sections are removed, the section shall be reviewed for resting or hiding species prior to removal. The exclusion fencing shall be maintained until all construction activities are completed and removed within 72 hours of the completion of work.

• **Vegetation Removal Inspections.** Vegetation and sediment removed from drainages shall be carefully placed in the dump truck bed and examined for frogs and salamanders by approved biologists prior to disposal.

• Impacts on areas determined to be habitat for California tiger salamander and California red-legged frog shall be fully mitigated, in consultation with the U.S. Fish and Wildlife Service and the California Department of Fish and Wildlife.

**BIO-6: Avoid and Minimize Impacts to Western Pond Turtle.** To minimize impacts on western pond turtles known to nest at the northeastern corner of Clifton Court Forebay, burrow remediation activities adjacent to the drainage along the toe access road (Stations 230+00 to 262+00, approximately) shall occur from May 1 to June 15 and September 1 to October 15 to avoid the peak nesting period (mid-June to August) and minimize mortality of hatchlings overwintering in nest sites (approximately November to April).

**BIO-7: Avoid and Minimize Impacts to Special-Status and Non-Special-Status Birds.** The following measures shall be implemented throughout the Project to avoid and minimize impacts to nesting birds, including special-status species:

• A qualified biologist shall conduct preconstruction surveys for nesting birds no more than 7 days prior to any construction activity involving vegetation removal (i.e., grubbing of herbaceous vegetation and grass, removal of trees or shrubs) that begins during the nesting season (March 15 to August 31) and shall resurvey if there is a four-day or more lapse in construction activities during this period. Surveys shall cover the construction footprint and suitable habitat within 100 feet for all birds, 300 feet for raptors (including white-tailed kite and northern harrier) and tricolored blackbird, and 0.25 miles for Swainson’s hawk. If the biologist does not find any nests but suitable habitat would be removed, the biologist shall conduct a final survey of such habitat and areas within 100 feet of the habitat within 48 hours of the activity to confirm the absence of nests (habitat outside the direct impact area would not need to be surveyed). If a lapse in Project-related activities of 15 days or longer occurs, another preconstruction survey shall be conducted. Any construction activity that occurs from September 1 to March 14, outside the nesting season, shall not require preconstruction nesting bird surveys. Work along the southern dam embankment at Clifton Court Forebay between Stations 3+15 to 85+00 shall begin on or after June 1 and be completed by October 31 of each year.
• If nests are located during preconstruction surveys, impacts shall be minimized by establishing an appropriate nondisturbance buffer zone around active nests or vegetation patches supporting nesting birds. The size of the buffer shall be determined by the biologist based on the species’ sensitivity to disturbance, time of year, and planned work activities in the vicinity. The buffer shall remain in effect until the nest is no longer active. Buffers for Swainson’s hawk nests shall be based on the guidance in the Recommended Timing and Methodology for Swainson’s Hawk Nesting Surveys in California’s Central Valley (SHTAC 2000).

BIO-8: Avoid and Minimize Impacts to Burrowing Owl. The following measures shall be implemented throughout the Project to avoid and minimize impacts to burrowing owl:

• A qualified biologist shall conduct a burrowing owl take avoidance survey no more than 14 days prior to the initiation of any construction activities within burrowing owl habitat areas as identified during 2021 field surveys (Appendix B). Surveys shall cover the construction footprint and suitable habitat within 250 feet.

• If an active burrow is found during the nesting season (March 15 to August 31), clear, visible markers will be placed on the roadways to clearly demarcate the burrow location so vehicles traveling either direction on the road and workers at the project site will avoid disturbing the area. If the burrow is in a proposed work area and work cannot be postponed until after the nesting season, a no-activity zone will be established by a qualified biologist and will at a minimum be 250-feet radius from the occupied burrow, following recommendations in the CDFW Staff Report on Burrowing Owl Mitigation (CDFG 2012).

• If burrowing owls are present at the site during the non-breeding period, a qualified biologist will establish a no-activity zone of at least 160 feet.

• If an effective no-activity zone cannot be established in either case, a qualified biologist will develop a site-specific plan (i.e., a plan that considers the type and extent of the proposed activity, the duration and timing of the activity, the sensitivity and habituation of the owls, and the dissimilarity of the proposed activity with background activities) to minimize the potential to affect the reproductive success of the owls.

BIO-9: Avoid and Minimize Impacts to San Joaquin Kit Fox. Any potential kit fox dens identified during 2021 field surveys (Appendix B) that are on California Department of Water Resources (DWR) property and located within 50 feet of the Project site shall be temporarily blocked with burlap bags or filled with soil (after three consecutive nights of tracking or game camera monitoring have confirmed that the den is not currently in use) to prevent access to these dens during Project activities. If a den is determined to be a natal den, then exclusion may not occur until the family has moved to another den location. A 100-foot exclusion zone shall be marked around any known kit fox dens within the survey area using lathe and flagging. The U.S. Fish and Wildlife Service (USFWS) Standardized Recommendations for the Protection of the Endangered San Joaquin Kit Fox Prior to or During Ground Disturbance (January 2011) or the latest guidance from the USFWS shall be referenced when implementing this measure.

BIO-10: Avoid and Minimize Impacts to American Badger. Within 14 days prior to the initiation of Project activities within 100 feet of potential badger dens identified during 2021 field surveys (Appendix B) and concurrent with the take avoidance surveys for burrowing owl, a
qualified biologist shall perform a survey to identify the presence of active or inactive American badger dens. If this species is not found, no further mitigation shall be required. If badger dens are identified within the construction footprint during the surveys or afterwards, dens shall be inspected and closed as follows:

- When unoccupied dens are encountered outside of work areas but within 100 feet of proposed activities, vacated dens shall be inspected to ensure they are empty and temporarily covered using plywood sheets or similar materials. If badger occupancy is determined at a given site within the work area, work activities at that site shall be halted. Depending on the den type, reasonable and prudent measures to avoid harming badgers shall be implemented and may include seasonal limitations on Project construction near the site (i.e., restricting the construction period to avoid spring–summer pupping season), and/or establishing a construction-exclusion zone around the identified site, or resurveying the den at a later time to determine species presence or absence.
- Badgers may be passively relocated using burrow exclusion (e.g., installing one-way doors on burrows) or similar California Department of Fish and Wildlife– (CDFW-) approved exclusion methods. In unique situations it might be necessary to actively relocate badgers (e.g., using live traps) to protect individuals from potentially harmful situations. Such relocation shall be performed with advance CDFW coordination and concurrence.

b) Would the Project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?

The impacts to the vegetation community alliances and land covers within the Project site are shown on Figures 19A through 19J, 20, and 21.

Clifton Court Forebay Dam

Direct Impacts

The Project would result in the following permanent direct impacts to sensitive vegetation communities at Clifton Court Forebay Dam:

- 0.05 acres of the Allenrolfea occidentalis/Distichlis spicata Provisional Association
- 0.46 acres of the Allenrolfea occidentalis Association
- 0.03 acres of the Alnus rubra/Salix lasiolepis/Rubus spp. Association
- 0.06 acres of Salix gooddingii Association

The Project would result in the following temporary direct impacts to sensitive vegetation communities at Clifton Court Forebay Dam:

- 0.74 acres of Allenrolfea occidentalis/Distichlis spicata Provisional Association
- 1.52 acres of Allenrolfea occidentalis Association
- 0.01 acres of Salix gooddingii Association
Direct impacts to these sensitive natural communities would be significant and protection measures would be required (Mitigation Measure BIO-3).

**Indirect Impacts**

Construction-related indirect impacts could affect sensitive natural communities. Potential short-term or temporary indirect impacts to sensitive natural communities resulting from construction activities include the generation of fugitive dust; changes in hydrology resulting from construction, including sedimentation and erosion; the release of chemical pollutants; and adverse effects of invasive plant species. Potential short-term or temporary indirect impacts to sensitive natural communities would be significant and protection measures would be required (Mitigation Measure BIO-3).

Long-term indirect impacts to sensitive vegetation communities associated with O&M activities would not likely result in significant impacts. All O&M activities are temporary and occur within the existing disturbance footprint. The proposed O&M activities would be short in duration and would not result in substantial changes to the landscape once completed (e.g., there would be no change or very limited changes in human activity, soil erosion, and hydrology). No significant long-term indirect impacts would occur to sensitive vegetation communities from O&M activities.

**Dyer Dam**

**Direct Impacts**

The Project at Dyer Dam would result in 3.43 acres of permanent impacts and 2.34 acres of temporary impacts to the needle grass–melic grass grassland (Nassella spp.–Melica spp.) Alliance, which is considered a sensitive vegetation community under CEQA. Direct impacts to these sensitive natural communities would be significant and protection measures would be required (Mitigation Measure BIO-3).

**Indirect Impacts**

Construction-related short-term and long-term operation-related indirect impacts to sensitive vegetation communities as a result of the Project at Dyer Dam would be the same as those at Clifton Court Forebay Dam. Potential short-term or temporary indirect impacts to sensitive natural communities would be significant and protection measures would be required (Mitigation Measure BIO-3).

**Patterson Dam and Reservoir**

**Direct Impacts**

The Project at Patterson Dam would not result in direct impacts to sensitive natural communities.

**Indirect Impacts**

Construction-related short-term and long-term operation-related indirect impacts to sensitive vegetation communities as a result of the Project at Patterson Dam would be the same as those at Clifton Court Forebay Dam. Potential short-term or temporary indirect impacts to sensitive natural communities would be significant and protection measures would be required (Mitigation Measure BIO-3).
Mitigation Measures

The Project could have a substantial adverse effect on sensitive natural communities; these impacts would be significant. **Mitigation Measure BIO-3**, listed in Section 3.4(a), would avoid, minimize, and/or mitigate for impacts to sensitive natural communities; therefore, impacts would be less than significant with mitigation incorporated.

c) **Would the Project have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?**

Clifton Court Forebay Dam

Direct Impacts

Impacts to potentially jurisdictional waters within the Clifton Court Forebay Dam study area are shown on Figures 22A through 22J, 25A through 25J, and 28A through 28J.

**U.S. Army Corps of Engineers**

The Project at Clifton Court Forebay Dam would result in permanent regulated impacts to 0.17 acres (593 LF) of non-wetland waters of the United States under the jurisdiction of USACE, shown within Sub Area A of Figure 22D. These impacts would be significant and protection measures would be required (Mitigation Measure BIO-11).

The impacts proposed within the remainder of the study area (not including Sub Area A) depicted on Figures 22A through 22J would not be considered regulated activities by USACE. Section 404(f)(1)(B) of the Clean Water Act exempts from section 404 permit requirements the discharge of dredged or fill material into waters of the United States “for the purpose of maintenance, including emergency reconstruction of recently damaged parts, or currently serviceable structures such as dikes, dams, levees, groins, riprap, breakwaters, causeways, and bridge abutments or approaches, and transportation structures.”

The impacts proposed within Sub Area A of Figure 22D are regulated by USACE under the purview of Section 10 of the Rivers and Harbors Act of 1899 and are not exempt from USACE permitting requirements.

**Regional Water Quality Control Board**

The Project at Clifton Court Forebay Dam would result in permanent regulated impacts to 0.17 acres (593 LF) of non-wetland waters of the state under the jurisdiction of RWQCB, shown within Sub Area A of Figure 25D. These impacts would be significant and protection measures would be required (Mitigation Measure BIO-11).

The impacts proposed within the remainder of the study area (not including Sub Area A) depicted on Figures 25A through 25J would not require section 401 water quality certification since the work is exempt from section 404 permit requirements and no federal permit from USACE is being sought.
California Department of Fish and Wildlife

The Project at Clifton Court Forebay Dam would result in permanent impacts to 0.03 acres (76 LF) of riparian habitat and 0.17 acres (593 LF) of streambed under the jurisdiction of CDFW. These impacts would be significant and protection measures would be required (Mitigation Measure BIO-11).

Indirect Impacts

Construction-related indirect impacts could affect state and federally jurisdictional waters of the United States/state. Potential short-term or temporary indirect impacts to jurisdictional waters resulting from construction activities include the generation of fugitive dust; changes in hydrology resulting from construction, including sedimentation and erosion; the release of chemical pollutants; and adverse effects of invasive plant species. Potential short-term or temporary indirect impacts to jurisdictional waters would be significant and protection measures would be required (Mitigation Measure BIO-11).

Long-term indirect impacts to jurisdictional waters associated with O&M activities would not likely result in significant impacts. All O&M activities are temporary and occur within the existing disturbance footprint. The proposed O&M activities would be short in duration and would not result in substantial changes to the landscape once completed (e.g., there would be no change or very limited changes in human activity, soil erosion, and hydrology). No significant long-term indirect impacts would occur to sensitive vegetation communities from O&M activities.

Dyer Dam

Impacts to jurisdictional waters from the Project at Dyer Dam are shown on Figures 23, 26, and 29.

Direct Impacts

U.S. Army Corps of Engineers

The Project at Dyer Dam would result in permanent impacts to 0.001 acres (13 LF) of non-wetland waters of the United States under the jurisdiction of USACE and temporary impacts to 0.01 acres (143 LF) of non-wetland waters of the United States under the jurisdiction of USACE. These impacts would be significant and protection measures would be required (Mitigation Measure BIO-11).

Regional Water Quality Control Board

The Project at Dyer Dam would result in permanent impacts to 0.02 (66 LF) acres of non-wetland waters of the state under the jurisdiction of RWQCB and temporary impacts to 0.067 acres (143 LF) of impacts to non-wetland waters of the state under the jurisdiction of RWQCB. These impacts would be significant and protection measures would be required (Mitigation Measure BIO-11).

California Department of Fish and Wildlife

The Project at Dyer Dam would result in permanent impacts to 0.02 acres (66 LF) of streambed under the jurisdiction of CDFW and temporary impacts to 0.067 (143 LF) of streambed under the jurisdiction of CDFW. These impacts would be significant and protection measures would be required (Mitigation Measure BIO-11).
Indirect Impacts

Construction-related short-term and long-term operation-related indirect impacts to jurisdictional waters as a result of the Project at Dyer Dam would be the same as those at Clifton Court Forebay Dam. Potential short-term or temporary indirect impacts to jurisdictional waters would be significant and protection measures would be required (Mitigation Measure BIO-11).

Patterson Dam

Impacts to jurisdictional waters from the Project at Patterson Dam are shown on Figures 24, 27, and 30.

Direct Impacts

U.S. Army Corps of Engineers

The Project at Patterson Dam would result in permanent impacts to 0.058 acres of wetlands (130 LF) and 0.03 acres (205 LF) of non-wetland waters of the United States under the jurisdiction of USACE and temporary impacts to 0.3022 acres of wetlands (573 LF) under the jurisdiction of USACE. These impacts would be significant and protection measures would be required (Mitigation Measure BIO-11).

Regional Water Quality Control Board

The Project at Patterson Dam would result in permanent impacts to 0.058 acres (130 LF) of wetlands and 0.11 acres (334 LF) of non-wetland waters of the state under the jurisdiction of RWQCB and temporary impacts to 0.3022 acres (573 LF) of wetlands and 0.02 acres (64 LF) of non-wetland waters of the state under the jurisdiction of RWQCB. These impacts would be significant and protection measures would be required (Mitigation Measure BIO-11).

California Department of Fish and Wildlife

The Project at Patterson Dam would result in permanent impacts to 0.058 acres (130 LF) of riparian habitat and 0.11 acres (334 LF) of streambed under the jurisdiction of CDFW and temporary impacts to 0.3022 acres (573 LF) of riparian habitat and 0.02 acres (64 LF) of streambed under the jurisdiction of CDFW. These impacts would be significant and protection measures would be required (Mitigation Measure BIO-11).

Indirect Impacts

Construction-related short-term and long-term operation-related indirect impacts to jurisdictional waters as a result of the Project at Patterson Dam would be the same as those at Clifton Court Forebay Dam. Potential short-term or temporary indirect impacts to jurisdictional waters would be significant and protection measures would be required (Mitigation Measure BIO-11).

Mitigation Measures

The Project could have a substantial adverse effect on federally and state-protected wetlands; these impacts would be significant. Mitigation Measure BIO-11, listed below, would avoid, minimize, and/or
mitigate for impacts to protected wetlands; therefore, impacts would be less than significant with mitigation incorporated.

**BIO-11 Avoid, Minimize, and Mitigate Impacts to Jurisdictional Waters.** All temporary impacts to jurisdictional waters of the United States/state shall be restored on site. Restoration shall include recontouring and erosion control with a native seed mix, where applicable. Prior to seeding temporary ground-disturbance areas, the approved biologist shall review the seeding palette to ensure that no seeding of non-native or invasive plant species, as identified in the most recent version of the California Invasive Plant Inventory for the region, will occur. The California Department of Water Resources (DWR) shall ensure recontouring and revegetation of disturbed portions of jurisdictional areas in areas temporarily affected by construction prior to demobilization by the contractor at the end of Project construction.

Compensatory mitigation for permanent impacts to prevent net loss of functions and values at Clifton Court Forebay shall occur either at a mitigation bank, within an in-lieu fee program, or through on-site or off-site permittee-responsible mitigation. Compensatory mitigation for permanent impacts to prevent net loss of functions and values at Dyer Dam and Patterson Dam shall occur through on-site or off-site permittee-responsible mitigation. Where on-site or off-site permittee-responsible mitigation is pursued, it and shall include establishment, restoration, or enhancement of aquatic resources occur at a ratio no less than 1:1 for the impacts to jurisdictional waters or at a ratio determined in the jurisdictional waters permits. If a mitigation bank or in-lieu fee program is not utilized and DWR proceeds with Under any permittee-responsible mitigation effort, a Compensatory Mitigation and Monitoring Plan shall be prepared that outlines the compensatory mitigation to address permanent loss, including functions and values, of aquatic resources in compliance with requirements from applicable regulatory agencies (i.e., U.S. Army Corps of Engineers [USACE], Regional Water Quality Control Board [RWQCB], and California Department of Fish and Wildlife [CDFW]). Suitable mitigation lands provided for species and vegetation communities may be used for jurisdictional waters of the United States/state mitigation. If required, The Compensatory Mitigation and Monitoring Plan wetland mitigation and monitoring plan shall be developed in coordination with CDFW, USACE, and RWQCB and shall detail mitigation and monitoring obligations for impacts to wetlands and other waters as a result of construction activities. The plan shall quantify the total acreage affected; annual success criteria; mitigation sites; monitoring and reporting requirements; and site-specific plans to compensate for wetland or other waters losses resulting from the Project. Include the following:

- **Compensatory Description.** A description of the quantity (acres and linear feet) affected by the project; aquatic resource types and amounts (acres and linear feet) for which compensatory mitigation is being provided, the type of compensation (i.e., restoration, establishment, enhancement, and/or preservation); and the process in which the resource functions of the compensatory mitigation efforts would address the needs of the watershed or ecoregion.

- **Site Selection.** A description of the factors considered in the site selection process, including demonstrating that an attempt to select a site within the same watershed and documentation of the characteristics of the site that would support restoration and/or establishment of aquatic resources. A description of the final proposed mitigation site(s) and site-specific plans to compensate for aquatic resources losses resulting from the project.
• **Performance Standards.** A description of the minimum performance standards that must be met at or before the end of monitoring to ensure no net loss of functions and values of aquatic resources. The description shall also include a description for annual success criteria, including a minimum percent cover of native vegetation within the compensatory mitigation area.

• **Monitoring and Reporting Specification.** A description of the monitoring obligations, monitoring periods (not less than annual reports for 5 years), and reporting specifications.

• **Adaptive Management.** A description of the adaptive management strategy to address changes in site conditions or other components of the compensatory mitigation efforts.

• **Financial Assurances.** A description of financial assurances which would be provided for the success of compensatory mitigation.

d) **Would the Project interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?**

**Clifton Court Forebay Dam**

Wildlife movement through and around the Project site at Clifton Court Forebay Dam is already constrained by the abundance of human-made water delivery features and associated infrastructure. The Project site is not located in any critical habitat linkages identified as regionally important for wildlife movement and habitat connectivity. The Project would not create any new barriers (e.g., roads, structures) that would permanently alter existing wildlife movement patterns. Any wildlife that currently move through the area are expected to have adapted to the moderate amount of human activity that already occurs on and adjacent to the Project site at Clifton Court Forebay Dam, and the Project would not significantly change this condition. Resident fish or wildlife that regularly move through the area while foraging and dispersing may temporarily alter their movement patterns to avoid increased noise, vibration, and human activity generated by the Project. Similarly, migratory wildlife (e.g., waterbirds) may avoid using areas exposed to increased disturbance activity as stopover habitat during activities conducted during a fall or spring migration period. Such impacts would be temporary, however, and both native and migratory wildlife are expected to resume normal movement patterns soon after Project construction is completed. Therefore, impacts from Project activities at Clifton Court Forebay Dam on wildlife movement would be less than significant.

**Dyer Dam and Patterson Dam**

The Project at Dyer Dam and Patterson Dam would occur in a critical habitat linkage identified as regionally important for wildlife movement and habitat connectivity (Penrod et al. 2013), but would not interfere substantially with wildlife movement through this linkage. The Project would not create any new barriers (e.g., roads, structures) that would permanently alter existing wildlife movement patterns. Resident fish or wildlife that regularly move through the area while foraging and dispersing may temporarily alter their movement patterns to avoid increased noise, vibration, and human activity generated by the Project. Similarly, migratory wildlife (e.g., waterbirds) may avoid using areas exposed to increased disturbance activity as stopover habitat during activities conducted during a fall or spring migration period. Such impacts would be temporary, however, and both native and migratory wildlife are expected to resume normal movement patterns soon after Project construction.
is completed. Therefore, impacts from Project activities at Dyer Dam and Patterson Dam on wildlife movement would be less than significant.

e) **Would the Project conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?**

The Project does not conflict with the East County Area Plan (Alameda County 1994a), which is part of the Alameda County General Plan. The goal of the plan’s Watershed section is to protect the watershed land from the direct and indirect effects of development. The goal of the plan’s Biological Resources section is to preserve a variety of plant communities, wildlife habitat, and wetlands, and to maintain biological diversity. The Project would comply with the goals and objectives of the East County Area Plan.

Alameda County Ordinance No 0-2004-23 regulates tree removal within the county right-of-way; however, Project activities would only occur on state-owned land and not within the county right-of-way. The Project would therefore not conflict with any local policies or ordinances protecting biological resources and there would be no impact.

f) **Would the Project conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?**

The Project site is not covered by an adopted habitat conservation plan, natural community conservation plan, or other approved local, regional, or state habitat conservation plan.

The East Alameda County Conservation Strategy (Conservation Strategy) is a voluntary conservation plan that was collaboratively developed by local and regulatory agencies between 2007 and 2009 (ICF 2010). The Conservation Strategy is not a formal habitat conservation plan or natural community conservation plan in that it does not have a corresponding programmatic incidental take permit from USFWS or CDFW. The primary goal of the Conservation Strategy is to develop a coordinated and biologically sound approach to mitigation that will both support conservation and/or recovery of listed species and streamline state and federal permitting by providing guidance on avoidance, minimization, and mitigation for projects. The Project site at Dyer Dam and Patterson Dam is in the Conservation Strategy planning area and the Project is generally consistent with the strategy. However, since the Conservation Strategy is a non-binding document that has not been formally adopted by any local or regional agencies, any conflicts with the Conservation Strategy cannot be considered an impact under CEQA. Therefore, the Project would have no impact on any approved local, regional, or state habitat conservation plans.
### 3.5 Cultural Resources

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<tr>
<th>V. CULTURAL RESOURCES – Would the Project:</th>
<th>Potentially Significant Impact</th>
<th>Less-Than-Significant Impact With Mitigation Incorporated</th>
<th>Less-Than-Significant Impact</th>
<th>No Impact</th>
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<tbody>
<tr>
<td>a) Cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?</td>
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<td>b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?</td>
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<td>c) Disturb any human remains, including those interred outside of dedicated cemeteries?</td>
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**Setting**

Information presented here is summarized from the following technical reports:

- Archaeological Resources Inventory Report for the Delta Dams Rodent Burrow Remediation Project at Clifton Court Forebay, Contra Costa County, California (Confidential Appendix C1),
- Archaeological Resources Inventory Report for the Delta Dams Rodent Burrow Remediation Project at Dyer Reservoir and Dam and Patterson Reservoir and Dam, Alameda County, California (Confidential Appendix C2),
- Built Environment Inventory and Evaluation Report (BEIER) for the Delta Dams Rodent Burrow Remediation Project at Clifton Court Forebay, Contra Costa County, California (Appendix D1), and
- BEIER for the Delta Dams Rodent Burrow Remediation Project at Dyer Reservoir and Dam and Patterson Reservoir and Dam Alameda County, California (Appendix D2).

The archaeological inventory reports are confidential to protect the cultural resources discussed within them. They present additional information regarding methodology, environmental and cultural context for each of the sites, background research, and survey results.

Clifton Court Forebay is located in southeast Contra Costa County, on the west side of California’s Central Valley at the southwestern edge of the Sacramento–San Joaquin River Delta (Delta), approximately 10 miles northwest of the City of Tracy and adjacent to Byron Road. Dyer Dam and Reservoir and Patterson Dam and Reservoir are located proximate to the City of Livermore in Alameda County, within the Coast Ranges foothills region at the edge of the western San Joaquin Valley.

**Archaeological Setting**

Various attempts to parse out information provided through recorded archaeological assemblages throughout California for the past 12,000 years have led to the development of numerous cultural chronologies. Some of these are based on geologic time, most are interpreted through temporal trends derived from archaeological
assemblages, and others are interpretive reconstructions. California’s archaeological assemblage composition is generally accepted as falling within the following overarching patterns: Paleoindian Period, Archaic Period, Emergent/Prehistoric Period, and Ethnohistoric Period (Confidential Appendices C1 and C2).

The archaeology and prehistory of the Central Valley, and the eastern Coast Ranges foothills/San Joaquin Valley in particular, are not well understood. Early and widespread agricultural use of the valley floor has destroyed much of the bottomland archaeology, and siltation has most likely buried many resources well below the surface sediments. Much of the recovered archaeological material from the valley area is devoid of context, having been scavenged from the surface and placed in private collection. Cultural resources within the foothills are often covered by the thick grass of the created grazing landscaped. Despite these difficulties, a general chronological framework for the Central Valley and eastern Coast Ranges foothills/western San Joaquin Valley has been developed. Like the general California chronology, the archaeological record of the region can be divided into the Paleoindian Period (11,550 to 8550 calibrated years [cal] BC), Archaic Period (8550 cal BC to cal AD 1100), Emergent Period (cal AD 1100 to 1750), and Ethnohistoric Period (post-AD 1769). The Archaic Period is further subdivided into three phases—the Lower Archaic (8550 to 5550 cal BC), Middle Archaic (5550 to 550 cal BC), and Upper Archaic (550 cal BC to cal AD 1100)—based on climatic and cultural variations (Bennyhoff and Fredrickson 1994; Groza 2002; Rosenthal et al. 2007) (Confidential Appendices C1 and C2).

**Built Environment Setting**

The three Project facilities are components of DWR’s SWP, which is a water storage and delivery system that consists of many reservoirs, aqueducts, power plants, and pumping plants. The California Aqueduct, which is a central feature of the SWP, begins at Clifton Court Forebay and extends over 400 miles to the south. The South Bay Aqueduct, another important SWP feature, begins at Bethany Reservoir, which is located south of Clifton Court Forebay, and carries water to communities in Alameda and Santa Clara Counties, passing through Dyer Reservoir and Patterson Reservoir (Figure 1).

The history associated with water management facilities in California is vast and complex. As discussed in detail in the BEIERs for this project (Appendices D1 and D2), the SWP was shaped by the successes and shortfalls of numerous water management policies and projects at the local, state, and national level over many decades. The BEIERs provide an overview of water development in California from the Spanish and Mexican periods, to the mining and agriculturally dominated water needs in the nineteenth century, to the engineered water reclamation solutions of the early twentieth century, and finally to the events and planning that led to the founding of DWR and implementation of the SWP. Important events through the latter part of the nineteenth century that contributed to the history of the SWP include the California gold rush and subsequent population growth, increases in irrigated agriculture activities, efforts by federal and state government to provide irrigation water to the San Joaquin Valley and flood control for the Sacramento Valley, and rapid growth of California cities.

At the turn of the twentieth century, California cities started to recognize that their water needs were outpacing what was readily available. The state and federal government also began making efforts to ensure water supplies and regulate water rights. The California legislature also took steps toward state-sponsored flood control when it created the State Reclamation Board in 1911 to assist in management of the San Joaquin and Sacramento Rivers.

Planning for a state water delivery system to complement the federal Central Valley Project and address some of its shortfalls began in 1945 with the State Water Resources Act. This authorized the State Water Resource Control Board, formerly the State Water Resource Board, to conduct investigations of the water resources of California,
which led to development of the California Water Plan in 1957, envisioning that a combination of local projects and a major state project would be needed to meet the state’s ultimate water demand needs.

The development of Clifton Court Forebay began with early land reclamation efforts in the San Joaquin Delta wetlands. In 1898, the Old River Land and Reclamation Company set out to drain and convert 4,000 acres of company-owned land located west of Union Island and south of the Byron Tract, also both reclaimed lands, for use as farmland. This newly reclaimed area was surrounded on three sides by earthen levees and canals and was named the Clifton Court Tract (Appendix D1). Preliminary planning for Clifton Court Forebay was underway early in 1965, which sought to locate a low, 30-foot dam within the existing levees of the Clifton Court Tract (Appendix D1, Exhibit B). Construction of the 28,653-acre-foot reservoir began on December 12, 1967, and was completed during December 1969 (Appendix D1, Exhibits C and D). Clifton Court Forebay has served in its capacity as an important storage component of the SWP since the time of its construction to the present (Appendix D1).

The South Bay Aqueduct was developed, in part, in response to ongoing growth of cities in the South Bay and associated growth in water demand combined with growing concerns due to saltwater intrusion into the groundwater wells serving these communities. The South Bay Aqueduct was first conceptualized in the 1951 Feather River Project, which proposed a dam for the Feather River near Oroville, two powerplants, a Delta cross-channel, an electric transmission system, an aqueduct between the Delta and Santa Clara and Alameda Counties, and another aqueduct to Central and Southern California. The South Bay Aqueduct was included in the 1955 revisions to the Feather River Project and was authorized for construction in 1957 and funded for construction in 1959 (Appendix D2). Because the South Bay Aqueduct was designed before the California Aqueduct, a variety of water conveyance types were piloted at the South Bay Aqueduct before the open-air, trapezoidal, concrete-lined canal was adopted for the California Aqueduct. The South Bay Aqueduct was completed in phases, reach by reach, starting from Bethany Reservoir. In 1960, DWR took bids for Patterson Reservoir, the 2.4-mile-long Brushy Creek First-Stage Pipeline, the 2-mile-long Dyer Canal, the 2.3-mile-long Altamont Pipeline, and a 1.8-mile portion of the Livermore Canal, constituting the first reach of the South Bay Aqueduct from the Surge Tank to Patterson Reservoir. On May 10, 1962, Governor Brown dedicated the South Bay Aqueduct and celebrated the first water delivery, which was made from Patterson Reservoir to water contractor Alameda County Flood Control and Water Conservation District (Appendix D2).

Impact Analysis

a) Would the Project cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?

Clifton Court Forebay Dam

As noted above, Clifton Court Forebay is located in southeast Contra Costa County, on the west side of California’s Central Valley and the southwestern edge of the Delta, approximately 10 miles northwest of the City of Tracy and adjacent to Byron Road. The forebay is surrounded on the northwest, north, and east sides by the Italian Slough, the Old River, and the West Canal. Water from the Delta enters the forebay through a gated intake control structure at the southeast end of the forebay. This structure connects the forebay to the West Canal. Other related SWP features nearby include the California Aqueduct intake channel, located along the southwest side of the forebay, the Skinner Fish Facility, and a control gate structure.
A records search of the Project site at Clifton Court Forebay Dam and a surrounding one-mile radius was completed by the California Historical Resources Information System (CHRIS) Central California Information Center (CCaIC) and the Northwest Information Center (NWIC) staff on November 30, 2020, and December 23, 2020, respectively (Confidential Appendices C1 and C2). Dudek conducted an intensive, pedestrian-level cultural survey of the area of potential effect (APE) on January 13, 2021. One previously recorded resource, Clifton Court Forebay (recorded in both P-07-003122 and P-07-004698), constructed between 1967 and 1969, was identified within the APE. Both of the previous records indicated that Clifton Court Forebay is eligible under National Register of Historic Places (NRHP)/California Register of Historical Resources (CRHR) Criteria A/1 and C/3 as a district contributor to two, separate proposed historic districts that were neither defined or formally recorded: the California Aqueduct (Ambacher 2013, p. 4) and the entirety of the SWP (Kim and Williams 2013, p. 2).

In the BEIER, Dudek disagrees with the previous approach and previous findings, and submits that Clifton Court Forebay is eligible as an individual property within its own right under NRHP/CRHR Criterion A/1 as a critical and planned element of the SWP and for its role in the development of the SWP and the California Aqueduct. It is also eligible individually under NRHP/CRHR Criterion C/3 for its design, as the critical infrastructure facilitating water flow from the Delta into the California Aqueduct.

As described in the BEIER for the Delta Dams Rodent Burrow Remediation Project at Clifton Court Forebay (Appendix D1), the proposed Project activities were analyzed in consideration of the adverse effect examples provided in Title 36, Part 800.5(a)(2) of the Code of Federal Regulations. The Project would have no adverse effect for the purposes of Section 106, or a significant impact for the purposes of CEQA on Clifton Court Forebay within the Project’s APE. Although Clifton Court Forebay is an individually eligible property under NRHP Criteria A and C and CRHR Criteria 1 and 3, the proposed burrow remediation and associated maintenance activities would not result in significant impacts or changes to Clifton Court Forebay. Therefore, the Project would result in a less-than-significant impact.

Dyer Dam

As noted previously, Dyer Dam is located in the Altamont Hills in Alameda County, approximately 13 miles west of the City of Tracy and approximately seven miles northeast of Livermore. The reservoir receives water from Bethany Reservoir via the South Bay Aqueduct and the Brushy Creek Pipeline, and discharges water back to the South Bay Aqueduct via Dyer Canal. Additionally, there is a settling pond east of the northeast end of the reservoir. The South Bay Aqueduct conveys water to Alameda and Santa Clara Counties.

Dyer Dam and Reservoir was built between 2009 and 2012 and does not meet the 50-year age requirement for resources to be evaluated for potential historic significance under NRHP or CRHR. Dyer Dam and Reservoir also lacks the important historical associations or engineering merit to be considered under NRHP Criterion Consideration G. Dyer Dam and Reservoir does not meet the criteria to be eligible as a historic resource pursuant to Section 15064.5, therefore there would be no impact to a significant resource.

A records search of the Project site at Dyer Dam and a surrounding 1-mile radius was completed by the CHRIS NWIC staff on December 23, 2020. Dudek conducted an intensive, pedestrian-level cultural survey of the APE on January 5, 2021. One resource, the South Bay Aqueduct (P-01-011603), was identified within the Project APE at Dyer Dam. The previous South Bay Aqueduct record dates to 1994 and was
created before the South Bay Aqueduct met the 50-year age threshold for consideration. Though the South Bay Aqueduct is recorded as “a conduit of considerable importance to the local economies of Alameda and Santa Clara Counties,” and the first completed component of the SWP, it was recommended ineligible by the report author at the time due to not meeting the age threshold and not qualifying for Criterion Consideration G for exceptional significance.

In the BEIER for the Delta Dams Rodent Burrow Remediation Project at Dyer Reservoir and Dam and Patterson Reservoir and Dam, the South Bay Aqueduct was reevaluated and found to be eligible under NRHP Criterion A and CRHR Criterion 1 for the originally identified reasons from the 1994 record: its connection and role within the larger SWP system and its association with the historical event of the first water delivery in the SWP. Dudek also found that the South Bay Aqueduct is eligible under NRHP Criterion C and CRHR Criterion 3 for its role in the testing and application of conveyance system technology for the SWP before it was standardized and implemented elsewhere.

As described in the BEIER, the proposed Project activities were analyzed in consideration of the adverse effect examples provided in Title 36, Part 800.5(a)(2) of the Code of Federal Regulations. The Project would not result in an adverse effect for the purposes of Section 106, or a significant impact for the purposes of CEQA on the South Bay Aqueduct segments within the Dyer Dam APE (Appendix D2). Therefore, the Project would result in a less-than-significant impact.

**Patterson Dam**

As noted previously, Patterson Dam is located about four miles east of Livermore, California, on the east side of Livermore Valley. Patterson Reservoir is a 104-acre-foot off-stream storage facility along the South Bay Aqueduct at the terminus of the Livermore Valley Canal. This reservoir, which was constructed between 1960 and 1962, provides off-line storage for the Zone 7 Patterson Pass Water Treatment Plant. Water enters the reservoir by flowing over a 175-foot-long reinforced concrete ogee-crest weir from the adjoining South Bay Aqueduct. The facility also includes a settling basin located east of the reservoir. Downstream of Patterson Reservoir, the South Bay Aqueduct continues to deliver water to Lake Del Valle and to its terminus at the Santa Clara Terminal Reservoir in San Jose. Patterson Dam has compacted earth embankment on three sides; the fourth side is formed by the adjacent South Bay Aqueduct.

A records search of the Project site at Patterson Dam and a surrounding one-mile radius was completed by NWIC staff on December 23, 2020, and Dudek conducted an intensive, pedestrian-level cultural survey of the APE on January 5, 2021. One previously recorded resource, the South Bay Aqueduct (P-01-011603), was identified within the Project APE at Patterson Dam (Appendix D2).

Two built environment historical resources required documentation as part of Dudek’s BEIER for the Delta Dams Rodent Burrow Remediation Project at Patterson Dam (Appendix D2): another segment of the South Bay Aqueduct (P-01-011603), constructed between 1958 and 1969, which required an updated evaluation; and Patterson Reservoir, constructed between 1960 and 1962, which required a separate, new evaluation. The South Bay Aqueduct (P-01-011603) was reevaluated and is eligible under NRHP Criterion A and CRHR Criterion 1 for its connection and role within the larger SWP system and its association with the historical event of the first water delivery in the SWP. The South Bay Aqueduct is also eligible under NRHP Criterion C and CRHR Criterion 3 for its role in the testing and application of conveyance system technology for the SWP before it was standardized and implemented elsewhere. The period of significance for the South Bay Aqueduct is established as its period of construction, between
1958 and 1969. Patterson Reservoir had not been previously recorded, and Dudek’s analysis found it eligible under NRHP Criterion A and CRHR Criterion 1 for its historically significant role as the location of the first SWP water delivery to a contractor. Because the SWP was meant to be self-sufficiently funded by its own water and power sales, the 1962 water deliveries made from Patterson Reservoir represent a significant event within the larger SWP context. Patterson Reservoir shares the period of significance for the South Bay Aqueduct, between 1958 and 1969 (Appendix D2).

As described in the BEIER for the Delta Dams Rodent Burrow Remediation Project at Dyer Reservoir and Dam and Patterson Reservoir and Dam, the proposed Project activities were analyzed in consideration of the adverse effect examples provided in Title 36, Part 800.5(a)(2) of the Code of Federal Regulations. No direct or indirect changes are proposed for the South Bay Aqueduct. Therefore, the Project would not result in an adverse effect for the purposes of Section 106, or a significant impact for the purposes of CEQA on the South Bay Aqueduct segments within the APE at Patterson Dam. Although Patterson Reservoir is eligible under the NRHP Criterion A and CRHR Criterion 1, the proposed burrow remediation and associated maintenance activities would not result in adverse effects or significant impacts to Patterson Dam and Reservoir (Appendix D2). Therefore, the Project would result in a less-than-significant impact.

b) Would the Project cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?

Clifton Court Forebay Dam

A records search of the APE at Clifton Court Forebay Dam, including a one-mile buffer surrounding the facility, was completed by CCaIC and NWIC staff on November 30, 2020, and December 23, 2020, respectively (Confidential Appendix C1). The CCaIC and NWIC records indicate that 83 previous cultural resources technical investigations have been conducted within one mile of Clifton Court Forebay. Of these, 16 studies intersect the APE at Clifton Court Forebay Dam (Confidential Appendix C1).

Dudek consulted historic-era maps and aerial photographs to understand development of the Clifton Court Forebay Dam site and surrounding properties (NETR 2021). Historic aerial photographs, available from 1949 to 2016, and historic maps, available from 1914 to 2018, were inspected to observe previous development at Clifton Court Forebay. Historic mapping shows the presence of the West Canal and Italian Slough as early as 1914, in their current positions adjacent to Clifton Court Forebay. The remainder of the site remained under agricultural cultivation until the construction of Clifton Court Forebay in 1968. Topographic mapping from 1969 indicates that a windmill and minor roads were present within the footprint of the forebay prior to its development, but no other structures were depicted. Aerial imagery is consistent with the topographic mapping, showing the presence of the West Canal, Italian slough, and agricultural fields in the surrounding vicinity. These adjacent areas are still under agricultural land use today (Confidential Appendix C1).

Dudek archaeologist inspected all areas of the APE on January 13, 2021. Clifton Court Forebay is located in a flat, agricultural surrounding. The APE in the vicinity of Clifton Court Forebay encompasses only the dam surrounding the forebay. As such, the entirety of the APE at Clifton Court Forebay Dam shows high levels of disturbance and in many cases the APE is in artificially created landforms such as levies and dikes. The majority of the APE is on the dam embankment and the asphalt-paved road circumnavigating the forebay. The water of the forebay itself is held by this artificial linear embankment and road, which surround the forebay; the embankment is asphalted on the water side and exposed imported soil on the
opposite side. Ground visibility was fair in the areas not paved, with approximately 50% of the ground visible. Several features of the forebay were observed in the APE, including boat ramps, intake/outtake pipes, and canal/aqueduct entrances and exits. No archaeological resources were observed.

The proposed Project, as currently designed, appears to have a very low potential for encountering intact archaeological deposits during ground-disturbing activities and would have no impact to known archaeological resources. Based on these negative findings and the observed conditions of the Clifton Court Forebay Dam site, no additional cultural resources efforts, including archaeological monitoring, are recommended to be necessary beyond standard protection measures for unanticipated discoveries of cultural resources, as outlined below in Mitigation Measure CUL-1. Therefore, the Project would result in a less-than-significant impact with mitigation incorporated.

Dyer Dam

NWIC records indicate that 25 previous cultural resources technical investigations have been conducted within a 1-mile radius of Dyer Dam and Patterson Dam. Of these, 8 studies intersect the current Dyer Dam APE (Confidential Appendix C2).

Historic aerial photographs, available from 1949 to 2016, and historic maps, available from 1949 to 2016, were inspected to observe previous development at Dyer Dam. These maps and images show that the APE was largely undeveloped prior to construction of the South Bay Aqueduct in the 1960s, except for a road that ran through the center of the Dyer Dam and Reservoir site prior to the creation of the reservoir in 2010. No other structures or land use was observed (Confidential Appendix C2).

Dudek archaeologists inspected all areas of the APE on January 14, 2021. Dyer Dam is located in a hilly, pastoral surrounding. The APE at Dyer Dam consists of the earthen embankment around the perimeter of the reservoir and a triangular staging area directly to the east. The entirety of the APE at Dyer Dam shows high levels of disturbance with the exception of the staging area, which shows minor disturbances. The reservoir itself is cut out of a hillside on the east side and then captured by a constructed earthwork dam around the remaining perimeter. Within this portion of the APE, utility buildings, paved roads, and canal/aqueduct entrances and exits are present. Visibility of exposed earth ground surfaces is extremely limited in this portion of the APE due to asphalt paving. The triangular staging area of the APE is a flat, grass-covered field that contains no structures. One pile of excavated boulders, likely from the excavation of the nearby settling pond, is present in the western portion of this staging area. Visibility of native ground surfaces in the staging area was constrained to less than 20% of the overall area due to the presence of thick grasses. No archaeological resources were observed (Confidential Appendix C2).

Dyer Dam site conditions are highly disturbed from creation and maintenance of Dyer Dam and Reservoir. No newly identified archaeological resources were recorded during the pedestrian survey, and the NWIC records search identified no cultural resources within the Project vicinity at Dyer Dam. The proposed Project appears to have a very low potential for encountering intact archaeological deposits during ground-disturbing activities and would have no impact to known archaeological resources. Based on these negative findings found in the archaeological report, no additional cultural resources efforts, including archaeological monitoring, are recommended to be necessary beyond standard protection measures for unanticipated discoveries of cultural resources, as outlined below in Mitigation Measure CUL-1. Therefore, the Project would result in a less-than-significant impact with mitigation incorporated.
Patterson Dam

NWIC records indicate that 31 previous cultural resources technical investigations have been conducted within a 1-mile radius of Dyer Dam and Patterson Dam. Of these, 1 study intersects the current Patterson Dam APE (Confidential Appendix C2).

Historic aerial photographs, available from 1949 to 2016, and historic maps, available from 1907 to 2018, were inspected to observe previous development at Patterson Dam and Reservoir. These maps and images indicate minimal development of the land prior to the construction of Patterson Dam and Reservoir and the South Bay Aqueduct in the 1960s. From that point, no major changes within the area occur, only routine maintenance of the dam facilities (Confidential Appendix C2).

Dudek archaeologists inspected all areas of the APE on January 14, 2021. Patterson Dam is located in a hilly, pastoral surrounding. The APE in the vicinity of Patterson Dam includes the earthen embankment around the perimeter of the reservoir, a bank along the nearby canal, and several staging areas. The entirety of the APE at Patterson Dam shows high levels of disturbance from existing DWR infrastructure. The reservoir itself is cut out of a hillside on the northeast side and then captured by an artificial earthwork dam around the remaining perimeter. Within this portion of the APE, utility buildings, paved roads, and canal/aqueduct entrances and exits are present. Earthen ground surfaces in this portion of the APE are limited due to asphalt paving. The staging areas of the APE are less developed and are primarily comprised of flat, grass-covered terrain. Staging areas have been clearly excavated and are no longer at the native ground level. Visibility in the staging areas was poor, providing for less than 20% of the ground surface to be directly observed due to the presence of thick grasses. No archaeological resources were observed (Confidential Appendix C2).

Patterson Dam site conditions are highly disturbed from creation and maintenance of Patterson Reservoir. No newly identified archaeological resources were recorded during the pedestrian survey, and the NWIC records search identified no cultural resources within the Project vicinity. The proposed Project appears to have a very low potential for encountering intact archaeological deposits during ground-disturbing activities and would have no impact to known archaeological resources. Based on these negative findings found in the archaeological report, no additional cultural resources efforts, including archaeological monitoring, are recommended to be necessary beyond standard protection measures for unanticipated discoveries of cultural resources, as outlined below in Mitigation Measure CUL-1. Therefore, the Project would result in a less-than-significant impact with mitigation incorporated.

c) Would the Project disturb any human remains, including those interred outside of dedicated cemeteries?

Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam

California law recognizes the need to protect interred human remains, particularly Native American burials and associated items of patrimony. The Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam sites have highly disturbed surface conditions. No evidence of human remains at the Project sites was found in documentary research and it is extremely unlikely that buried human remains are present. Furthermore, the Project activities do not require excavation at depths that would typically have the potential to unearth buried human remains. Nevertheless, it is possible that presently unknown prehistoric burials exist and could be uncovered during Project construction. Therefore, this impact would be potentially significant. However, with implementation of Mitigation Measure CUL-2, in the unlikely
event that human remains are discovered during Project-related construction activities, this potential impact would be reduced to a less-than-significant level by ensuring compliance with Section 7050.5 of the California Health and Safety Code and ensuring protection of any Native American burials encountered during project implementation. Therefore, the Project would result in a less-than-significant impact with mitigation incorporated.

**Mitigation Measures**

**CUL-1: Unanticipated Archaeological Resources.** A Worker Environmental Awareness Training for cultural resources shall be prepared and provided to all construction workers prior to initiation of work. The training shall generally summarize the protocols provided below that must be followed in the event that there is an inadvertent discovery of cultural resources and/or potential tribal cultural resources. In the event that cultural resources (e.g., sites, features, or artifacts) are exposed during construction activities, all ground disturbing work occurring within 100 feet of the find shall immediately stop until a qualified specialist, meeting the Secretary of the Interior’s Professional Qualification Standards, can evaluate the significance of the find and determine whether additional study is warranted. Prehistoric archaeological deposits may be indicated by the presence of discolored or dark soil, fire-affected material, concentrations of fragmented or whole freshwater bivalve shell, burned or complete bone, non-local lithic materials, or the characteristic observed to be atypical of the surrounding area. Common prehistoric artifacts may include modified or battered lithic materials; lithic or bone tools that appeared to have been used for chopping, drilling, or grinding; Projectile points; fired clay ceramics or non-functional items; and other items. Historic-age deposits are often indicated by the presence of glass bottles and shards, ceramic material, building or domestic refuse, ferrous metal, or old features such as concrete foundations or privies. Depending upon the significance of the find under the California Environmental Quality Act (CEQA) (14 CCR 15064.5[f]; California Public Resources Code, Section 21082), the archaeologist may simply record the find and allow work to continue. If the discovery proves significant under CEQA, additional work, such as preparation of an archaeological treatment plan, testing, or data recovery, may be warranted.

**CUL-2: Unanticipated Human Remains.** In accordance with Section 7050.5 of the California Health and Safety Code, if potential human remains are found, the county coroner shall be immediately notified of the discovery. No further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent remains shall occur until the county coroner has made their determination regarding the appropriate next steps to be taken. This determination must be completed within 2 working days of notification of the discovery. If the county coroner determines that the remains are, or are believed to be, Native American, he or she shall notify the Native American Heritage Commission in Sacramento within 24 hours. In accordance with California Public Resources Code, Section 5097.98, the Native American Heritage Commission must immediately notify those persons it believes to be the most likely descendant from the deceased Native American. The most likely descendant shall complete his or her inspection within 48 hours of being granted access to the site. The designated Native American representative would then determine, in consultation with the property owner, the disposition of the human remains.
3.6 Energy

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<tr>
<td>a) Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during Project construction or operation?</td>
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<tr>
<td>b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?</td>
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Setting

PG&E is the utility provider within the Project area. PG&E provides electric services to 5.4 million customers including 106,681 circuit miles of electric distribution lines and 18,466 circuit miles of interconnected transmission lines over a 70,000-square-mile service area in Northern and Central California (PG&E 2016). PG&E receives electric power from a variety of sources. According to the California Public Utilities Commission’s 2018 Renewable Portfolio Standard Annual Report to the Legislature, 39% of PG&E’s power came from eligible renewable energy sources in 2018, including biomass/waste, geothermal, small hydroelectric, solar, and wind sources (PG&E 2019).

The California Public Utilities Commission regulates natural gas utility service for customers who receive natural gas from PG&E. The California Public Utilities Commission also regulates independent storage operators Lodi Gas Storage, Wild Goose Storage, Central Valley Storage, and Gill Ranch Storage (CPUC 2017). PG&E provides natural gas service to most of Northern California, including the areas surrounding each of the three DWR facilities included in this Project.

There are more than 35 million registered vehicles in California, and those vehicles consume an estimated 16 billion gallons of fuel each year (CEC 2020; DMV 2019). Petroleum currently accounts for approximately 92% of California’s transportation energy consumption (CEC 2020). However, technological advances, market trends, consumer behavior, and government policies could result in significant changes in fuel consumption by type and in total. At the federal and state levels, various policies, rules, and regulations have been enacted to improve vehicle fuel efficiency, promote the development and use of alternative fuels, reduce transportation-source air pollutants and GHG emissions, and reduce vehicle miles traveled.
Impact Analysis

a) Would the Project result in a potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during Project construction or operation?

Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam

Remediation treatment would involve the use of lightweight and heavy equipment to collapse and/or excavate and backfill burrowing holes. These activities would require the use of energy to fuel equipment and other vehicles. Energy usage on site would be temporary and limited to the duration of the maintenance effort. No permanent or long-term energy consumption is anticipated. Therefore, there would be a less-than-significant impact.

b) Would the Project conflict with or obstruct a state or local plan for renewable energy or energy efficiency?

Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam

As stated in Section 3.6(a), energy usage at the Project sites would be relatively small and would not result in permanent long-term energy consumption. The proposed Project would not conflict with a state or local plan for renewable energy or energy efficiency plan. Nonetheless, the Project would not entail inefficient, wasteful, and unnecessary consumption of energy and would not result in any irreversible or irretrievable commitments of energy. Thus, impacts would be less than significant.

3.7 Geology and Soils

<table>
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<tr>
<th>VII. GEOLOGY AND SOILS – Would the Project:</th>
<th>Potentially Significant Impact</th>
<th>Less-Than-Significant Impact With Mitigation Incorporated</th>
<th>Less-Than-Significant Impact</th>
<th>No Impact</th>
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<tbody>
<tr>
<td>a) Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:</td>
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<td>i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.</td>
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<td>ii) Strong seismic ground shaking?</td>
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<td>iii) Seismic-related ground failure, including liquefaction?</td>
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<td>iv) Landslides?</td>
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<tr>
<td>b) Result in substantial soil erosion or the loss of topsoil?</td>
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### Setting

**Clifton Court Forebay Dam**

Clifton Court Forebay Dam is located at the southwestern margin of the Delta, where the physiographic regions of the flat Delta basin merge with the gentle slopes of the Coast Range geomorphic province. The area is underlain by flat-lying delta, alluvial, and alluvial fan deposits (DWR 2013a). The deltaic sediments consist of two units, a muck and peat series and the underlying fine-grained basin sediments. The basin sediments are underlain by a water-bearing silty sand layer that transitions into a dense to very dense fine sand layer at approximately 65 feet below the original ground layer (DWR 2013a). The nearest active fault to Clifton Court Forebay Dam is the Greenville fault, located approximately 9 miles to the southwest (USGS 2021a).

**Dyer Dam**

Dyer Dam is located in the northern Diablo Range of the Coast Range geomorphic province. The geology of the Diablo Range is dominated by the Franciscan Complex, a diverse group of metamorphosed igneous, sedimentary, and metamorphic rocks of Cretaceous to late Jurassic age (65 to 163 million years old). The reservoir is situated on the eastern margin of the Livermore Basin, which is a deep, structural, contractional, sedimentary basin that lies within the more extensive Mount Diablo fold-and-thrust belt. The nearest active fault to Dyer Dam is the Greenville fault, located approximately 2.5 miles to the southwest (USGS 2021b).

**Patterson Dam**

Patterson Dam is also located in the northern Diablo Range. Patterson Dam was constructed on both Quaternary (from 11,700 up to 2.6 million years old) alluvium and the Miocene (5.3 to 23 million years old) Cierbo
Sandstone. Exposures of Cierbo Sandstone in the reservoir foundation and adjacent Livermore Valley Canal channel were described during dam construction as very light gray to buff quartzose sandstone with lenses of weathered clay shale and minor conglomerate (DWR 2013b). The flat-lying alluvium exposed in the southern two thirds of the reservoir is comprised of unconsolidated dark brown and reddish-brown clay with minor silt, sand, and gravel (DWR 2013b). The nearest active fault to Patterson Dam is also the Greenville fault, which is mapped to show two strands that terminate just north of the reservoir. According to a 2005 fault investigation report, no active traces of the Greenville fault near Patterson Dam were found to extend into the footprint of the dam (DWR 2005a, as cited in DWR 2013b).

All Dam Sites – Seismicity

All three Project sites are located within a seismically active region that is dominated by the San Andreas fault system. The San Andreas fault represents the tectonic plate boundary of the Pacific Ocean and North American plates. According to mapping compiled by the California Emergency Management Agency, the northeast half of Patterson Reservoir is located within the boundary of an Alquist-Priolo Earthquake Fault Zone (area of required investigation) defined by the Holocene-active Greenville fault zone (CalEMA 2021). The Greenville fault zone is the easternmost component of the San Andreas fault system in the San Francisco Bay Region. Despite its location within the Greenville fault zone, no evidence of faulting (active or inactive) was recorded during the original design and construction of the existing Patterson Reservoir (DWR 1967, as cited in DWR, 2013b).

Impact Analysis

a) Would the Project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:

   i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.

Clifton Court Forebay Dam

There are no active faults or associated Alquist-Priolo Earthquake Fault Zones that intersect the Clifton Court Forebay Dam site. The nearest active fault, the Greenville Fault, is approximately 9 miles to the southwest. As a result, there would be no impact related to fault rupture at the Clifton Court Forebay Dam site.

Dyer Dam

There are no active faults or associated Alquist-Priolo Earthquake Fault Zones that intersect the Dyer Dam site. The nearest active fault, the Greenville Fault, is approximately 2.5 miles to the southwest. As a result, there would be no impact related to fault rupture at the Dyer Dam site.

Patterson Dam

As noted above, the approximate northeast half of Patterson Reservoir is located within the Alquist-Priolo Earthquake Fault Zone associated with the Greenville Fault. According to the fault investigation effort conducted prior to construction of the reservoir, no evidence of active faulting was observed at the reservoir site. In addition, the proposed Project would not include the construction of any habitable structures and the proposed improvements would actually provide some level of increased seismic...
stability by backfilling existing burrows, compacting the soil, and implementing measures to prevent future burrowing, all of which would strengthen the embankment overall. Therefore, the potential impact related to fault rupture at the Patterson Dam site would be **less than significant**.

**ii) Strong seismic ground shaking?**

**Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam**

All three Project sites are located in a seismically active region where a seismic event on any of the regional active faults could produce strong ground shaking at any of the sites. The U.S. Geologic Survey estimates that there is a 63% chance that an earthquake with magnitude 6.7 or greater could occur by 2045 (USGS 2015). The amount of ground shaking and intensity would depend on a number of factors including distance to the epicenter, duration of shaking, and site-specific characteristics of underlying materials. As discussed in the Project Description, DSOD has identified the existing rodent burrowing as a potential threat to the structural integrity of the dams that could lead to failure modes for dams by promoting piping and internal erosion (erosion is also discussed below). This internal erosion could also lessen the dam’s ability to withstand future ground shaking that would be expected to occur sometime in the future. DSOD classifies Dyer Dam and Patterson Dam as high hazard, indicating that their failure is likely to result in the loss of at least one human life. DSOD classifies Clifton Court Forebay Dam as a low-hazard dam because its failure is not expected to result in loss of human life, but would result in economic and environmental impacts. To address the hazards identified by DSOD at the three dams, the proposed Project would involve the use of various methods and approaches (e.g., use of compacted imported fill materials, heavy construction equipment to collapse and/or excavate holes, placement of cement-soil slurry, low-pressure grout, impervious native soil placement, placement of bedding materials, wire mesh, and other armoring materials) to restore the structural integrity of the dams and meet DSOD requirements. In addition, as discussed in Section 3A.3-6, following completion of the remediation activities, in the following years, DWR would undertake annual monitoring inspections and implement additional burrow treatment activities as warranted to ensure continued stability of the embankments.

Therefore, considering that all three dams have been identified through dam safety inspections by DSOD as safety concerns under existing conditions and that the proposed Project would involve collapse, fill, and/or restoration of the structural integrity of the dams in accordance with DSOD guidelines, the potential impact related to strong seismic ground shaking would be **less than significant**.

**iii) Seismic-related ground failure, including liquefaction?**

**Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam**

As noted in Section 3.7(a.ii), the three dams have been adversely affected by rodent burrowing; under existing conditions, DSOD considers the dams to be safety concerns, largely due to the burrows and internal erosion that may ultimately lead to dam failure. The placement of fill, impervious fill, cement-soil slurry, and/or low-pressure grout that would occur under the proposed Project would not result in the potential increase for seismic-related ground failure or liquefaction. The restoration activities would actually increase the overall structural integrity of the dams, consistent with DSOD guidelines and inspection recommendations, such that the potential for adverse effects occurring from seismic-related ground failure or liquefaction would be reduced compared to existing conditions. Therefore, the potential impact from seismic-related ground failure, including liquefaction, would be **less than significant**.
iv) Landslides?

Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam

In areas with dense burrowing, the proposed Project could involve use of heavy machinery and excavation to perform remediation activities. DWR has conducted surveys of the dams to rate the disturbed areas for severity of burrow activity, the influence of the burrow activity on dam integrity, and the potential consequences of dam failure. Remediation within high-priority and medium-priority areas would include collapsing and/or excavating burrows. If not conducted appropriately, excavation of burrowed areas at the toe of the embankment slopes could destabilize the embankment, causing slope failure or landslides. However, all remediation activities would be conducted under the direction of a California licensed geotechnical engineer to ensure that backfilling of the holes with impervious native soil, cementitious-soil slurry, low-pressure grout, and/or similar embankment material would occur such that the embankments are not destabilized. The fill materials would be compacted and smoothed to match the surrounding ground. Following compaction and smoothing, high-priority areas in the upper zones of the downstream face would receive permanent armoring using a combination of bedding material (sand and gravels), wire mesh, and/or rock. Controlled low-strength material–filled trenches would be installed in the high-density burrow areas to prevent rodent burrowing beyond the armoring measures at Clifton Court Forebay Dam and Patterson Dam. Once remediation activities are completed, the structural integrity of the embankments would be improved over existing conditions and the potential impact related to landslides would be less than significant.

b) Would the Project result in substantial soil erosion or the loss of topsoil?

Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam

The burrowing activity at all three dam locations has caused and currently causes disturbances to the earthen embankments of the dams, as well as related embankments of associated drainage channels that expose soils to the effects of erosion. Burrowing not only loosens soil at the surface, but it creates pathways for internal erosion of the embankments. A burrow that intercepts the underlying water surface of the embankment can cause erodible material from the dam embankment to migrate and be carried away. However, the proposed Project would involve measures to collapse or fill existing burrows, compact materials, and provide improvements such as sand, gravel, wire mesh, and larger rock materials to deter any future burrowing activity. Therefore, the proposed Project would result in improved soil stability of the embankments and deterrents to future burrowing that would reduce the potential for soil erosion or loss of topsoil.

Soil disturbance during construction and remediation activities would involve earthwork that could potentially result in erosion and loss of topsoil. The dam embankments were originally created with imported fill materials, therefore the areas affected by the proposed Project are unlikely to encounter topsoil; however, erosion could still lead to adverse effects to the existing dam embankments and other improvements, such as drainage channels.

The Project would involve disturbance of more than 1 acre of land and thus would be subject to the SWRCB Construction General Permit. The Construction General Permit requires preparation and implementation of a SWPPP, which must include best management practices (BMPs) designed to reduce potential impacts to surface water quality throughout construction and operation of the Project.
that would include erosion control measures. The Construction General Permit would require DWR to submit a Notice of Intent to the SWRCB for coverage by a National Pollutant Discharge Elimination System permit and prepare a SWPPP prior to the beginning of construction. Specifically, the SWPPP must identify the erosion control BMPs that would be implemented at each of the three DWR facilities included in the Project to avoid significant adverse effects from erosion and include routine inspection of all BMPs to monitor effectiveness of the SWPPP.

Therefore, with elimination of the existing burrows and placement of fill, cement-soil slurry, wire mesh, and other rodent deterrents along with implementation of the required SWPPP, the Project would result in less-than-significant impacts associated with erosion and loss of topsoil.

c) **Would the Project be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the Project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?**

**Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam**

The proposed Project consists of providing remediation actions to address rodent burrowing within the existing embankments at the three identified dam locations. DSOD has already identified these dams as safety concerns due to the extent of burrowing and the potential for internal erosion that could lead to instability and dam failure. The proposed Project does not include construction of any new facilities, but would improve the overall stability of the affected areas through the various remediation approaches that are described above. All work, including the compaction of fill materials, use of cement-soil slurries, and placement of bedding materials, would be overseen by a California-licensed geotechnical engineer or engineering geologist such that implementation of the Project would not result in conditions that would make any geologic unit or soil unstable. The potential for landslides is discussed in Section 3.7(a.iv), lateral spreading (related to liquefaction) and liquefaction hazards are addressed in Section 3.7(a.iii). Therefore, because the proposed Project would result in increased stability to the existing embankments and the proposed remediation measures would be overseen by a California-licensed geotechnical engineer or engineering geologist, the potential impact would be less than significant.

d) **Would the Project be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?**

**Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam**

Expansive soils are characterized by shrink-swell properties that over time can lead to cyclical volumetric changes that can damage improvements such as building foundations or roadways. The proposed Project does not include construction of any habitable structures or other improvements that would be considered susceptible to adverse effects from expansive soils. Therefore, the potential impact related to expansive soils would be less than significant.
e) Would the Project have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?

Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam

The proposed Project does not include the use or installation of septic tanks or alternative wastewater disposal systems and thus there would be no impact related to this criterion.

f) Would the Project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam

Proposed Project activities would occur primarily on previously disturbed areas and constructed embankments. As discussed in more detail in Section 3.5, Cultural Resources, the proposed Project, as currently designed, appears to have a very low potential for encountering intact paleontological deposits during ground-disturbing activities and would have no impact to known paleontological resources. Further, due to the previously disturbed nature of most of the Project site, activities are not likely to encounter or disturb unique geologic features. Should unique paleontological and/or geologic features be encountered during Project activities, implementation of standard protection measures for unanticipated discoveries of paleontological resources during earthwork activities, as outlined Mitigation Measure GEO-1 would reduce impacts to less than significant. Therefore, the Project would result in a less-than-significant impact with mitigation incorporated.

Mitigation Measures

GEO-1 Unanticipated Paleontological Resources. In the event that paleontological resources (e.g., fossils) are exposed during construction activities for the Project, all construction work occurring within 50 feet of the find shall immediately stop until a qualified paleontologist meeting the professional standards of the Society of Vertebrate Paleontology (SVP) can evaluate the significance of the find and determine whether additional study is warranted. If the discovery is clearly not significant, the paleontologist may document the find and allow work to continue. If the discovery may consist of or include unique paleontological resources as defined under the California Environmental Quality Act, a qualified paleontologist shall evaluate the resource and prepare a proposed mitigation plan in accordance with SVP guidelines (1995) sufficient to ensure that the project does not result in the direct or indirect destruction of any unique paleontological resources. The proposed mitigation plan may include a field survey, construction monitoring, sampling and data recovery procedures, museum storage coordination for any specimen recovered, and a report of findings.
3.8 Greenhouse Gas Emissions

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
</tr>
<tr>
<td>b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?</td>
<td>☐</td>
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</table>

Setting

Climate change refers to any significant change in measures of climate, such as temperature, precipitation, or wind, lasting for an extended period (decades or longer). Gases that trap heat in the atmosphere are often called greenhouse gases or GHGs. The greenhouse effect traps heat in the troposphere through the following threefold process: (1) short-wave radiation emitted by the Sun is absorbed by the Earth; (2) the Earth emits a portion of this energy in the form of long-wave radiation; and (3) GHGs in the upper atmosphere absorb this long-wave radiation and emit this long-wave radiation into space and back toward the Earth. This trapping of the long-wave (thermal) radiation emitted back toward the Earth is the underlying process of the greenhouse effect. Principal GHGs include carbon dioxide (CO$_2$), methane, nitrous oxide, O$_3$, and water vapor. Some GHGs—such as CO$_2$, methane, and nitrous oxide—occur naturally and are emitted to the atmosphere through natural processes and human activities. Of these gases, CO$_2$ and methane are emitted in the greatest quantities from human activities. Emissions of CO$_2$ are largely byproducts of fossil-fuel combustion, whereas methane results mostly from off-gassing associated with agricultural practices and landfills. Manufactured GHGs, which have a much greater heat-absorption potential than CO$_2$, include fluorinated gases, such as hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride, which are associated with certain industrial products and processes (CAT 2006). The Intergovernmental Panel on Climate Change developed the Global Warming Potential concept to compare the ability of each GHG to trap heat in the atmosphere relative to another gas. The Global Warming Potential of a GHG is defined as the ratio of the time-integrated radiative forcing from the instantaneous release of 1 kilogram of a trace substance relative to that of 1 kilogram of a reference gas (IPCC 2014). The reference gas used is CO$_2$; therefore, Global Warming Potential-weighted emissions are measured in metric tons (MT) of CO$_2$ equivalent (CO$_2$e).

Regarding impacts from GHGs, both the BAAQMD and the California Air Pollution Control Officers Association consider GHG impacts to be exclusively cumulative impacts (BAAQMD 2017a; CAPCOA 2018); therefore, assessment of significance is based on a determination of whether the GHG emissions from a project represent a cumulatively considerable contribution to the global atmosphere. This analysis uses both a quantitative and a qualitative approach.
DWR GHG Reduction Plan

As the first phase of DWR’s Climate Action Plan, DWR adopted a Greenhouse Gas Emissions Reduction Plan in 2012 (2012 Plan) to guide decision-making related to energy use and GHG emissions. Consistent with commitments made in the 2012 plan, DWR prepared the Greenhouse Gas Emissions Reduction Plan Update 2020 (Update 2020) to review the GHG reductions achieved through implementation of the 2012 Plan and to update strategies for further reductions consistent with legislative changes adopted since adoption of the 2012 Plan (DWR 2020b). Through DWR’s work on its Climate Action Plan, including the 2012 Plan and Update 2020, DWR has found that most of DWR’s GHG emissions are associated with energy purchased to move water through the SWP. The 2012 Plan and Update 2020 also identify that construction and maintenance projects contribute to DWR’s total GHG emissions inventory (DWR 2020b).

In the 2012 Plan, DWR established a near-term goal of reducing its GHG emissions to 50% below 1990 emissions level by 2020. DWR achieved this goal in 2015. Under Update 2020, DWR established a mid-term goal of reducing GHG emissions to at least 60% below the 1990 level by 2030 and a long-term goal of supplying 100% of its electricity load with zero-carbon resources and achieve carbon neutrality by 2045. Achievement of these goals would ensure that DWR complies with GHG reduction targets established by the State of California. Specifically, DWR’s mid-term goal exceeds the statewide emissions reduction target of 40% below the 1990 level by 2030, which was established in Senate Bill 32 (adopted in 2016), and DWR’s long-term goal is consistent with the emissions reduction goals and policies established in Senate Bill 100 (adopted in 2018) and Executive Order B-55-18. Further, Update 2020 states that “by achieving carbon neutrality by 2045, DWR will also exceed the statewide goal of reducing emissions by at least 80% below the 1990 level by 2050, which was established in Executive Order S-3-05 (2005)” (DWR 2020b).

The mid-term and long-term goals primarily relate to DWR operational activities, and Update 2020 includes specific implementation measures to help achieve these goals. Update 2020 also identifies GHG emission reduction applicable to construction and maintenance efforts.

Update 2020 also analyzes forecasted GHG emissions and GHG emissions reductions associated with most future DWR projects and activities, including emissions generated as a result of typical construction activities. Update 2020 defines construction projects as “construction, maintenance, or refurbishment work performed on DWR’s facilities by an outside contractor.”

Based on analysis conducted for the 2012 Plan, earthwork projects constitute approximately 25% of DWR’s projects and more than 50% of emissions from construction activities. Pipeline and storage basin projects are estimated to contribute 10% and 11%, respectively, to DWR’s construction emissions and involve substantial amounts of work with large earthwork equipment. Update 2020 assumes that these percentages have remained the same and that modest increases in the efficiency of earthwork equipment since 1990 have likely reduced the actual emissions from DWR construction activities, though the actual rate of reduction is not quantifiable with available data (DWR 2020b).

Prior to adopting the 2012 Plan, DWR prepared a CEQA IS that supported adoption of a Negative Declaration. In support of the Update 2020, DWR prepared an addendum to the Negative Declaration pursuant to CEQA Guidelines Sections 15162(b) and 15164(b). The addendum evaluated the changes that Update 2020 would make to the 2012 Plan and changes in surrounding circumstances (such as updates in legislative and regulatory requirements as well as changes in market conditions) and concluded that these changes would not cause any new significant environmental impacts that would require preparation of a subsequent negative declaration or an environmental
impact report (DWR 2020b). DWR relies on this prior CEQA analysis of the 2012 Plan and Update 2020 in evaluating the potential GHG emissions impacts of subsequent DWR projects, including the proposed Project.

**Thresholds of Significance**

**DWR Update 2020**

The following steps must be completed to determine whether a subsequent project is consistent with Update 2020 and the cumulative impact analysis of DWR GHG emissions (DWR 2020b):

1. Identify, quantify, and analyze the GHG emissions from the proposed project and alternatives using a method consistent with that described in DWR internal guidance, “Guidance for Quantifying Greenhouse Gas Emissions and Determining the Significance of their Contribution to Global Climate Change for CEQA Purposes,” as such guidance document may be revised.

2. Determine that construction emissions levels do not exceed the Extraordinary Construction Project threshold of either 25,000 MT CO₂e for the entire construction phase of the project or 12,500 MT CO₂e in any single year of construction.

3. Incorporate into the design or implementation plan for the project all project-level GHG emissions reduction measures listed in Chapter VI or explain why measures that have not been incorporated do not apply to the project.

4. Determine that the project does not conflict with DWR’s ability to implement any of the specific project GHG emissions reduction measures listed in Chapter VI.

5. If implementation of the proposed project would result in additional energy demands on the SWP system of 15 GWh/year or greater, the project must obtain a written confirmation from the DWR SWP Power and Risk Office stating that the Renewable Power Procurement Plan will be updated to accommodate the additional load resulting from the proposed project at such time as the proposed project is ultimately implemented.

Additionally, Update 2020 found that all DWR typical construction operations in an average year emit a total of 25,000 MT CO₂e. Based on this, Update 2020 concludes that any project that would emit this amount of GHG emissions throughout the entirety of its construction and/or would emit 12,500 MT CO₂e in a single year would exceed the emissions estimates reflected in Update 2020 and thus would “represent construction activities exceeding the typical level of construction activity performed by DWR and, therefore, exceeding the level of cumulative effects analysis for construction-related emissions reflected in Update 2020.”

**BAAQMD**

Separate thresholds of significance are established by the BAAQMD for operational emissions from stationary sources (e.g., generators, furnaces, and boilers) and nonstationary sources (e.g., on-road vehicles) (BAAQMD 2017a). The threshold for stationary sources is 10,000 MT CO₂e per year (i.e., emissions above this level may be considered significant). For nonstationary sources, the following three separate thresholds have been established:

- Compliance with a Qualified Greenhouse Gas Reduction Strategy (i.e., if a project is found to be out of compliance with a Qualified Greenhouse Gas Reduction Strategy, its GHG emissions may be considered significant)
- 1,100 MT CO$_2$e per year (i.e., emissions above this level may be considered significant)
- 4.6 MT CO$_2$e per service population per year (i.e., emissions above this level may be considered significant)

(Service population is the sum of residents plus employees expected for a development project.)

Because the BAAQMD has not adopted a threshold for post-2020, this assessment uses a bright-line threshold of 660 MT of CO$_2$e per year, a 40% reduction of the BAAQMD’s 1,100 MT CO$_2$e per year threshold based on California’s 2030 GHG reduction target per Executive Order B-30-15. The bright-line threshold is applicable to the proposed Project because a qualified GHG reduction plan would not be applicable to the Project and the Project is not a residential or mixed-use project for which impacts would be more appropriately evaluated using a service population threshold to reflect per-person emission efficiency.

**DWR Standard Contract Specifications**

DWR requires contractors to follow standard specifications during project construction to protect environmental resources. These include meeting all state and federal statutes, rules, regulations, and policies enacted to protect the environmental resources and ensure that any significant environmental impacts of projects are identified and adequately mitigated. Contractors must implement these provisions by developing and submitting an Air Quality Control Plan, a Traffic and Noise Abatement Plan, and a Fire Prevention and Control Plan; by performing construction equipment maintenance in accordance with manufacturer’s recommendations, ensuring the proper use of mufflers and filters, and defining and implementing maintenance schedules for each piece of construction equipment; and by implementing the following best available control technology measures: (1) install high-pressure injectors, (2) use renewable diesel fuel, (3) use Caterpillar pre-chamber diesel engines or equivalent, (4) replace fossil fuel-powered equipment with electric equipment, (5) replace gasoline or diesel-powered vehicle with electric vehicles, (6) replace gasoline-powered equipment with catalytic converters, and (7) reduce construction activities during Stage 2 alerts issued by local air pollution control districts where required (DWR 2020b).

**Update 2020 Best Management Practices**

In addition to the Standard Contract Specifications, Update 2020 identifies 15 BMPs that must be implemented during construction to reduce fuel consumption for construction equipment and transportation of construction materials, ensure use of renewable diesel that has zero GHG emission, reduce the amount of landfill material, and reduce emissions from the production of cement. Update 2020 found that implementation of these BMPs is estimated to reduce annual GHG emissions by 15,090 MT CO$_2$e by the year 2030 compared to the estimated emissions from 1990, resulting in estimated annual emissions from construction of 13,110 MT CO$_2$e (DWR 2020b). The required BMPs are as follows:

**BMP 1.** Evaluate project characteristics, including location, project work flow, site conditions, and equipment performance requirements, to determine whether the specifications for the use of equipment with repowered engines, electric drive trains, or other high-efficiency technologies are appropriate and feasible for the project or specific elements of the project.

**BMP 2.** Evaluate the feasibility and efficacy of performing on-site material hauling with trucks equipped with on-road engines.

**BMP 3.** Ensure that all feasible avenues have been explored for providing an electrical service drop to the construction site for temporary construction power. When generators must be used, use alternative fuels, such as propane or solar, to power generators to the maximum extent feasible.
BMP 4. Evaluate the feasibility and efficacy of producing concrete on site and specify that batch plants be set up on site or as close to the site as possible.

BMP 5. Evaluate the performance requirements for concrete used on the project and specify concrete mix designs that minimize GHG emissions from cement production and curing while preserving all required performance characteristics.

BMP 6. Limit deliveries of materials and equipment to the site to off peak traffic congestion hours.

BMP 7. Minimize idling time by requiring that equipment be shut down after five minutes when not in use (as required by the State airborne toxics control measure [13 CCR Section 2485]). Provide clear signage that posts this requirement for workers at the entrances to the site and provide a plan for the enforcement of this requirement.

BMP 8. Maintain all construction equipment in proper working condition and perform all preventative maintenance. Required maintenance includes compliance with all manufacturer’s recommendations, proper upkeep and replacement of filters and mufflers, and maintenance of all engine and emissions systems in proper operating condition. Maintenance schedules shall be detailed in an Air Quality Control Plan prior to commencement of construction.

BMP 9. Implement tire inflation program on jobsite to ensure that equipment tires are correctly inflated. Check tire inflation when equipment arrives on site and every two weeks for equipment that remains on site. Check vehicles used for hauling materials off site weekly for correct tire inflation. Procedures for the tire inflation program shall be documented in an Air Quality Management Plan prior to commencement of construction.

BMP 10. Develop a project specific ride share program to encourage carpools, shuttle vans, transit passes and/or secure bicycle parking for construction worker commutes.

BMP 11. Reduce electricity use in temporary construction offices by using high efficiency lighting and requiring that heating and cooling units be Energy Star compliant. Require that all contractors develop and implement procedures for turning off computers, lights, air conditioners, heaters, and other equipment each day at close of business.

BMP 12. For deliveries to project sites where the haul distance exceeds 100 miles and a heavy-duty class 7 or class 8 semi-truck or 53-foot or longer box type trailer is used for hauling, a SmartWay1 certified truck will be used to the maximum extent feasible.

BMP 13. Minimize the amount of cement in concrete by specifying higher levels of cementitious material alternatives, larger aggregate, longer final set times, or lower maximum strength where appropriate.

BMP 14. Develop a project specific construction debris recycling and diversion program to achieve a documented 50% diversion of construction waste.

BMP 15. Evaluate the feasibility of restricting all material hauling on public roadways to off-peak traffic congestion hours. During construction scheduling and execution minimize, to the extent possible, uses of public roadways that would increase traffic congestion.
Impact Analysis

a) **Would the Project generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?**

**Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam**

Construction of the proposed Project would result in GHG emissions, which are primarily associated with use of off-road construction equipment, vendor trucks, and worker vehicles. A detailed depiction of the construction schedule—including information regarding phasing, equipment utilized during each phase, trucks, and worker vehicles—is included in Appendix A and is based on the same scenario used in Section 3.3, Air Quality. The estimated Project-generated GHG emissions from construction activities are shown in Table 16.

**Table 16. Estimated Annual Operational Greenhouse Gas Emissions**

<table>
<thead>
<tr>
<th>Year</th>
<th>CO₂ (Metric Tons)</th>
<th>CH₄</th>
<th>N₂O</th>
<th>CO₂e (Metric Tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2021</td>
<td>193.70</td>
<td>0.04</td>
<td>0.00</td>
<td>198.97</td>
</tr>
<tr>
<td>2022</td>
<td>545.80</td>
<td>0.10</td>
<td>0.00</td>
<td>561.08</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>760.05</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Amortized over 30 years</strong></td>
<td></td>
<td></td>
<td><strong>25.34</strong></td>
</tr>
</tbody>
</table>

Notes: CO₂ = carbon dioxide; CH₄ = methane; N₂O = nitrous oxide; CO₂e = carbon dioxide equivalent.
See Appendix A for complete results.

The estimated GHG emissions are substantially below the maximum emission levels identified in Update 2020 of 25,000 MT CO₂e in total and/or 12,500 MT CO₂e annually. DWR anticipates retaining a contractor for Project implementation; the contractor would be required to meet DWR’s Standard Contract Specifications and implement all the construction BMPs identified in Update 2020. The Project involves rodent burrow remediation and maintenance activities and would not alter operation of any of the three DWR facilities affected by the Project. Thus, the Project would not conflict with DWR’s ability to implement any of the GHG emissions reduction measures listed in Update 2020 Chapter VI and would not result in any additional energy demands on the SWP system. Therefore, the Project’s GHG emissions would be consistent with the assumptions and requirements under in Update 2020 and would result in a less-than-significant impact.

Additionally, the estimated construction emissions would remain well below BAAQMD standards. Because BAAQMD has not established construction-phase GHG thresholds, construction GHG emissions were amortized assuming a 30-year development life after completion of construction and were compared to the BAAQMD operational GHG threshold. As shown in Table 16, the estimated total GHG emissions during construction would be approximately 760 MT CO₂e over the construction period. Estimated Project-generated construction emissions amortized over 30 years would be approximately 25 MT CO₂e per year and would not exceed the applied threshold of 660 MT CO₂e per year. As with Project-generated construction criteria air pollutant emissions, GHG emissions generated during construction of the Project would be short term in nature, lasting only for the duration of the construction period each year, and would not represent a long-term source of GHG emissions. Therefore, the Project’s GHG emissions would be less than significant and would not be cumulatively considerable.
b) Would the Project generate conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam

Remediation treatment would involve the use of lightweight and heavy equipment to collapse and/or excavate and backfill burrowing holes. These activities would not result in a substantial increase in GHG emissions. As discussed in response 3.8(a) above, the project would not conflict with Update 2020, which is DWR’s GHG reduction plan, because the estimated GHG emissions would remain substantially below the maximum emission levels identified in Update 2020, the Project contractor would be required to meet DWR’s Standard Contract Specifications and implement all Update 2020 construction BMPs, the Project would not conflict with DWR’s ability to implement any of the operational GHG emissions reduction measures identified in Update 2020, and the Project would not result in any additional energy demands on the SWP system. Therefore, the Project’s GHG emissions would be consistent with the assumptions and requirements in Update 2020 and would result in a less-than-significant impact.

### 3.9 Hazards and Hazardous Materials

<table>
<thead>
<tr>
<th>IX. HAZARDS AND HAZARDOUS MATERIALS – Would the Project:</th>
<th>Potentially Significant Impact</th>
<th>Less-Than-Significant Impact With Mitigation Incorporated</th>
<th>Less-Than-Significant Impact</th>
<th>No Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?</td>
<td>☒</td>
<td>☒</td>
<td>☒</td>
<td>☐</td>
</tr>
<tr>
<td>b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?</td>
<td>☒</td>
<td>☒</td>
<td>☒</td>
<td>☐</td>
</tr>
<tr>
<td>c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?</td>
<td>☒</td>
<td>☒</td>
<td>☐</td>
<td>☒</td>
</tr>
<tr>
<td>d) Be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?</td>
<td>☒</td>
<td>☒</td>
<td>☐</td>
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</tbody>
</table>
### Setting

Hazardous materials stored and used in the area surrounding the Project sites would likely be associated with common materials used in agricultural, commercial and recreational activities, such as paints, cleaning solvents, bonding agents, and small quantity petroleum fuels and lubricants, as well as herbicides and pesticides used for common weed and pest control applications. In addition, hazardous materials are used and stored at the Zone 7 Patterson Pass Water Treatment Plant, which is adjacent to Patterson Dam. A search of the state Geotracker and Envirostor databases determined that none of the three DWR facilities included in this Project are identified as being the site of a hazardous materials release. There are several leaking underground storage tank sites within 1 mile of Clifton Court Forebay Dam, but all have attained a “case closed” status. There is one closed “clean-up program” site located approximately 0.5 miles northwest of Dyer Dam. There is one open soil cleanup case proximate to Patterson Dam, located approximately 0.33 miles southwest of the reservoir (SWRCB 2021; DTSC 2021).

There are no schools within 0.25 miles of any of the three DWR facilities included in the Project. Byron Airport is located approximately 3 miles from Clifton Court Forebay Dam; there are no public or private airports or airstrips in the vicinity of Dyer Dam or Patterson Dam.

Clifton Court Forebay Dam is located in a local responsibility area for fire protection and there are no Moderate or High Fire Severity Zones within or adjacent to the DWR property associated with this facility. Dyer Dam and Patterson Dam are located in a state responsibility area and in Moderate to High Fire Severity Zones (CAL FIRE 2021).
Impact Analysis

a) Would the Project create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam

Implementation of the proposed Project would not require extensive or ongoing use of acutely hazardous materials or substances. Project activities would involve limited transport, storage, use, and disposal of hazardous materials, including fueling and servicing construction equipment on-site, and the transport of fuels, lubricating fluids, and solvents. These types of materials, however, are not acutely hazardous, and all storage, handling, and disposal of these materials is regulated by the California Department of Toxic Substances Control, U.S. Environmental Protection Agency, California Environmental Protection Agency, and the Occupational Safety and Health Administration.

During ongoing maintenance, hazardous materials that may be needed for additional burrow remediation and dam restoration would be managed consistent with existing practices. All hazardous materials would be stored and used in accordance with applicable federal, state, and local regulations. In addition, proper spill management, including response plans and spill kits, would be implemented and maintained on site, as is currently required by DWR. None of the Project components would require new types or additional quantities of hazardous materials to be stored or used at each of the three DWR facilities included in this Project. Accordingly, impacts related to the routine use of hazardous materials would be less than significant.

b) Would the Project create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?

Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam

As discussed in Section 3.9(a), hazardous materials that would be used for burrow remediation, dam restoration, and other Project activities would be managed consistent with existing practices. Following initial implementation of the Project activities, no new types or additional quantities of hazardous materials would be stored or used at each of the three DWR facilities included in this Project, and hazardous materials needed for burrow remediation and dam restoration would be managed consistent with existing practices. Therefore, implementation of the proposed Project would not increase the risk of the release of hazardous materials into the environment, and this impact would be less than significant.

c) Would the Project emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?

Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam

There are no existing or proposed schools within 0.25 miles of any of the three DWR facilities included in the proposed Project, thus there would be no impact associated with emitting or handling hazardous materials proximate to schools.
d) *Would the Project be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?*

**Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam**

None of the three DWR facilities included in the Project are included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 (SWRCB 2021; DTSC 2021), thus there would be **no impact** associated with Project activities occurring on a site known to be affected by hazardous materials.

e) *For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the Project result in a safety hazard or excessive noise for people residing or working in the Project area?*

**Clifton Court Forebay Dam**

Clifton Court Forebay Dam is not located within 2 miles of a public airport or any private airstrips. The Contra Costa County Byron Airport is located over 3 miles north of Clifton Court Forebay Dam and the forebay is outside of the Byron Airport Land Use Compatibility Plan area. Implementation of the Project would not affect any airport operations and would not expose construction workers to excessive air traffic noise levels or safety hazards. Therefore, there would be **no impact** related to airport noise or hazards.

**Dyer Dam and Patterson Dam**

There are no public or private airports or airstrips in the vicinity of Dyer Dam or Patterson Dam. The proposed rodent burrow remediation and restoration work would not expose any people working in the Project site to excessive aircraft-related noise levels or safety hazards. Therefore, the Project would have **no impact**.

f) *Would the Project impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?*

**Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam**

The proposed Project activities would occur within DWR property. There are no residences or business within the Project site, thus there is no demand for emergency response or evacuation at the sites other than the recreational uses at Clifton Court Forebay. The Project would not result in the creation of any physical barriers to emergency response or evacuation activities at the Clifton Court Forebay recreational area or in the areas surrounding each of the three DWR facilities. Construction equipment and materials would be staged on site and would not impede traffic flows in the area. Thus, the Project would have **no impact** related to physical interference with emergency response or evacuation.
Would the Project expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires?

Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam

The proposed Project would involve rodent burrow remediation and restoration measures to provide protection from dam failure, thereby increasing community safety. The Project sites contain limited trees and vegetation; thus, the remediation and restoration activities would not create a substantial risk of fire ignition. Additionally, equipment and materials would be stored at staging areas on site and would not impact daily traffic that could somehow impede evacuation efforts of local communities. If anything, fortifying these water bodies to ensure that they operate and store/convey water properly ensures that a reliable water supply is delivered to end users, including fire protection personnel, during wildfire events such as those that have occurred on a widespread scale in California over the last decade. Therefore, the Project would result in less-than-significant impacts.

3.10 Hydrology and Water Quality

<table>
<thead>
<tr>
<th>X. HYDROLOGY AND WATER QUALITY – Would the Project:</th>
<th>Potentially Significant Impact</th>
<th>Less-Than-Significant Impact With Mitigation Incorporated</th>
<th>Less-Than-Significant Impact</th>
<th>No Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
</tr>
<tr>
<td>b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the Project may impede sustainable groundwater management of the basin?</td>
<td>☐</td>
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<tr>
<td>c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:</td>
<td></td>
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<tr>
<td>i) result in substantial erosion or siltation on or off site;</td>
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<tr>
<td>ii) substantially increase the rate or amount of surface runoff in a manner which would result in flooding on or off site;</td>
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<tr>
<td>iii) create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or</td>
<td>☐</td>
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</tbody>
</table>
Setting

The dams at Clifton Court Forebay, Dyer Reservoir, and Patterson Reservoir were designed as homogenous earthen embankment dams with internal drainage systems. Clifton Court Forebay provides storage for off-peak pumping and allows for regulation of flows into the Harvey O. Banks Pumping Plant. The pumping plant discharges to the California Aqueduct and to the Brushy Creek Pipeline, which discharges to Dyer Reservoir and the South Bay Aqueduct. Water leaves Dyer Reservoir through the Dyer Canal, which discharges to the South Bay Aqueduct. The South Bay Aqueduct feeds Patterson Reservoir through a 175-foot-long reinforced concrete ogee-crest weir. Flow into Patterson Reservoir is controlled by regulation of the canal water surface elevation with Check Structure No. 3. Water within Patterson Reservoir is conveyed to the adjacent Zone 7 Patterson Pass Water Treatment Plant to provide water supply for Livermore.

Impact Analysis

a) Would the Project violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?

Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam

Soil disturbance during grading and construction could potentially result in erosion and sedimentation of downstream water bodies. Erosion and sedimentation affect water quality and interfere with photosynthesis; oxygen exchange; and the respiration, growth, and reproduction of aquatic species. In addition to sediment, other pollutants associated with construction activity could include heavy metals, oil/grease, fuels, debris/trash from construction-related materials, and concrete curing compounds. Sediment can also be a carrier for these pollutants if such pollutants impact on-site soils and are subsequently transported off site.

The Porter–Cologne Act (codified in the California Water Code, Section 13000 et seq.) is the primary water quality control law for California. Whereas the federal Clean Water Act applies to all waters of the United States, the Porter–Cologne Act applies to waters of the state, which includes isolated wetlands and groundwater in addition to federal waters. Under the Act, that State must adopt water quality policies, plans, and objectives that project the State’s waters for the use and enjoyment of the people. The act is implemented by the SWRCB and the RWQCBs, who are required to adopt and periodically update water quality control plans (Basin Plans). Basin Plans are the regional water quality control plan that establish water quality objectives and implementation programs to meet stated objectives and to protect the...
beneficial uses of water in the basin, in compliance with the federal Clean Water Act and the state Porter-Cologne Water Quality Control Act.

For Clifton Court Forebay, the applicable basin plan is the Water Quality Control Plan for the Sacramento River and the San Joaquin River Basins. For Dyer Dam and Patterson Dam, the applicable basin plan is the Water Quality Control Plan for the San Francisco Bay Basin.

The Project could result in localized, short-term impacts to water quality due to excavation and other activities within drainage and intake channels. However, because the Project would result in the disturbance of more than 1 acre of land, it would be subject to the SWRCB General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (Construction General Permit). The Construction General Permit requires preparation and implementation of a SWPPP, which must include best management practices designed to reduce potential impacts to surface water quality throughout construction and operation of a project. The Construction General Permit requires routine inspection of all best management practices to monitor effectiveness of the SWPPP. DWR would be required to submit a Notice of Intent to the SWRCB to be covered by a National Pollutant Discharge Elimination System permit and prepare the SWPPP prior to beginning Project construction. Specifically, the SWPPP must identify the erosion control measures that would be implemented at each of the three DWR facilities included in this Project to protect water quality and avoid significant adverse effects from erosion, siltation, and introduction of water pollutants.

The activities included in this Project would affect more than 1 acre of land at each of the individual three DWR facilities affected by the Project, and thus a separate SWPPP could be prepared for each individual facility, or a single SWPPP could be prepared for the entire Project.

With implementation of the required SWPPP, the Project would result in less-than-significant impacts associated with potential violations of water quality standards or waste discharge requirements or other degradation of water quality.

b) Would the Project substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the Project may impede sustainable groundwater management of the basin?

Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam

A significant impact could occur if the Project necessitated a volume of groundwater that could lead or contribute to overdraft and unsustainable conditions in a groundwater basin or if the Project would result in the creation of substantial new areas of impervious surfaces that reduce groundwater recharge such that attainment of an identified sustainable yield target would be impaired. Such outcomes would conflict with the California Sustainable Groundwater Management Act.

Proposed Project activities would not require any use or pumping of groundwater, and would not create substantial areas of new impervious surfaces that could reduce groundwater recharge. Therefore, the Project would result in no impact because it would not decrease groundwater supplies.
c) Would the Project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:

i) result in substantial erosion or siltation on or off site;

Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam

In the event drainage patterns were altered and/or increased impervious surfaces resulted in increased stormwater runoff onto existing natural slopes, on-site or off-site erosive scour could occur, which could lead to siltation of downstream water conveyance facilities. The proposed Project involves burrow remediation and dam restoration designed to improve the integrity of the earthen embankment dams at each of the three DWR facilities included in the Project. The Project would also entail improvements to and maintenance activities for drainage channels, intake channels, and drainage ditches. These activities are intended to reduce erosion and scouring.

As discussed in Section 3.10(a), all of the remediation and restoration would be subject to a SWPPP (either a Project-wide SWPPP or individual SWPPPs for each of the three DWR facilities included in the Project) that includes site-specific erosion control measures. The reservoirs associated with each of the dams are built structures; each outlet connects to an aqueduct that is either channelized or piped and would therefore not be subject to erosion. The Project activities at Dyer Dam and at Patterson Dam involve vegetation removal, minor grading of channel invert slope, and placement of permanent vegetation barriers and erosion control. Concrete lining and vegetation planting within the low-level drainage outlet ditches/stormwater control features (see Sections 3A.4-4, 3A.5-4, and 3A.5-5). While these activities are planned to reduce erosion within the drainage outlet ditches, there is a potential for the improvements to increase flow rates and volumes downstream of the affected sections, which could cause additional erosion. Mitigation Measure HYD-1 identifies performance standards for the proposed drainage improvements to ensure that downstream erosion does not occur. Therefore, the Project would have a less-than-significant impact with mitigation incorporated.

ii) substantially increase the rate or amount of surface runoff in a manner which would result in flooding on or off site;

Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam

The rate and amount of surface runoff would be increased if a project increased the amount of impervious surfaces within the project site. The earthen dam embankments at each of the three DWR facilities included in the Project consist of engineered and compacted fill. The Project would involve remediation of rodent burrows at each site by excavating the burrows, backfilling the dam surface with native soil and cementitious material consistent with the existing dam surface materials, and compacting the materials to restore the embankment to the existing condition. The Project would not result in the creation of any areas of new impervious surfaces within the dam embankments.

The proposed Project includes construction of up to 10.64 acres of new permanent toe access roads at Clifton Court Forebay Dam, concrete lining within the north access road drainage ditch at Dyer Dam, and installation of one or more new culverts within an existing unlined drainage ditch at Patterson Dam. Surface drainage from the new roads at Clifton Court Forebay Dam would flow to the surrounding
waterbodies – Old River, Italian Slough, and West Canal. Relative to the size of and existing flows in these waterbodies, the additional drainage from a maximum of 10.64 acres of roads would not cause a noticeable increase in flows and would not cause flooding on or off site.

The new concrete lining in the drainage ditch at Dyer Dam and new culverts at Patterson Dam would add impervious surfaces to the drainage ditches, which could result in slight increases in the rate at which water moves through the ditches, as discussed in Section 3.10(c); however, because the ditches are conveyance features for existing runoff from surfaces outside of the ditch, the additional impervious surfaces would not increase the volume of runoff. Therefore, the Project would have a less-than-significant impact to on- or off-site flooding.

iii) create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or

Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam

Where a project creates new impervious surfaces that increase the rate and/or volume of surface runoff and that runoff is conveyed into a stormwater drainage system, the increased runoff can exceed the capacity of the stormwater conveyance facilities. However, in the case of the proposed Project, runoff flows into the California Aqueduct or the South Bay Aqueduct and does not contribute flows to a stormwater drainage system. Further, the runoff does not pass over impervious surfaces associated with urban development, where pollutants such as oil, particulates from vehicle exhaust, vehicle and tire wear, crank case drippings, and spills are present.

Further, as discussed in Sections 3.10(a) and 3.10(c)ii, the proposed Project would not result in the creation of substantial areas of new impervious surfaces and would not substantially alter the existing rate or amount of surface runoff. Thus, the amount of stormwater runoff at each of the three DWR facilities included in this Project would remain similar to existing conditions.

As discussed in Section 3.9, Hazards and Hazardous Materials, construction of the Project would involve temporary use of common hazardous materials used for construction purposes. However, continued implementation of standard DWR practices to manage hazardous materials through materials handling protocols and spill prevention measures would ensure that water quality would not be degraded by materials used during construction or inadvertent release of those materials. Following construction, the Project would not be expected to result in the release of pollutants into the storm drain system. As a result, the Project would not result in substantial alterations to the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner that would create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff. Impacts would be less than significant.

iv) impede or redirect flood flows?

Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam

The proposed Project would involve implementation of a rodent burrow remediation and dam restoration plan at each of the three DWR facilities included in the proposed Project to improve the integrity of each dam and lessen the potential for dam failure that could result in flooding. The Project would not result in
alterations to the size, slope, or configuration of the earthen dam embankments at each facility and thus would not increase or decrease reservoir capacity and the associated potential for flooding. The Project would result in no impact associated with the potential to impede or redirect flood flows.

Mitigation Measures

The Project could have a substantial adverse effect on drainage patterns by resulting in substantial erosion downstream of the proposed activities within the drainage ditches at Dyer Dam and Patterson Dam; these impacts would be significant. Mitigation Measure HYD-1, listed below, would reduce impacts related to erosion to below a level of significance. Impacts would be less than significant with mitigation incorporated.

HYD-1: Avoid or Minimize Increased Erosion. To avoid or minimize the potential for increased erosion downstream of the low-level drainage outlet ditch improvements at Dyer Dam and Patterson Dam, the California Department of Water Resources (DWR) shall complete a fluvial geomorphology study for the drainage outlet each ditch that evaluates the physical shape of the outlet each ditch and the properties (e.g., velocity, volume, and flow resistance) of water and sediment transport through the drainage outlet each ditch. The fluvial geomorphology study shall also provide design criteria for the proposed drainage ditch activities improvements that will ensure the Project does not increase erosion within or downstream of the affected ditch segments.

d) In flood hazard, tsunami, or seiche zones, would the Project risk release of pollutants due to Project inundation?

Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam

Seiche and tsunami are short duration earthquake-generated water waves in large, enclosed bodies of water and the open ocean, respectively. The extent and severity of a seiche or tsunami would be dependent upon ground motions and fault offset from nearby active faults. No part of the Project would involve alterations to the behavior or direction of earthquake-induced seismic activity. However, implementation of the Project would fortify three existing dams by remediating burrowing rodent damage. Burrowing weakens the integrity of the dams, which could result in dam failure after a seismic event. Given that the purpose of the Project is to fortify three existing dams to ensure that dam integrity is maintained during and after a seismic event, the Project would result in a positive effect. Therefore, this impact would be less than significant.

e) Would the Project conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam

As discussed in Section 3.10(a), the Project would result in effects to more than 1 acre of land and therefore is required to prepare and implement a SWPPP to protect water quality. Further, the DWR facilities included in the Project contribute water to other DWR facilities or local water supply facilities and do not contribute water to natural drainage features. Thus the stormwater runoff from each of the DWR facilities included in this Project would not affect attainment of the water quality control plan goals and objectives for the local water basins.
As discussed in Sections 3.10(b) and 3.10(c), the proposed Project activities would not require any use or pumping of groundwater, and would not create substantial areas of new impervious surfaces that could reduce groundwater recharge. Therefore, the Project would result in no impact to the sustainable groundwater management plans adopted for the project area.

3.11 Land Use and Planning

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<tbody>
<tr>
<td>a) Physically divide an established community?</td>
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</tr>
<tr>
<td>b) Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?</td>
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Setting

**Clifton Court Forebay Dam**

The surrounding land use at Clifton Court Forebay Dam is agriculture and specifically viticulture, pasture grazing, and agricultural preserves. The Contra Costa County General Plan identifies Clifton Court Forebay as being located in the Primary Zone of the Delta and the larger Southeast County planning area, which is “almost exclusively planned for agricultural, watershed, or public purposes” (Contra Costa County 2005).

Contra Costa County General Plan Policy 3-54 states “All public and private management and development activities within the Primary Zone of the Delta shall be consistent with the goals, policies, and provisions of the ‘Land Use and Resource Management Plan’ for the Primary Zone of the Delta as adopted and as may be amended by the Delta Protection Commission” (Contra Costa County 2005).

**Dyer Dam and Patterson Dam**

Dyer Dam and Patterson Dam are located in the unincorporated area of Alameda County. Surrounding land use include large parcels for agricultural uses. There are residential and agricultural land uses to the west of Dyer Road. Additionally, the Zone 7 Patterson Pass Water Treatment Plant is located south of Patterson Dam.

Impact Analysis

**a) Would the Project physically divide an established community?**

Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam

As shown in Figures 8, 13, and 18, all of the proposed Project activities would occur entirely within DWR property. The Project involves maintenance and remediation work for each of the three DWR facilities and
would not alter the size or configuration of the earthen embankments or reservoirs at each facility. The Project would not involve altering the existing use of the site and would not divide an established community. There would be no impact.

b) Would the Project cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?

**Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam**

All Project activities would occur within DWR property. Implementation of the proposed Project would involve burrow remediation, restoration, and maintenance activities necessary to ensure the proper and safe operation of the individual DWR facilities. Implementation of the proposed Project would not alter or change the existing land use or water conveyance operations of DWR and would not directly cause or indirectly contribute to changes in land use or other environmental changes outside of DWR property. There are no approved habitat conservation plans or natural community conservation plans that cover the Project area. Thus, the proposed Project activities would not conflict with any land use policies or regulations, and no impacts would occur.

### 3.12 Mineral Resources

<table>
<thead>
<tr>
<th>XII. MINERAL RESOURCES – Would the Project:</th>
<th>Potentially Significant Impact</th>
<th>Less-Than-Significant Impact With Mitigation Incorporated</th>
<th>Less-Than-Significant Impact</th>
<th>No Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?</td>
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<tr>
<td>b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?</td>
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</table>

### Setting

The Project facilities are located in unincorporated areas of Alameda and Contra Costa Counties. The California Department of Conservation, California Geological Survey conducts Mineral Land Classification surveys that designate land areas, such as mineral resources zones or aggregate resources zones (DOC 2018). The California Geological Survey has mapped aggregate availability in the state, and no aggregate resources zones have been identified on or within the vicinity of the Project. None of the Project sites are located in an area of known or significant mineral resources.
Impact Analysis

a) Would the Project result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?

Clifton Court Forebay Dam

No known mineral resources, mineral recovery sites, or aggregate resource zones are located on the Project sites. According to Contra Costa County General Plan, Figure 8-4 Mineral Resources, there are no designated areas of mineral resource located on or nearby the Project site at Clifton Court Forebay Dam (Contra Costa County 2005). Furthermore, the proposed Project would not involve activities that would impact areas of known mineral resources or mineral recovery sites. The Project would result in no impact to mineral resources.

Dyer Dam and Patterson Dam

Alameda County contains high value sand and gravel resources in the Livermore–Amador Valley floor. According to Figure 8-3, Mineral Resources Sectors within the Planning Area, in the Open Space and Conservation Element of the City of Livermore’s General Plan, Dyer Dam and Patterson Dam are not located in a known mineral resource area (City of Livermore 2004). Furthermore, the proposed Project would not involve activities that would impact areas of known mineral resources or mineral recovery sites. Therefore, implementation of the Project would result in no impact to mineral resources.

b) Would the Project result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?

Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam

As stated in response Section 3.12(a), there are no known mineral resources at any of the Project facilities. The Project would not result in a loss of availability of locally important mineral resources recovery sites in Contra Costa County or Alameda County and there would be no impact. Significant mineral deposits are not known to be present at any of the three DWR facilities included in this Project and none of the DWR facilities are identified as containing important minerals by the applicable general plan. As there are no known mineral resources underlying the Project site, implementation of the Project would not result in a loss of availability of any known mineral resource. The proposed Project would result in no loss of availability of any locally important mineral resources delineated on a local general plan or other land use plan; the Project would have no impact.
# 3.13 Noise

<table>
<thead>
<tr>
<th>Xlll. NOISE – Would the Project result in:</th>
<th>Potentially Significant Impact</th>
<th>Less-Than-Significant Impact With Mitigation Incorporated</th>
<th>Less-Than-Significant Impact</th>
<th>No Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the Project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?</td>
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<tr>
<td>b) Generation of excessive groundborne vibration or groundborne noise levels?</td>
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</tr>
<tr>
<td>c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the Project expose people residing or working in the Project area to excessive noise levels?</td>
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</table>

**Setting**

Clifton Court Forebay Dam is located in Contra Costa County, and Dyer Dam and Patterson Dam are located in Alameda County. Existing noise sources in the Project area include distant traffic, agricultural operations, wildlife vocalizations, wind, and moving water within Clifton Court Forebay, Dyer Reservoir, and Patterson Reservoir.

The Contra Costa County General Plan Policy 11-2 establishes a standard for maximum outdoor noise levels in residential areas of 60 decibels (dB) and a conditionally allowable noise level of 70 dB (Contra Costa County 2005). However, construction noise is exempt from Contra Costa County ordinances as long as work is performed after 7:00 a.m. and before 7:00 p.m. on any day, except Saturday or Sunday on which work shall not take place before 8:00 a.m. and after 5:00 p.m. Similarly, the Alameda County East County Area Plan, Policy 289 states that new noise-sensitive development should include mitigation to avoid being exposed to noise levels that exceed 60 dB and the Alameda County Code defines allowable noise exposure levels for noise-sensitive receptors ranging from 50 dB to 70 dB during daytime hours (7:00 a.m. to 10:00 p.m.) (Alameda County 1994a). The Alameda County Code provides exemptions from these standards for noise from “Public Health, Welfare and Safety Activities,” which include “construction or maintenance and repair operations conducted by public agencies and/or utility companies or their contractors which are deemed necessary to serve the best interests of the public and to protect the public health, welfare and safety” and for construction activities that occur between 7:00 a.m. and 7:00 p.m. on weekdays and between 8:00 a.m. and 5:00 p.m. on Saturdays and Sundays (Alameda County 2021b).

Residences and schools are considered noise-sensitive receptors because ordinary use and enjoyment of these properties and facilities can be impaired by excessive noise levels. The nearest noise-sensitive receptors are a
small residential subdivision with the closest home being approximately 275 feet north of the northeast corner of Clifton Court Forebay Dam; the residential–agricultural properties located west of Dyer Dam, with the residence nearest to the Project work area being approximately 0.2 miles away; and a residential property located south of Patterson Pass Road and east of the South Bay Aqueduct, approximately 0.28 miles from Patterson Dam.

Impact Analysis

a) Would the Project result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the Project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam

Construction noise levels would fluctuate depending on the type, number, and duration of usage of the varying equipment. The effects of noise largely depend on the type of maintenance activities occurring on any given day, noise levels generated by those activities, distances to noise-sensitive receptors, and the existing ambient noise environment near the receptor. On-site maintenance equipment used during site preparation would include excavators, dozers, backhoes, and trucks.

Noise from construction equipment generally exhibits point source acoustical characteristics. Sound from a point source is attenuated (reduced) at a rate of 6 dB per doubling of distance from the source for “hard site” (e.g., paved, urban environments) conditions and at 7.5 dB per doubling of distance for “soft site” (e.g., unpaved, agricultural or natural lands) conditions. Thus, a noise level of 85 dB at 50 feet from the source would decrease to 79 dB or 77.5 dB at 100 feet, 73 dB or 70 dB at 200 feet, and 67 dB or 62.5 dB at 400 feet.

The range of maximum noise levels for various types of construction equipment is depicted in Table 17. These levels reflect a single piece of equipment operating at maximum power. Actual noise levels from a given piece of equipment usually fluctuate because typical operating cycles for construction equipment often involves 2 minutes of full power, followed by 3 or 4 minutes at lower levels. The noise levels shown in Table 17 are based on surveys conducted by the U.S. Environmental Protection Agency in 1971. In the time since 1971, regulations have been adopted to reduce noise generated by certain types of equipment to meet worker noise exposure standards. Also, because of stringent air quality emissions standards, newer, cleaner, and quieter equipment is used on most construction projects in California. Thus, the construction equipment noise levels indicated in Table 17 represent “worst-case” conditions.

Table 17. Construction Equipment Noise Emission Levels

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Typical Maximum Sound Level (dB) at 50 feet from Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>All other equipment &gt; 5 horsepower</td>
<td>85</td>
</tr>
<tr>
<td>Auger drill rig</td>
<td>84</td>
</tr>
<tr>
<td>Backhoe</td>
<td>78</td>
</tr>
<tr>
<td>Compressor (air)</td>
<td>78</td>
</tr>
<tr>
<td>Concrete pump truck</td>
<td>81</td>
</tr>
<tr>
<td>Crane</td>
<td>81</td>
</tr>
</tbody>
</table>
### Table 17. Construction Equipment Noise Emission Levels

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Typical Maximum Sound Level (dB) at 50 feet from Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dozer</td>
<td>82</td>
</tr>
<tr>
<td>Dump truck</td>
<td>76</td>
</tr>
<tr>
<td>Excavator</td>
<td>81</td>
</tr>
<tr>
<td>Flatbed truck</td>
<td>74</td>
</tr>
<tr>
<td>Front end loader</td>
<td>79</td>
</tr>
<tr>
<td>Generator</td>
<td>81</td>
</tr>
<tr>
<td>Generator (&lt;25 KVA, variable message signs)</td>
<td>73</td>
</tr>
<tr>
<td>Man Lift</td>
<td>75</td>
</tr>
<tr>
<td>Pickup truck</td>
<td>75</td>
</tr>
<tr>
<td>Pneumatic tools</td>
<td>85</td>
</tr>
<tr>
<td>Pumps</td>
<td>81</td>
</tr>
<tr>
<td>Roller</td>
<td>80</td>
</tr>
<tr>
<td>Sand blasting (single nozzle)</td>
<td>96</td>
</tr>
<tr>
<td>Scraper</td>
<td>84</td>
</tr>
<tr>
<td>Welder/Torch</td>
<td>74</td>
</tr>
</tbody>
</table>

**Source:** FHWA 2008.

**Notes:** dB = decibels; KVA = kilovolt-amps.

During implementation of the Project, the nearest residential receptor may be exposed to periodic and temporary increases in noise levels. The nearest sensitive receptors to any of the DWR facilities included in the Project are the residences north of Clifton Court Forebay Dam. These residences are approximately 275 feet from the nearest construction activity, and thus would be exposed to maximum noise levels of between 63 and 70 dB. Noise exposure for the nearest residences to Dyer Dam and Patterson Dam would be substantially lower because they are at least 1,000 feet away from Project activities. Thus noise levels for residents near Dyer Dam and Patterson Dam would remain below Alameda County’s maximum acceptable noise exposure level while residents nearest to Clifton Court Forebay Dam could experience temporary noise levels that exceed the Contra Costa County noise standard of 60 dB, but within the conditionally acceptable noise level of 70 dB. However, the Contra Costa County Code exempts construction noise that occurs during daytime hours (between 7:00 a.m. and 7:00 p.m. weekdays and between 8:00 a.m. and 5:00 p.m. weekends) from its noise exposure standards.

Additionally, the construction period would be of limited duration, with Project implementation occurring at all three of the project facilities for up to 6 months per year between 2022 and 2026. Further, construction activities would move around the perimeter of each dam throughout the construction periods, thus noise level exposure at any single noise-sensitive receptor would fluctuate throughout the construction period.

After completion of the initial burrow remediation, restoration, and other Project implementation activities, temporary noise generation would be limited to ongoing monitoring aimed at identifying new rodent burrows that require remediation. Noise levels during these isolated remediation events would be similar to those during the initial remediation and restoration activities.
Because construction noise levels would be within Alameda County’s and Contra Costa County’s conditionally acceptable ranges, the maximum noise levels would be temporary, and there would be minimal periods of noise throughout ongoing monitoring and maintenance, this impact would be less than significant.

b) **Would the Project result in generation of excessive groundborne vibration or groundborne noise levels?**

Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam

Construction activities in the Project area may result in varying degrees of temporary ground vibration, depending on the specific construction equipment used and operations involved. However, excavation would be limited to a maximum of 18 inches in depth and would occur within existing dam embankments and drainage channels. The Project would not require blasting or pile driving. Thus, the potential for groundborne vibration is limited.

Further, groundborne vibration and noise results in impacts when it could cause damage to structures that are proximate to the construction area. Due to the distance to the nearest structure and the minor nature of the ground disturbance associated with the Project, groundborne noise impacts would be less than significant.

c) **For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the Project expose people residing or working in the Project area to excessive noise levels?**

Clifton Court Forebay Dam

Clifton Court Forebay Dam is not located within 2 miles of a public airport. The Contra Costa County Byron Airport is located over 3 miles north of Clifton Court Forebay Dam and is outside of the Byron Airport Land Use Compatibility Plan area. The Project would not result in effects to any airport operations and proposed Project activities would not expose people on- or off-site to excessive noise levels. Therefore, there would be no impact related to airport noise. No private airstrips are in the vicinity of the Project site at Clifton Court Forebay Dam, and the Project would not affect any airstrip operations. Therefore, the proposed Project would not result in exposing people on- or off-site to excessive noise levels and would have no impact to private airstrip noise.

Dyer Dam and Patterson Dam

There are no public or private airports or airstrips in the vicinity of Dyer Dam or Patterson Dam. The proposed rodent burrow remediation and restoration work would not expose any people working on the Project site at Dyer Dam or Patterson Dam to excessive aircraft-related noise levels and the Project would have no impact.
3.14 Population and Housing

<table>
<thead>
<tr>
<th>XIV. POPULATION AND HOUSING – Would the Project:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?</td>
</tr>
<tr>
<td>b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?</td>
</tr>
</tbody>
</table>

Setting

**Clifton Court Forebay Dam**

Surrounding land uses at Clifton Court Forebay Dam include agricultural, viticulture, pasture grazing, and agricultural preserves. Surrounding lands are designated for agricultural use.

**Dyer Dam and Patterson Dam**

Surrounding land use at Dyer Dam and Patterson Dam include large parcels for agricultural uses. Residential/Agriculture properties are located west of Dyer Road. The Zone 7 Patterson Pass Water Treatment Plant is located south of Patterson Dam.

Impact Analysis

a) **Would the Project induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?**

**Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam**

Proposed Project activities include rodent burrow remediation and restoration measures for the downstream faces of the Patterson, Dyer, and Clifton Court Forebay Dams to prevent the ongoing deterioration of the dam embankments. Project activities also include associated improvements to drainage channels, and intake channels, and ditches to reduce erosion and improve water flow. The proposed Project would not involve constructing any housing or land uses that could create significant new employment opportunities and thus would not directly or indirectly increase population in the Project area.
The remediation and maintenance work for the Project would not consume water, change the existing storage capacity of any of the three DWR facilities included in the Project, or extend water supply infrastructure. Thus, implementation of the Project would not result in increased water consumption, require development of new sources of water, or make water supply available to properties that are not currently served. Accordingly, the proposed Project would not induce population growth in the area, and there would be no impact.

b) Would the Project displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?

**Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam**

All Project activities would occur within DWR property and the Project sites do not contain any residences. The proposed Project would not result in displacement of any existing housing. Furthermore, the purpose of the Project is to reduce the risk of dam failure, thus providing a greater protection to residences within the Project vicinity of each facility. Therefore, the proposed Project would not result in impacts to housing or necessitate the construction of replacement housing. In addition, the proposed Project would not displace any people, or result in the need for replacement housing. **No impact** would occur.

### 3.15 Public Services

<table>
<thead>
<tr>
<th>XV. PUBLIC SERVICES</th>
<th>Potentially Significant Impact</th>
<th>Less-Than-Significant Impact With Mitigation Incorporated</th>
<th>Less-Than-Significant Impact</th>
<th>No Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Would the Project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
</tr>
<tr>
<td>Fire protection?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
</tr>
<tr>
<td>Police protection?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
</tr>
<tr>
<td>Schools?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
</tr>
<tr>
<td>Parks?</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
</tr>
<tr>
<td>Other public facilities?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
</tr>
</tbody>
</table>

**Setting**

Fire protection and police protection services in the unincorporated areas of Alameda County are provided by the Alameda County Fire Department and the Alameda County Sheriff’s Department, respectively. Similarly, Contra Costa County’s sheriff and fire departments serve the unincorporated areas of Contra Costa County.

At Clifton Court Forebay, the northern peninsula extending from Clifton Court Road provides access for boating and fishing. The Lazy M Marina is located adjacent to Clifton Court Road, west of Italian Slough. Additionally, members of the public occasionally use the dam crest for walking and bicycling, although the crest is not a public
trail and Clifton Court Forebay is not identified in the Contra Costa General Plan as a public recreation area. Dyer Dam and Patterson Dam are not accessible for public recreation.

The Project sites are outside city limits and there are no schools or parks located in the Project vicinity.

Impact Analysis

a) Would the Project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:

Fire protection?

Clifton Court Forebay Dam

The Project site at Clifton Court Forebay Dam would continue to be served by the Contra Costa County Fire Department. The closest fire station, East Contra Costa Fire Protection, located at 1685 Bixler Road, Brentwood, California is approximately 7.7 miles north of the Project site.

The burrow remediation and restoration work would include use of construction equipment, which could cause a spark or other source of fire ignition. However, the work areas would be cleared of vegetation at the beginning of each construction phase, which would reduce the potential for a fire to be ignited. The annual maintenance activities included in the proposed Project would involve inspection and limited ongoing burrow remediation work similar to existing routine maintenance activities at this site. Thus, the proposed burrow remediation and restoration program would not increase the demand for fire protection or emergency response services. Additionally, construction equipment and vehicles would be staged on site and Project activity would not impede traffic flow on local roadways. Traffic associated with the Project would not increase fire department response times to nearby properties.

The Project would not involve the construction of any new land uses that could increase permanent or temporary population in the area, and thus would not increase demand for fire protection and emergency response services for residential, commercial, or industrial areas. The Project would not result in an increase in the recreational uses of Clifton Court Forebay, and therefore it would not result in a higher level of human activity that could increase demand for fire protection or emergency response services associated with the existing recreation use at this facility. No impacts related to fire protection services would occur as a result of the proposed Project.

Dyer Dam and Patterson Dam

The Project site at Dyer Dam and Patterson Dam would continue to be served by the Alameda County Fire Department. The closest fire station, Station 20, located at 7000 East Avenue, Livermore, California is approximately 6 miles southwest of Dyer Dam and 1.9 miles from Patterson Dam.

The burrow remediation and restoration work would include use of construction equipment, which could cause a spark or other source of fire ignition. However, the work areas would be cleared of vegetation at the beginning of each construction phase, which would reduce the potential for a fire to be ignited. The annual maintenance activities included in the proposed Project would involve inspection and limited
ongoing burrow remediation work similar to existing routine maintenance activities at this site. Thus, the proposed burrow remediation and restoration program would not increase the demand for fire protection or emergency response services. Additionally, construction equipment and vehicles would be staged on site and Project activity would not impede traffic flow on local roadways. Traffic associated with the Project would not increase fire department response times to nearby properties. The Project would not involve the construction of any new land uses that could increase permanent or temporary population in the area, and thus would not increase demand for fire protection and emergency response services for residential, commercial, or industrial areas. Therefore, no impacts related to fire protection services would occur as a result of the proposed Project.

Police protection?

Clifton Court Forebay Dam

The Contra Costa County Sheriff Department provides law enforcement and emergency response in unincorporated areas of Contra Costa County, including the area around Clifton Court Forebay.

The burrow remediation and restoration work would not increase the potential for illegal activity to occur at the Project site and would not increase demand for law enforcement or emergency response services. The Project would not result in increased recreational uses of Clifton Court Forebay, thus it would not result in a higher level of human activity that could increase demand for law enforcement or emergency response services associated with the existing recreation use at this facility. Construction equipment and vehicles would be staged on site and Project activity would not impede traffic flow on local roadways. Traffic associated with the Project would not increase law enforcement response times to nearby properties. The Project would not involve the construction of any new land uses that could increase permanent or temporary population in the area, and thus would not increase demand for police protection services for residential, commercial, or industrial areas. Therefore, no impacts related to police protection services would occur as a result of the proposed Project.

Dyer Dam and Patterson Dam

The Alameda County Sheriff’s Patrol Division provides uniformed law enforcement services to residents in the unincorporated areas of Alameda County, including the area around Dyer Dam and Patterson Dam.

The burrow remediation and restoration work would not increase the potential for illegal activity to occur at the Project site and would not increase demand for law enforcement or emergency response services. Construction equipment and vehicles would be staged on site and Project activity would not impede traffic flow on local roadways. Traffic associated with the Project would not increase law enforcement response times to nearby properties. The Project would not involve the construction of any new land uses that could increase permanent or temporary population in the area, and thus would not increase demand for police protection services for residential, commercial, or industrial areas. Therefore, no impacts related to police protection services would occur as a result of the proposed Project.
**Schools?**

**Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam**

The proposed Project would include two seasons of burrow remediation and restoration as well as ongoing maintenance activities around each of the DWR facilities. The Project would not involve creating new housing or a large number of employment opportunities. Therefore, implementation of the proposed Project would not generate new students or increase the demand on local school systems, and **no impact** to school services would occur.

**Parks?**

**Clifton Court Forebay Dam**

As noted above, at Clifton Court Forebay, the northern peninsula extending from Clifton Court Road provides access for boating and fishing. Proposed Project activities would generally affect the downstream faces of the dam embankment and adjacent channels. As shown in Figure 8, no Project activities are proposed on the northern peninsula. Public access to the boating and fishing area at Clifton Court Forebay would not be affected by the proposed Project. The Project would not result in the creation of any new recreational areas or parks. The Project would have **no impact** on parks and recreation.

**Dyer Dam and Patterson Dam**

Dyer Dam and Patterson Dam are not accessible for public recreation. This Project would not involve creating new recreational areas or parks. It also would not increase population in the area and thus would not increase demand for parks and recreation facilities. The Project would have **no impact** on parks and recreation.

**Other public facilities?**

**Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam**

No other public facilities exist in the Project area that would be affected by the Project activities. The Project would not involve the construction of any new land uses or infrastructure and would not result in increased population in the Project region. Thus, implementation of the proposed Project would not create demands for use or maintenance of other public facilities. There would be **no impact** to other public facilities.
3.16 Recreation

<table>
<thead>
<tr>
<th>XVI. RECREATION</th>
<th>Potentially Significant Impact</th>
<th>Less-Than-Significant Impact With Mitigation Incorporated</th>
<th>Less-Than-Significant Impact</th>
<th>No Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Would the Project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
</tr>
<tr>
<td>b) Does the Project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
</tr>
</tbody>
</table>

Setting

The Contra Costa County Public Works Department operates and maintains a variety of parks throughout the county. There are a number of regional park districts within Contra Costa County, including the East Bay Regional Park District. Livermore offers several public parks maintained by the Livermore Area Recreation and Park District. Park lands in Alameda County are maintained by the East Bay Regional Park District.

Impact Analysis

a) **Would the Project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?**

   **Clifton Court Forebay Dam**

   The Clifton Court Forebay provides limited public access for boating and fishing recreation uses. As discussed in Section 3.15, Public Services, implementation of the Project would have no effect on the recreation facilities at the site. The proposed Project would not entail construction of any new land uses that could increase permanent or temporary population in the area and thus would not increase use of any existing neighborhood parks, regional parks, or other recreational facilities. The Project would have **no impact** due to physical deterioration of any recreational facilities.

   **Dyer Dam and Patterson Dam**

   Dyer Dam and Patterson Dam are not available to the public for recreational uses. The proposed Project would not entail construction of any new land uses that could increase permanent or temporary population in the area and thus would not increase use of any existing neighborhood parks, regional parks, or other recreational facilities. The Project would have **no impact** due to physical deterioration of any recreational facilities.
b) **Does the Project include recreational facilities or require the construction or expansion of recreational facilities, which might have an adverse physical effect on the environment?**

**Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam**

As discussed in Section 3.14, Population and Housing, and Section 3.15, Public Services, implementation of the Project would not directly or indirectly lead to population growth in the region, and thus would not require construction or expansion of recreational facilities. As discussed in Section 3.15, implementation of the proposed Project would not adversely affect the existing recreational activities at Clifton Court Forebay. Implementation of the Project would not require construction or expansion of recreational facilities and therefore would result in no impact.

### 3.17 Transportation

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
</tr>
<tr>
<td>b) Conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
</tr>
<tr>
<td>c) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
</tr>
<tr>
<td>d) Result in inadequate emergency access?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
</tr>
</tbody>
</table>

### Setting

**Clifton Court Forebay Dam**

As shown in Figure 6, Clifton Court Forebay Access, the primary access to the dam is via Byron Highway to Clifton Court Road and a secondary access is provided from Byron Highway via the Skinner Fish Facility entrance. The primary access point provides access to the west, north, and east dam segments. Typical access to the south dam segment is also from Clifton Court Road, but this access point is subject to load restrictions because it passes over the intake control structure bridge. Thus, the additional access point through the Skinner Fish Facility entrance would provide access to the southern dam embankment and intake channel for heavy haul trucks or equipment. There is a potential alternative access point from Byron Highway via Herdlyn Road, but this alternative would require access through private farmland and would only be used if access through the Skinner Fish Facility would interfere with ongoing O&M operations. Additionally, this alternative would require a temporary entry permit for evaluation of the existing farm road if needed as site access for construction. Additionally, new temporary and...
permanent toe access roads covering up to 5.75 and 10.64 acres, respectively, may be necessary for construction and long-term operations and maintenance.

**Dyer Dam**

Dyer Dam is located in Altamont Hills, north of Altamont Pass Road. As shown in Figure 11, Dyer Reservoir Access, this site can be accessed from Dyer Road via the existing entrance road serving the reservoir facility. Access to the entire toe of the dam and the dam facility is provided by an existing gravel road, which provides access to a paved roadway atop the crest of the dam via ramps on the north and south side of the reservoir. Existing gravel access roads and the paved crest road would provide access to the western embankment slope while the eastern embankment slope would be accessed from the paved crest road and from the upper settling pond maintenance road. Construction of a temporary construction road connected to the existing maintenance road near the spillway may be necessary due to heavy use of the north access road. Construction of this temporary access road would minimize impacts to existing traffic on the north access road. The temporary construction road would be 20 feet wide and 0.25 miles long, with a gravel surface.

**Patterson Dam**

As shown in Figure 16, Patterson Reservoir Access, the site is accessed from Patterson Pass Road. Approximately 1 mile to the west, Patterson Pass Road intersects with Greenville Road, which then provides access to I-580. Existing paved and gravel access roads within the Patterson Dam facility would provide access to most of the construction areas within this site. As shown in Figure 16, a temporary construction access area would be constructed north of the proposed staging area and existing settling pond on the east side of the reservoir, and a second temporary construction access area would be provided through the existing maintenance yard.

**Impact Analysis**

a) *Would the Project conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities?*

**Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam**

Proposed Project activities include rodent burrow remediation and restoration measures for the downstream faces of the earthen embankment dams at Clifton Court Forebay, Dyer Dam, and Patterson Dam to prevent the ongoing deterioration of the dam embankments. Activities also include associated improvements to drainage channels, and intake channels, and ditches to reduce erosion and improve water flow.

During the remediation and restoration efforts between 2022 and 2026, construction traffic would include trucks delivering equipment and materials to be staged at each of the three DWR facilities, trucks importing materials to the Project site, and construction workers commuting to and from each facility. All Project traffic would use existing roadways to access the DWR facilities. The only new permanent and temporary roadways would be constructed within DWR property. The Project would result in no impact related to creating roadways that could conflict with the existing or planned circulation system, including transit, roadway, bicycle, and pedestrian modes of travel.

After the initial construction seasons, ongoing monitoring and maintenance would require the use of a periodic passenger vehicle for monitoring activities and truck traffic for localized remediation and
restoration work. Implementation of the Project would not generate daily traffic that could interfere with the operation of transit, roadway, bicycle, or pedestrian facilities outside of the affected DWR properties.

As discussed in Section 3.15, Public Services, and Section 3.16, none of the DWR facilities included in this Project include public bicycle or pedestrian trails or facilities. Thus, implementation of the Project would have no impact to bicycle and pedestrian transportation.

b) Would the Project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?

Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam

CEQA Guidelines Section 15064.3(b) stipulates that CEQA analyses for land development projects may not rely on measures of roadway congestion to identify environmental effects and that “generally, vehicle miles traveled is the most appropriate measure of transportation impacts.” The California Governor’s Office of Planning and Research Technical Advisory on Evaluating Transportation Impacts Under CEQA (Technical Advisory) (OPR 2018) provides guidance on how to incorporate analysis of vehicle miles traveled in a CEQA analysis. The Technical Advisory states that achieving the state’s long-term climate goals will require that California reduce per capita vehicle miles traveled, particularly because half of California’s GHG emissions come from the transportation sector. The Technical Advisory also notes that CEQA Guidelines Section 15064.3 defines vehicle miles traveled as “the amount and distance of automobile travel attributable to a project,” and further that the term automobile refers to on-road passenger vehicles, specifically cars and light trucks while excluding heavy equipment (OPR 2018).

Proposed Project activities include rodent burrow remediation and restoration measures for the downstream faces of the earthen embankment dams at Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam to prevent the ongoing deterioration of the dam embankments. Activities also include associated improvements to drainage channels and, intake channels, and ditches to reduce erosion and improve water flow. During the remediation and restoration efforts between 2022 and 2026, construction traffic would include trucks delivering equipment and materials to be staged at each of the three DWR facilities, trucks importing materials to the Project site, and construction workers commuting to and from each facility. After the initial construction seasons, ongoing monitoring and maintenance would require periodic passenger vehicle travel for monitoring activities and truck traffic for localized remediation and restoration work. The monitoring activities would be consistent with the existing DWR maintenance activities for each dam and thus would not generate daily traffic trips and would not substantially increase annual vehicle miles traveled associated with dam monitoring and maintenance.

Implementation of the Project would not generate new traffic trips and vehicle miles traveled because it would not involve the construction any new land uses, would not increase the recreational facilities at Clifton Court Forebay, and would not directly or indirectly increase population in the Project region. Therefore, no impact would occur.

c) Would the Project substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam

The Project would not involve the construction of any new permanent roads or modification to existing roads; thus it would not create any hazards due to a geometric design feature. Implementation of the
Project would require transport of heavy equipment and materials to each of the three DWR facilities at the start of each construction season. However, the transport of this equipment and materials would not change or reconstruct existing roadways, and thus would not create any impediments to existing emergency access in the area. Therefore, **no impact** would occur.

d) **Would the Project result in inadequate emergency access?**

**Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam**

Access to the Project site would be maintained via the existing roadways. Staging would occur on site and would not block emergency vehicle access to any of the three DWR facilities included in this Project or to any surrounding properties. Implementation of the Project would not change or reconstruct existing roadways, and thus would not create any impediments to existing emergency access in the area. Implementation of the Project would therefore result in **no impacts** to emergency vehicle or resource access.

### 3.18 Tribal Cultural Resources

<table>
<thead>
<tr>
<th>XVIII. TRIBAL CULTURAL RESOURCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Would the Project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>a) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>b) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe?</th>
</tr>
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</table>

### Setting

As stated in Section 3.5, Cultural Resources, the archaeology and prehistory of the Central Valley, and San Joaquin Valley in particular, are not well understood. Early and widespread agricultural use of the valley floor has destroyed much of the bottomland archaeology, siltation has most likely buried many resources well below the
surface sediments, and archaeological material that has been recovered from the valley area is devoid of context because it was scavenged from the surface and placed in private collection. Despite these difficulties, a general chronological framework for the Central Valley has been developed. Like the general California chronology, the archaeological record of the Central Valley can be divided into the Paleoindian Period (11,550 to 8550 calibrated years [cal] BC), Archaic Period (8550 cal BC to cal AD 1100), Emergent Period (cal AD 1100 to 1750), and Ethnohistoric Period (post-AD 1769). The Archaic Period is further subdivided into three phases—the Lower Archaic (8550 to 5550 cal BC), Middle Archaic (5550 to 550 cal BC), and Upper Archaic (550 cal BC to cal AD 1100)—based on climatic and cultural variations (Bennyhoff and Fredrickson 1994; Groza 2002; Rosenthal et al. 2007) (Confidential Appendices C1 and C2).

The Project is subject to compliance with AB 52 (California Public Resources Code, Section 21074), which requires consideration of impacts to “tribal cultural resources” as part of the CEQA process and requires the CEQA lead agency to notify any California Native American groups (who have requested notification) of a proposed project who are traditionally or culturally affiliated with the geographic area in which the project takes place. On February 24, 2021, DWR sent a notification letter to the Ione Band of Miwok Indians, pursuant to AB 52. DWR then followed up with an email on March 3, 2021. DWR has not received any response to the AB 52 notification. DWR considers the period of AB 52 consultation to be closed.

Additionally, in accordance with DWR’s established Tribal Engagement Policy, DWR contacted Native American tribes as recommended by the Native American Heritage Commission, independent of AB 52 outreach. Under DWR’s Tribal Engagement Policy, notifications regarding the Project were sent to the following tribes in May 2021:

- Amah Matsun Tribal Band of Mission San Juan Bautista
- The Confederated Villages of Lisjan
- Costanoan Rumsen Carmel Tribe
- Indian Canyon Matsun Band of Costanoan
- Muwekma Ohlone Indian Tribe of the San Francisco Bay Area
- North Valley Yokuts Tribe
- The Ohlone Indian Tribe
- Tule River Indian Tribe
- Wilton Rancheria

DWR, having reviewed all information provided, considers the Project unlikely to impact tribal cultural resources and/or cultural resources and the period of tribal engagement to be closed.
Impact Analysis

a) Would the Project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:

i) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k)?

Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam

As discussed in Section 3.5, the NWIC records search and the archaeological survey completed for the Project did not identify evidence of Native American archaeological deposits or ancestral remains. Implementation of the proposed Project would not impact known tribal cultural resources that are listed or eligible for listing in the CRHR or a local register of historical resources, nor has a tribal cultural resource been identified at the Project site. As noted in Section 3.5, implementation of Mitigation Measures CUL-1 and CUL-2 would ensure that potential impacts related to previously undiscovered historic or archaeological resources and human remains, including tribal resources, would be less than significant. The Project would result in a less-than-significant impact with mitigation incorporated.

ii) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe?

Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam

Implementation of Mitigation Measures CUL-1 and CUL-2 would ensure that potential impacts related to previously undiscovered historic or archaeological resources and human remains, including tribal resources, would be less than significant. The Project would result in a less-than-significant impact with mitigation incorporated.
3.19 Utilities and Service Systems

<table>
<thead>
<tr>
<th>XIX. UTILITIES AND SERVICE SYSTEMS – Would the Project:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Require or result in the relocation or construction of new or expanded water, wastewater treatment, or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?</td>
</tr>
<tr>
<td>b) Have sufficient water supplies available to serve the Project and reasonably foreseeable future development during normal, dry, and multiple dry years?</td>
</tr>
<tr>
<td>c) Result in a determination by the wastewater treatment provider, which serves or may serve the Project that it has adequate capacity to serve the Project’s projected demand in addition to the provider’s existing commitments?</td>
</tr>
<tr>
<td>d) Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?</td>
</tr>
<tr>
<td>e) Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?</td>
</tr>
</tbody>
</table>

Setting

Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam do not currently generate wastewater or require the use of a wastewater treatment facility. None of the Project activities would require consumption of potable water or generate wastewater.

Impact Analysis

a) Would the Project require or result in the relocation or construction of new or expanded water, wastewater treatment, or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?

Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam

Implementation of the proposed Project would involve use of existing water supplies, would not generate wastewater, and would not require new water supplies. Additionally, implementation of the proposed Project...
would not require new or expanded sources of storm drainages, electric power, natural gas, or telecommunication facilities. Therefore, there would be no impact from construction or relocation of utilities.

b) Would the Project have sufficient water supplies available to serve the Project and reasonably foreseeable future development during normal, dry, and multiple dry years?

Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam

The Project would involve rodent burrow remediation (burrow collapse, excavation, compaction, and backfilling), erosion prevention measures, ongoing monitoring, and permanent measures to prevent future burrowing where warranted. After completion of burrow remediation, DWR would undertake ongoing monitoring and maintenance, as described in the Rodent Burrow Maintenance and Monitoring Plan (DWR 2021), to prevent formation of new habitat capable of supporting special-status wildlife species. Project activities would use existing water supplies and would not increase the current water use at the Project sites. Therefore, there would be no impact to future water supplies as a result of the Project.

c) Would the Project result in a determination by the wastewater treatment provider, which serves or may serve the Project that it has adequate capacity to serve the Project’s projected demand in addition to the provider’s existing commitments?

Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam

As noted in Section 3.19(a), proposed Project activities would involve the use of existing water supplies and would not generate wastewater. Implementation of the proposed Project would not require new water supplies and would not construct any new restroom facilities. As such, no increase in wastewater generation or increases in discharge from wastewater treatment facilities would occur. Therefore, no impacts would occur.

d) Would the Project generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?

Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam

Implementation of the proposed Project would require removal of vegetation and sediment from the Project sites. Vegetation and sediment removal would be transported via dump truck to a nearby green waste facility and designated spoil sites. The amount of green waste generated by Project activities would not cause a green waste facility to exceed capacity. Therefore, the Project would result in a less-than-significant impact.

e) Would the Project comply with federal, state, and local management and reduction statutes and regulations related to solid waste?

Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam

As stated in Section 3.19(d), implementation of the proposed Project would generate solid waste in the form of vegetation and sediment. Vegetation and sediment would be disposed via dump trucks to a nearby green waste facility and designated spoil sites. The proposed Project would comply with all applicable federal, state, and local regulations and no impacts are anticipated.
3.20 Wildfire

<table>
<thead>
<tr>
<th>XX. WILDFIRE – If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the Project:</th>
</tr>
</thead>
<tbody>
<tr>
<td>XX. WILDFIRE – If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the Project:</td>
</tr>
<tr>
<td>a) Substantially impair an adopted emergency response plan or emergency evacuation plan?</td>
</tr>
<tr>
<td>Potentially Significant Impact</td>
</tr>
<tr>
<td>☐</td>
</tr>
<tr>
<td>b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose Project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?</td>
</tr>
<tr>
<td>Potentially Significant Impact</td>
</tr>
<tr>
<td>☐</td>
</tr>
<tr>
<td>c) Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines, or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?</td>
</tr>
<tr>
<td>Potentially Significant Impact</td>
</tr>
<tr>
<td>☐</td>
</tr>
<tr>
<td>d) Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?</td>
</tr>
<tr>
<td>Potentially Significant Impact</td>
</tr>
<tr>
<td>☐</td>
</tr>
</tbody>
</table>

Setting

The Project sites are entirely located in unincorporated areas of Alameda County and Contra Costa County. The California Department of Forestry and Fire Protection (CAL FIRE) adopted Fire Hazard Severity Zones Maps, which includes maps for state responsibility areas, as well as recommended maps for local responsibility areas. Fire protection services are provided by each county’s fire department.

Impact Analysis

a) Would the Project substantially impair an adopted emergency response plan or emergency evacuation plan?

Clifton Court Forebay Dam

The Project site at Clifton Court Forebay Dam is located in a local responsibility area and therefore is not located within a CAL FIRE designated Very High Fire Hazard Severity Area Zone (CAL FIRE 2021). The Project site at Clifton Court Forebay Dam would continue to be served by the Contra Costa County Fire Department. The proposed Project would not result in permanent increases in vehicle traffic or any changes to existing roadways and thus would not interfere with emergency response or evacuation. The Project would have no impact due to impairing implementation of emergency response or evacuation plans at Clifton Court Forebay Dam.
Dyer Dam and Patterson Dam

According to CAL FIRE’s Fire Hazard Severity Zones Maps, Dyer Dam and Patterson Dam are located in a state responsibility area and are within CAL FIRE-designated Moderate Fire Hazard Severity Zones (CAL FIRE 2021). Fire protection for the Project sites at Dyer Dam and Patterson Dam is provided by CAL FIRE. The closest station is CAL FIRE Station 21, located on Corral Hollow Road, approximately 13.5 miles east of Patterson Dam. The nearest Alameda County Fire Department station is Station 20, located at 7000 East Avenue, approximately 2.5 miles west of Patterson Dam. The proposed Project would not result in permanent increases in vehicle traffic or any changes to existing roadways and thus would not interfere with emergency response or evacuation. The Project would have no impact due to impairing implementation of emergency response or evacuation plans at Dyer Dam and Patterson Dam.

b) Would the Project, due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose Project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?

Clifton Court Forebay Dam

The Project site at Clifton Court Forebay Dam is not located within a Very High Fire Hazard Severity Area Zone, as mapped by CAL FIRE (CAL FIRE 2021). While the dam itself contains sections with moderate to steep slopes, the surrounding areas are relatively flat agricultural lands. Canals and other waterways are present on three sides of the dam, and the site contains limited trees and vegetation. Therefore the dam is not in an area of substantial wildfire risk. The proposed Project would involve rodent burrow remediation and restoration measures to provide protection from dam failure. During implementation, the use of heavy equipment could cause sparks that may be a source of fire ignition. However, given the limited extent of vegetation, this would not create a substantial risk of wildfire. Thus, the Project would not result in an exacerbated fire risk. Further, the Project does not include any residential or commercial land uses that would introduce human population or activities to the project area and the Project would result in no impact associated with exposing individuals to pollutant concentrations or uncontrolled spread of a wildfire at Clifton Court Forebay Dam.

Dyer Dam and Patterson Dam

Dyer Dam and Patterson Dam are located in a state responsibility area and designated as Moderate to High Severity Zones (CAL FIRE 2021). The proposed Project sites are generally flat, contain limited trees and vegetation, and are surrounded by agricultural lands. The purpose of the proposed Project is to provide dam remediation and maintenance to decrease the risk of dam failure due to hazards created by rodent burrows. During implementation, the use of heavy equipment could cause sparks that may be a source of fire ignition. However, given the limited extent of vegetation within the Project site, this would not create a substantial risk of wildfire. Thus, the Project would not result in an exacerbated fire risk. Further, the Project does not include any residential or commercial land uses that would introduce human population or activities to the project area and the Project would result in no impact associated with exposing individuals to pollutant concentrations or uncontrolled spread of a wildfire at Dyer Dam and Patterson Dam.
c) **Would the Project require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines, or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?**

**Clifton Court Forebay Dam**

The Project site at Clifton Court Forebay Dam is not located within a Very High Fire Hazard Severity Area Zone, as mapped by CAL FIRE (CAL FIRE 2021). The Project would involve rodent burrow remediation and restoration measures to arrest ongoing deterioration of the dam embankments and prevent future burrowing. Access to the site would rely on existing roadways and the Project would not involve the installation of roads, fuel breaks, emergency water sources, power lines, or other utilities that would otherwise exacerbate fire risk. Therefore, there would be no impact.

**Dyer Dam and Patterson Dam**

The proposed Project would involve rodent burrow remediation and restoration measures to arrest ongoing deterioration of the dam embankments and prevent future burrowing. Access to the Dyer Dam and Patterson Dam sites would rely on existing roadways and the Project would not involve the installation of roads, fuel breaks, emergency water sources, power lines, or other utilities that would otherwise exacerbate fire risk. Therefore, there would be no impact.

d) **Would the Project expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?**

**Clifton Court Forebay Dam**

While Clifton Court Forebay Dam contains sections with moderate to steep slopes, the surrounding areas are relatively flat agricultural lands. Canals and other waterways are present on three sides of the dam, and the site contains limited trees and vegetation. Therefore, the dam is not in an area of substantial wildfire risk. Further, once implementation of the proposed rodent burrow remediation and restoration measures is complete, the Project would not increase the potential for the dam to be affected by wildfire and the Project would not alter the potential for post-fire hazards, such as flooding, landslides, slope instability, or drainage changes, to occur in the Project vicinity. Thus, the Project at Clifton Court Forebay Dam would have no impact.

**Dyer Dam and Patterson Dam**

The Project sites at Dyer Dam and Patterson Dam are located entirely on DWR lands that are predominantly flat. Areas of rolling topography are present in the vicinity but are not immediately adjacent to the sites. Once implementation of the proposed rodent burrow remediation and restoration measures is complete, the Project would not increase the potential for the dam to be affected by wildfire. Further, the Project would not alter the potential for post-fire hazards, such as flooding, landslides, slope instability, or drainage changes, to occur in the project vicinity. Thus, the Project at Dyer Dam and Patterson Dam would have no impact.
### 3.21 Mandatory Findings of Significance

<table>
<thead>
<tr>
<th>XXI. MANDATORY FINDINGS OF SIGNIFICANCE</th>
<th>Potentially Significant Impact</th>
<th>Less-Than-Significant Impact With Mitigation Incorporated</th>
<th>Less-Than-Significant Impact</th>
<th>No Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Does the Project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?</td>
<td>❌</td>
<td>✗</td>
<td>❌</td>
<td>✗</td>
</tr>
<tr>
<td>b) Does the Project have impacts that are individually limited, but cumulatively considerable? (“Cumulatively considerable” means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?</td>
<td>❌</td>
<td>✗</td>
<td>❌</td>
<td>✗</td>
</tr>
<tr>
<td>c) Does the Project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?</td>
<td>❌</td>
<td>✗</td>
<td>❌</td>
<td>✗</td>
</tr>
</tbody>
</table>

**a)** Does the Project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory?

As discussed in Section 3.4, the Project has the potential to result in significant impacts to special-status plant and wildlife species, riparian habitat and other sensitive natural communities, state and federally protected wetlands, and wildlife movement. Implementation of Mitigation Measures BIO-1 through BIO-11 would ensure that these impacts would be avoided and/or minimized, and compensation would be provided where impact avoidance is infeasible, such that the Project impacts would be reduced to less-than-significant levels.

As discussed in Section 3.5, no known cultural resources would be affected by the Project, though known resources exist within 0.5 miles of the Project site. Implementation of Mitigation Measure CUL-1 would ensure that appropriate measures are implemented to ensure that impacts to any inadvertent discovery of cultural resources during ground-disturbing activities remains less than significant. Mitigation Measure CUL-2 would ensure compliance with applicable regulations and appropriate protocol should human remains be unearthed during Project construction. With implementation of mitigation measures, impacts would be less than significant.
As discussed in Section 3.10, Project activities at the low-level within drainage outlet ditches at Dyer Dam and Patterson Dam could result in erosion, which could contribute to impacts to fish and wildlife species. Mitigation Measure HYD-1 would ensure that Project activities are appropriately designed and implemented to avoid this potential impact. Thus, with implantation of this mitigation measure, impacts would be less than significant.

b) Does the Project have impacts that are individually limited, but cumulatively considerable? (*Cumulatively considerable* means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?

The direct activities of the Project would occur solely within the footprint of the Project site of the existing dams. Impact analyses included in this IS take into account nearby projects and consider the Project within the context of local and regional planning guidance. While ongoing land use development throughout Alameda and Contra Costa Counties could lead to significant cumulative impacts to air quality, biological and cultural resources, hydrology and water quality, public services, and transportation, the proposed Project would not make a cumulatively considerable contribution to these impacts with implementation of the mitigation measures identified throughout this IS.

c) Does the Project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?

The Project would be consistent with applicable local ordinances and policies related to aesthetics, air quality, GHG, management of potential hazards, land use, noise, and protection of natural resources and the environment, as disclosed by this IS. The analyses of impacts provided throughout this IS evaluate direct and indirect impacts that could result from the Project. Impacts within all resource categories evaluated would be less than significant with implementation of mitigation measures identified throughout this document and thus the Project would not result in direct or indirect substantial adverse effects on human beings. Further, the purpose of the proposed Project is to remediate existing rodent burrows to improve the integrity of each dam. Thus, implementation of the Project would reduce the potential for dam failure that could result in flooding that would adversely affect people residing or working in areas or within the potential inundation zones associated with Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam, and reduce the potential for dam failure that could disrupt water supplies to urban and agricultural land uses.
4 References and Preparers

4.1 References Cited

14 CCR 15000–15387 and Appendices A through N. Guidelines for Implementation of the California Environmental Quality Act, as amended.


Ambacher, P. 2013. “P-07-003122 (Clifton Court Forebay).” DPR 523-series forms on file at the CHRIS Northwest Information Center, Sonoma State University, Rohnert Park, California. Prepared by AECOM for DWR.


DWR. n.d. “Special-status species occurrence data from the Delta Field Division” [GIS digital data]. Unpublished geodatabase files, provided by DWR Division of Environmental Services (DES) to Dudek, on November 25, 2020.


Kim, M., and J. Williams. 2013. “P-07-004698 (MPTO_002_001; California State Water Project, Delta Field Division Facilities).” DPR 523-series forms on file at the CHRIS Northwest Information Center, Sonoma State University, Rohnert Park, California. Prepared by ICF International for DWR.


4.2 List of Preparers

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GIS

Kirsten Zecher, Graphics Technician
Andrew Greis, GIS Analyst
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At Clifton Court Forebay Dam: Rodent burrows, slumping, and erosion due to animal burrowing, November 2019.

At Patterson Dam: Burrow holes and associated embankment surface slope failures on downstream dam embankment, November 2019.

Burrow Remediation Step by Step

Existing Conditions
Rodents make burrows in earthen dams that could compromise structural integrity. Special-status wildlife species potentially utilize the burrows, complicating maintenance efforts.

1. Excavation
Dam surface excavated, depth of excavation varies based on site-specific conditions.

2. Backfill
Remnants of burrows are backfilled with varying materials based on site conditions.

3. Compaction
Excavated areas filled-in/compacted.

4. Bedding Rock/Armored Rock
Layers of rock and wire mesh help prevent new burrows.

- **Top Layer:** Armoring rock layer where warranted based on site-specific conditions and monitoring data; depth varies to a maximum of 18”.
- **Middle Layer:** PVC-Coated steel wire mesh.
- **Bottom Layer:** Bedding rock layer, depth varies based on site-specific conditions to a maximum of 12”.

Diagram is not to scale.
Clifton Court Forebay Overview

SOURCE: DWR 1/8/2021; ESRI World Imagery
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FIGURE 6
Clifton Court Forebay Access
Delta Dams Rodent Burrow Remediation

Access Gates

SOURCE: DWR 1/8/2021; ESRI World Imagery
FIGURE 7

Clifton Court Forebay Rodent Burrow Damage Severity

SOURCE: DWR 1/8/2021; ESRI World Imagery

Rodent Burrow Damage Severity
- Low
- Medium
- High
Figure 8
Clifton Court Forebay Proposed Activities
Delta Dams Rodent Burrow Remediation

SOURCE: DWR 2021-05-12; ESRI World Imagery

Legend:
- Project Site
- Burrow Remediation Area
- Staging Area
- Tree Removal
- Construction Access

Segment 4
Segment 5
Tree Removal Area
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Dyer Canal
South Bay Aqueduct
Dyer Reservoir

Rodent Burrow Damage Severity
- Medium
- High

FIGURE 12
Dyer Dam Rodent Burrow Damage Severity
Delta Dams Rodent Burrow Remediation

SOURCE: DWR 12/28/2020; ESRI World Imagery
FIGURE 13
Dyer Reservoir Proposed Activities
Delta Dams Rodent Burrow Remediation

SOURCE: DWR 04/05/2022; ESRI World Imagery
Zone 7 Wash
Water Tank
Check Structure No. 3
Water Intake Weir
Settling Pond
Patterson Pass Water Treatment Plant
Patterson Reservoir
South Bay Aqueduct
Aqueduct Overflow Channel
Low Flow Channel
Maintenance Yard
Low Flow Outlet Pipe
Patterson Reservoir Overview

FIGURE 14
Patterson Reservoir Overview
Delta Dams Rodent Burrow Remediation

SOURCE: DWR 12/11/2020; ESRI World Imagery
Maintenance Yard

Patterson Reservoir

South Bay Aqueduct

Existing Access Road

Proposed Temporary Access Road

SOURCE: DWR 12/11/2020; ESRI World Imagery
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FIGURE 17
Patterson Dam Rodent Burrow Damage Severity

Source: DWR 12/11/2020; ESRI World Imagery

Rodent Burrow Damage Severity
- High
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Patterson Reservoir Proposed Activities

FIGURE 18

Patterson Reservoir Rodent Burrow Remediation

SOURCE: DWR 04/05/2022; ESRI World Imagery
Impacts to Vegetation Communities - Clifton Court Forebay

FIGURE 19A

SOURCE: DWR 05/12/2021; ESRI World Imagery

Study Area

Impacts

Permanent
Temporary

Vegetation Communities

Bog and Marsh
- *Allenroflea occidentalis / Distichlis spicata Provisional Association*
- *Allenroflea occidentalis Association*
- Atriplex lentiformis Association
- Distichlis spicata Association
- Schoenoplectus acutus Association*

Grass and Herb Dominated
- *Lolium perenne - Hordeum marinum - Ranunculus californicus Semi-natural Association*
- *Wild oats and annual brome grasslands (Avena spp. - Bromus spp.) Semi-Natural Alliance*

Disturbed and Developed
- Open water
- Disturbed Habitat
- Urban/Developed

* Sensitive Vegetation Community
Figure 19B
Impacts to Vegetation Communities - Clifton Court Forebay

DAM ACCESS RD

Study Area
Impacts
Permanent
Temporary

Vegetation Communities

Bog and Marsh
- Allenroflea occidentalis / Distichlis spicata
  Provisional Association*
- Allenroflea occidentalis Association*
- Atriplex lentiformis Association
- Juncus arcticus var. balticus - (var. mexicanus) Association

Grass and Herb Dominated
- Brassica nigra Semi-natural Association
- Wild oats and annual brome grasslands (Avena spp. - Bromus spp.) Semi-Natural Alliance

Disturbed and Developed
- General Agriculture
- Disturbed Habitat
- Urban/Developed

* Sensitive Vegetation Community
**Impacts to Vegetation Communities - Clifton Court Forebay**

**Study Area**

**Impacts**

Permanent

**Vegetation Communities**

**Bog and Marsh**
- *Atriplex lentiformis Association*
- *Distichlis spicata Association*

**Grass and Herb Dominated**
- *Brassica nigra Semi-natural Association*
- *Conium maculatum Semi-natural Association*
- *Lolium perenne - Hordeum marinum - Ranunculus californicus* Semi-natural Association
- *Wild oats and annual brome grasslands (Avena spp. - Bromus spp.)* Semi-Natural Alliance

**Disturbed and Developed**
- *General Agriculture*
- *Open water*
- *Disturbed Habitat*
- *Urban/Developed*

**Figure 19C**

**SOURCE:** DWR 05/12/2021; ESRI World Imagery
Impacts to Vegetation Communities - Clifton Court Forebay

**Study Area**

**Impacts**
- Permanent
- Temporary

**Vegetation Communities**

**Bog and Marsh**
- *Arundo donax* Semi-natural Association
- *Lepidium latifolium* Semi-natural Association

**Riparian**
- *Alnus rubra / Salix lasiolepis / Rubus spp./ita> Association*
- *Rubus armeniacus* Semi-natural Association

**Grass and Herb Dominated**
- *Brassica nigra* Semi-natural Association
- *Conium maculatum* Semi-natural Association
- *Lolium perenne / Hordeum marinum / Ranunculus californicus* Semi-natural Association
- Wild oats and annual brome grasslands (*Avena spp. - Bromus spp.*) Semi-Natural Alliance

**Disturbed and Developed**
- Open water
- Urban/Developed

* Sensitive Vegetation Community
FIGURE 19E
Impacts to Vegetation Communities - Clifton Court Forebay

DWR 05/12/2021; ESRI World Imagery

Study Area
Impacts
- Permanent
- Temporary

Vegetation Communities
- Bog and Marsh
  - Lepidium latifolium Semi-natural Association
- Riparian
  - Rubus armeniacus Semi-natural Association
- Grass and Herb Dominated
  - Lolium perenne - Hordeum marinum - Ranunculus californicus Semi-natural Association
- Disturbed and Developed
  - Open water
  - Urban/Developed

SOURCE: DWR 05/12/2021; ESRI World Imagery
**Impacts to Vegetation Communities - Clifton Court Forebay**

- **Bog and Marsh**
  - Lepidium latifolium Semi-natural Association
  - Polygonum (amphibium, lapathifolium) Association
  - Schoenoplectus americanus Association*

- **Riparian**
  - Juglans hindsii Semi-natural Association*
  - Rubus armeniacus Semi-natural Association
  - Salix gooddingii Association*

- **Grass and Herb Dominated**
  - Elymus glaucus Association*
  - Lolium perenne - Hordeum marinum - Ranunculus californicus Semi-natural Association
  - Wild oats and annual brome grasslands (Avena spp. - Bromus spp.) Semi-Natural Alliance

- **Disturbed and Developed**
  - Open water
  - Disturbed Habitat
  - Urban/Developed

* Sensitive Vegetation Community

**Figure 19F**

Source: DWR 05/12/2021; ESRI World Imagery
FIGURE 19G
Impacts to Vegetation Communities - Clifton Court Forebay

Study Area
Impacts
Permanent
Temporary
Vegetation Communities

Bog and Marsh
- Arundo donax Semi-natural Association
- Frankenia salina Association
- Polygonum (amphibium, lapathifolium) Association
- Schoenoplectus americanus Association

Riparian
- Rubus armeniacus Semi-natural Association
- Salix gooddingii Association

Grass and Herb Dominated
- Brassica nigra Semi-natural Association
- Conium maculatum Semi-natural Association
- Elymus glaucus Association
- Lolium perenne - Hordeum marinum - Ranunculus californicus Semi-natural Association

Dune
- Carpobrotus (edulis) Semi-natural Association

Disturbed and Developed
- Urban/Developed

*Sensitive Vegetation Community

SOURCE: DWR 05/12/2021; ESRI World Imagery
**Figure 19H: Impacts to Vegetation Communities - Clifton Court Forebay**

- **Study Area**
- **Impacts**
  - Permanent
  - Temporary

**Vegetation Communities**

- **Bog and Marsh**
  - *Lepidium latifolium* Semi-natural Association
  - *Schoenoplectus americanus* Association*

- **Riparian**
  - *Cephalanthus occidentalis* Association*
  - *Rubus armeniacus* Semi-natural Association
  - *Salix gooddingii* Association*

- **Scrub**
  - *Baccharis pilularis* / Annual grass - herb Association

- **Grass and Herb Dominated**
  - *Brassica nigra* Semi-natural Association
  - *Conium maculatum* Semi-natural Association
  - *Lolium perenne* / *Hordeum marinum* / *Ranunculus californicus* Semi-natural Association
  - Wild oats and annual brome grasslands (*Avena* spp. - *Bromus* spp.) Semi-Natural Alliance

- **Disturbed and Developed**
  - Open water
  - Disturbed Habitat
  - Urban/Developed

* Sensitive Vegetation Community

---

**Source:** DWR 05/12/2021; ESRI World Imagery

**Sheet:** DWR 08/12/2021; ESRI World Imagery
FIGURE 19
Impacts to Vegetation Communities - Clifton Court Forebay

SOURCE: DWR 05/12/2021; ESRI World Imagery

- Study Area
- Impacts
- Permanent
- Temporary

Vegetation Communities

- Bog and Marsh
  - Lepidium latifolium Semi-natural Association
  - Schoenoplectus americanus Association*

- Riparian
  - Cephalanthus occidentalis Association*

Grass and Herb Dominated
- Brassica nigra Semi-natural Association
- Conium maculatum Semi-natural Association
- Lolium perenne - Hordeum marinum - Ranunculus californicus Semi-natural Association

Disturbed and Developed
- Open water
- Disturbed Habitat
- Urban/Developed

* Sensitive Vegetation Community
FIGURE 19J
Impacts to Vegetation Communities - Clifton Court Forebay

Impacts:
- Permanent
- Temporary

Vegetation Communities:
- Bog and Marsh:
  - Allenroflea occidentalis Association
  - Arundo donax Semi-natural Association
  - Brassica nigra Semi-natural Association
  - Lactuca perenne - Hordeum marinum - Ranunculus californicus Semi-natural Association
  - Wild oats and annual brome grasslands (Avena spp. - Bromus spp.) Semi-Natural Alliance

- Disturbed and Developed:
  - Open water
  - Disturbed Habitat
  - Urban/Developed

* Sensitive Vegetation Community

SOURCE: DWR 05/12/2021; ESRI World Imagery
Impacts to Vegetation Communities - Dyer Dam

**Generalized Vegetation Communities**

**Bog and Marsh**
- Cattail marshes; *Typha-latifolia-angustifolia*
- Quailbush scrub; *Atriplex lentiformis*
- Salt grass flats; *Distichlis spicata*

**Grass and Herb Dominated**
- Needle grass-Melic grass grassland *
- Perennial rye grass fields; *Lolium perenne-Hordeum marinum-Ranunculus californicus*
- Upland mustards or star-thistle fields; *Carduus pycnocephalus-Silybum marianum*
- Upland mustards or star-thistle fields; *Brassica nigra*
- Wild oats and annual brome grasslands

**Riparian**
- Arroyo willow thickets; *Salix lasiolepis*

**Other**
- Disturbed and Developed

* Sensitive Vegetation Community

**Figure 20**

SOURCE: DWR 04/05/2022; ESRI Imagery

Delta Dams Rodent Burrow Remediation
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Generalized Vegetation Communities

**Bog and Marsh**
- Cattail marshes; *Typha latifolia-angustifolia*
- Hardstem and California bulrush marshes; *Schoenoplectus acutus* *
- Salt grass flats; *Distichlis spicata*

**Grass and Herb Dominated**
- Needle grass-Melic grass grassland *
- Upland mustards or star-thistle fields; *Brassica nigra*
- Upland mustards or star-thistle fields; *Raphanus sativus*
- Wild oats and annual brome grasslands

**Other**
- Disturbed and Developed

* Sensitive Vegetation Community

**Study Area**
- **Impacts**
  - Permanent
  - Temporary

**FIGURE 21**
Impacts to Vegetation Communities - Patterson Dam

SOURCE: DWR 04/05/2022; ESRI Imagery

DUDEK
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FIGURE 22A
USACE - Impacts to Delineated Aquatic Resources - Clifton Court Forebay

SOURCE: DWR 2021-05-12; ESRI World Imagery

Study Area
Proposed Exempt (Maintenance) Impacts
- Permanent
- Temporary

Delineated Aquatic Resources
- Non-wetland Waters
- Wetland

Staging Area
Burrow Remediation Area
Toe Road
California Aqueduct
Byron Hwy
Clifton Court Forebay
Dam Access Rd
Clifton Court Forebay
Staging Area
Burrow Remediation Area

SOURCE: DWR 2021-05-12; ESRI World Imagery

0 450 900 Feet
FIGURE 22B

USACE - Impacts to Delineated Aquatic Resources - Clifton Court Forebay

Study Area
Proposed Exempt (Maintenance) Impacts
- Permanent
- Temporary

Delineated Aquatic Resources
- Non-wetland Waters
- Wetland

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SOURCE: DWR 2021-05-12; ESRI World Imagery
FIGURE 22C
USACE - Impacts to Delineated Aquatic Resources - Clifton Court Forebay

SOURCE: DWR 2021-05-12; ESRI World Imagery

Study Area
Proposed Exempt (Maintenance) Impacts
Permanent
Delineated Aquatic Resources
- Non-wetland Waters
- Wetland
Burrow Remediation Area

Staging Area

TOE ROAD

Burrow Remediation Area

Clifton Court Forebay

Old River

Intake Channel

FIGURE 22D

USACE - Impacts to Delineated Aquatic Resources - Clifton Court Forebay

Source: DWR 2021-05-12; ESRI World Imagery
Figure 22E

USACE - Impacts to Delineated Aquatic Resources - Clifton Court Forebay

Study Area
- Proposed Exempt (Maintenance) Impacts
  - Permanent
  - Temporary

Delineated Aquatic Resources
- Non-wetland Waters
- Wetland

Source: DWR 2021-05-12; ESRI World Imagery
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FIGURE 22G
USACE - Impacts to Delineated Aquatic Resources - Clifton Court Forebay

Source: DWR 2021-05-12; ESRI World Imagery

Study Area

Proposed Exempt (Maintenance) Impacts
- Permanent
- Temporary

Delineated Aquatic Resources
- Non-wetland Waters
- Wetland

Clifton Court Forebay

Old River

Burrow Remediation Area

Staging Area

Toe Road
FIGURE 22H

USACE - Impacts to Delineated Aquatic Resources - Clifton Court Forebay

Study Area
Proposed Exempt (Maintenance) Impacts
- Permanent
- Temporary

Delineated Aquatic Resources
- Non-wetland Waters
- Wetland

SOURCE: DWR 2021-05-12; ESRI World Imagery
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FIGURE 22J

USACE - Impacts to Delineated Aquatic Resources - Clifton Court Forebay

Study Area
Proposed Exempt (Maintenance) Impacts
- Permanent
- Temporary

Delineated Aquatic Resources
- Non-wetland Waters
- Wetland

SOURCE: DWR 2021-05-12; ESRI World Imagery
FIGURE 23
Impacts to USACE-Jurisdictional Areas - Dyer Dam

SOURCE: DWR 04/05/2022; ESRI Imagery

Study Area

Impacts
- Permanent
- Temporary

USACE Jurisdictional Areas
- Non-wetland Waters
- Wetland
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FIGURE 24

Impacts to USACE-Jurisdictional Areas - Patterson Dam

SOURCE: DWR 04/05/2022; ESRI Imagery

DUDEK

Study Area
Impacts
- Permanent
- Temporary
USACE-Jurisdictional Areas
- Non-wetland Waters
- Wetland
FIGURE 25A

RWQCB - Impacts to Delineated Aquatic Resources - Clifton Court Forebay

SOURCE: DWR 2021-05-12; ESRI World Imagery
FIGURE 25B
RWQCB - Impacts to Delineated Aquatic Resources - Clifton Court Forebay

SOURCE: DWR 2021-05-12; ESRI World Imagery
Study Area

Proposed Exempt (Maintenance) Impacts

Permanent

Delineated Aquatic Resources

- Non-wetland Waters
- Wetland

Clifton Court Forebay

Toe Road

FIGURE 25C

RWQCB - Impacts to Delineated Aquatic Resources - Clifton Court Forebay

Delta Dams: Rodent Burrow Remediation

SOURCE: DWR 2021-05-12; ESRI World Imagery
FIGURE 25D
RWQCB - Impacts to Delineated Aquatic Resources - Clifton Court Forebay

SOURCE: DWR 2021-05-12; ESRI World Imagery

- Study Area
- Sub Area A
- Proposed Regulated Impacts
  - Permanent
- Proposed Exempt (Maintenance) Impacts
  - Permanent
  - Temporary
- Delineated Aquatic Resources
  - Non-wetland Waters
  - Wetland
FIGURE 25E
RWQCB - Impacts to Delineated Aquatic Resources - Clifton Court Forebay

SOURCE: DWR 2021-05-12; ESRI World Imagery

- Study Area
- Proposed Exempt (Maintenance) Impacts
  - Permanent
  - Temporary

Delineated Aquatic Resources
- Non-wetland Waters
- Wetland

- Toe Road
- Burrow Remediation Area
- Clifton Court Forebay
- Dam Access Rd
- West Canal
- Byron Hwy
- 4B
- 4C
- 4D
- 4E
- 4F
- 4G
- 4H
- 4I
- 4J
- 4K

300 Feet

0 300 600 Feet
Staging Area

Toe Road

Burrow Remediation Area

Clifton Court Forebay

Old River

West Canal

FIGURE 25F

RWQCB - Impacts to Delineated Aquatic Resources - Clifton Court Forebay

SOURCE: DWR 2021-05-12; ESRI World Imagery
**FIGURE 25G**

RWQCB - Impacts to Delineated Aquatic Resources - Clifton Court Forebay

**SOURCE:** DWR 2021-05-12; ESRI World Imagery

- **Study Area**
- **Proposed Exempt (Maintenance) Impacts**
  - Permanent
  - Temporary
- **Delineated Aquatic Resources**
  - Non-wetland Waters
  - Wetland
FIGURE 25H

RWQCB - Impacts to Delineated Aquatic Resources - Clifton Court Forebay

Delta Dams: Rodent Burrow Remediation

SOURCE: DWR 2021-05-12; ESRI World Imagery
Study Area

Proposed Exempt (Maintenance) Impacts
- Permanent
- Temporary

Delineated Aquatic Resources
- Non-wetland Waters
- Wetland

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FIGURE 25I
RWQCB - Impacts to Delineated Aquatic Resources - Clifton Court Forebay
Delta Dams Rodent Burrow Remediation Project

SOURCE: DWR 2021-05-12; ESRI World Imagery
Burrow Remediation Area
Toe Road
Staging Area
Clifton Court
Forebay
Clifton Court Rd
Dam Access Rd
Californ ia Aqu educt
Italian Slou gh
FIGURE 25J
RWQCB - Impacts to Delineated Aquatic Resources - Clifton Court Forebay
Delta Dams Rodent Burrow Remediation
SOURCE: DWR 2021-05-12; ESRI World Imagery

Study Area
Proposed Exempt (Maintenance) Impacts
- Permanent
- Temporary
Delineated Aquatic Resources
- Non-wetland Waters
- Wetland
FIGURE 26

Impacts to RWQCB-Jurisdictional Areas - Dyer Dam

* additional aquatic resources may be present outside of impact areas
Impacts to RWQCB-Jurisdictional Areas - Patterson Dam

Study Area
- Burrow Remediation Area
- Drainage Feature Improvements
- Drainage Channel
- Maintenance Access
- Construction Access
- Vegetation Removal

RWQCB-Jurisdictional Areas*
- Non-wetland waters
- Wetland

* additional aquatic resources may be present outside of impact areas

FIGURE 27

SOURCE: DWR 04/05/2022; ESRI Imagery

DWR 04/05/2022; ESRI Imagery

Delta Dams Rodent Burrow Remediation
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Impacts to CDFW-Jurisdictional Areas - Clifton Court Forebay Dam

Study Area
Impacts
Permanent
Temporary
CDFW-Jurisdictional Areas
Streambed
Riparian

FIGURE 28A
Impacts to CDFW-Jurisdictional Areas - Clifton Court Forebay Dam

SOURCE: DWR 05/12/2021; ESRI World Imagery
Impacts to CDFW-Jurisdictional Areas - Clifton Court Forebay Dam

Staging Area

Burrow Remediation Area

Toe Road

Staging Area

Clifton Court Forebay

FIGURE 28B
FIGURE 28E  Impacts to CDFW-Jurisdictional Areas - Clifton Court Forebay Dam

- Study Area
- Impacts
- Permanent
- Temporary

CDFW-Jurisdictional Areas
- Streambed
- Riparian

SOURCE: DWR 05/12/2021; ESRI World Imagery
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Impacts to CDFW-Jurisdictional Areas - Clifton Court Forebay Dam

Study Area

Impacts
- Permanent
- Temporary

CDFW-Jurisdictional Areas
- Streambed
- Riparian

Source: DWR 05/12/2021; ESRI World Imagery

FIGURE 28F

Impacts to CDFW-Jurisdictional Areas - Clifton Court Forebay Dam

Delta Dams Rodent Burrow Remediation
Impacts to CDFW-Jurisdictional Areas - Clifton Court Forebay Dam

Delta Dams Rodent Burrow Remediation

SOURCE: DWR 05/12/2021; ESRI World Imagery

Study Area
Impacts
- Permanent
- Temporary
CDFW-Jurisdictional Areas
- Streambed
FIGURE 28H
Impacts to CDFW-Jurisdictional Areas - Clifton Court Forebay Dam

SOURCE: DWR 05/12/2021; ESRI World Imagery
Impacts to CDFW-Jurisdictional Areas - Clifton Court Forebay Dam

Study Area

Impacts
- Permanent
- Temporary

CDFW-Jurisdictional Areas
- Streambed

FIGURE 28I

Impacts to CDFW-Jurisdictional Areas - Clifton Court Forebay

SOURCE: DWR 05/12/2021; ESRI World Imagery
FIGURE 28J
Impacts to CDFW-Jurisdictional Areas - Clifton Court Forebay Dam

- Study Area
- Impacts
  - Permanent
  - Temporary
- CDFW-Jurisdictional Areas
  - Streambed

SOURCE: DWR 05/12/2021; ESRI World Imagery

Clifton Court Forebay
DAM ACCESS RD

Clifton Court Forebay

Burrow Remediation Area

Staging Area

Toe Road
Impacts to CDFW-Jurisdictional Areas - Dyer Dam

SOURCE: DWR 04/05/2022; ESRI Imagery

FIGURE 29

Study Area

Impacts

- Permanent
- Temporary

CDFW-Jurisdictional Areas

- Streambed
- Riparian
Impacts to CDFW-Jurisdictional Areas - Patterson Dam

Study Area

Impacts
- Permanent
- Temporary

CDFW-Jurisdictional Areas
- Streambed
- Riparian

FIGURE 30

SOURCE: DWR 04/05/2022; ESRI Imagery
Clifton Court Forebay

**FIGURE 31**

Impacts to Special-Status Plants - Clifton Court Forebay Dam

**SOURCE:** DWR 05/17/2021; ESRI World Imagery

Study Area
Impacts
Permanent
Temporary

Special-Status Plants (CRPR 1B.2)
- long-styled sand-spurrey (*Spergularia macrotheca*)
FIGURE 32
Temporary Impacts on Vernal Pool Fairy Shrimp Habitat

SOURCE: DWR 2021-05-12; CDFW 2021; ESRI World Imagery

- Study Area
- Non-jurisdictional Aquatic Resources

**Impacts**
- Permanent
- Temporary

**Proposed Activities**
- Burrow Remediation Area
- Staging Area
- Toe Road

**CNDDB Occurrence**
- Vernal pool fairy shrimp
Impacts on California Red-legged Frog and California Tiger Salamander Habitat at Dyer Dam

- SOURCE: DWR 04/05/2022; ESRI World Imagery

**FIGURE 33**

- Study Area
- Impacts
  - Permanent
  - Temporary

**California Red-legged Frog and California Tiger Salamander Habitat**
- Aquatic Habitat
- Upland and Dispersal Habitat
Impacts on California Red-Legged Frog and California Tiger Salamander at Patterson Dam

Aquatic Habitat
Upland and Dispersal Habitat

Study Area
Impacts
Permanent
Temporary

California Red-legged Frog and California Tiger Salamander Habitat

SOURCE: DWR 04/05/2022; ESRI World Imagery

FIGURE 34

Impacts on California Red-Legged Frog and California Tiger Salamander at Patterson Dam

Delta Dams Rodent Burrow Remediation
5 Responses to Comments

This chapter of the Final IS includes a copy of all comment letters that were submitted during the public review period for the Draft IS for the Delta Dams Rodent Burrow Remediation Project (Project), along with responses to those comments. The focus of the responses to comments is on the disposition of significant environmental issues raised in the comments, as specified by Section 15088(c) of the California Environmental Quality Act Guidelines.

Three written comment letters were received on the Draft IS. These have been coded with a letter to facilitate identification and tracking (see Table 2-1). The comment letters were reviewed and divided into individual comments, with each comment containing a single theme, issue, or concern. Individual comments and the responses to them were assigned corresponding numbers (e.g., A-1, A-2, A-3). To aid readers and commenters, electronically bracketed comment letters have been reproduced in this document, with the corresponding responses provided immediately following each comment letter. The interested parties listed in Table 2-1 submitted letters during the public review period for the Draft IS.

Table RTC-1. Comments Received on the Draft Initial Study

<table>
<thead>
<tr>
<th>Comment Letter</th>
<th>Commenter</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Stephanie Fong, California Department of Fish and Wildlife–Bay Delta Region</td>
<td>December 29, 2021</td>
</tr>
<tr>
<td>B</td>
<td>Brian Wines, San Francisco Bay Regional Water Quality Control Board</td>
<td>December 30, 2021</td>
</tr>
<tr>
<td>C</td>
<td>Nicholas White, Central Valley Regional Water Quality Control Board</td>
<td>January 3, 2022</td>
</tr>
</tbody>
</table>

In addition to revisions made to the IS described in these responses to comments, the California Department of Water Resources has made the following IS revisions:

1. Revised the Project Description to omit the originally proposed Project component of adding concrete lining to the v-ditch along the north access road at Dyer Dam.
2. Revised the Project Description and associated figures to reduce the extent of riprap within the low-level outlet channel at Patterson Dam from 180 feet to 135 feet.
3. Revised the Project Description to omit the originally proposed Project component of excavating, regrading, and/or lining surface drainage features northwest of Patterson Dam.
4. In Mitigation Measure BIO-5, added a requirement to develop a Relocation Plan pursuant to comments from California Department of Fish and Wildlife staff regarding the Streambed Alteration Agreement application.
Memorandum

Date: December 29, 2021

To: Sara Paiva
California Department of Water Resources
Post Office Box 942836
Sacramento, CA 94236
Sara.Paiva-Lowry@water.ca.gov

From: Melissa Farinha for Stephanie Fong
California Department of Fish and Wildlife-Bay Delta Region, 2825 Cordelia Road, Suite 100, Fairfield, CA 94534

Subject: Delta Dam Rodent Burrow Remediation Project, Initial Study/Mitigated Negative Declaration, SCH No. 20201120050, County of Alameda and Contra Costa

The California Department of Fish and Wildlife (CDFW) has reviewed the Initial Study/Mitigated Negative Declaration (IS/MND) prepared by the California Department of Water Resources (DWR) for the Delta Dam Rodent Burrow Remediation Project (Project), located in the County of Alameda and Contra Costa. CDFW is submitting comments on the IS/MND regarding potentially significant impacts to biological resources associated with the Project.

CDFW ROLE

CDFW is a Trustee Agency with responsibility under the California Environmental Quality Act (CEQA; Pub. Resources Code, § 21000 et seq.) pursuant to CEQA Guidelines section 15386 for commenting on projects that could impact fish, plant, and wildlife resources (e.g., biological resources). CDFW is also considered a Responsible Agency if a project would require discretionary approval, such as permits issued under the California Endangered Species Act (CESA), the Native Plant Protection Act, the Lake and Streambed Alteration (LSA) Program, and other provisions of the Fish and Game Code that afford protection to the state’s fish and wildlife trust resources.

PROJECT DESCRIPTION AND LOCATION

The Project will occur at three DWR facilities: Clifton Court Forebay, Dyer Reservoir, and Patterson Reservoir. The facilities are surrounded by an earthen dam that is subject to ongoing rodent burrowing that can lead to “piping” and internal erosion. “Piping” occurs when a burrow intercepts the water level within the dam and causes material from the dam embankment to migrate and be carried away. This “piping” progresses upstream, elongating the pipe, until it reaches the reservoir. Once connection is made to the reservoir, the “piping” can cause a dam breach and could lead to dam failure.
The Project proposes to prevent dam failure by collapsing and/or excavating burrows, backfilling the dam surface, and compacting the soil. In some locations, wire and/or rock would be placed to provide permanent armor to deter future rodent burrowing. Additional maintenance and repair measures include intake channel repair and removal of trees around a sump at Clifton Court Forebay; drainage ditch repair and remediation of erosion along the entrance road at Dyer Reservoir; and outlet drainage channel improvements at Patterson Reservoir.

The Clifton Court Forebay is located within the County of Contra Costa approximately 10 miles northwest from the City of Tracy, Dyer Dam is located within the County of Alameda approximately 13 miles west of the City of Tracy and 7 miles southeast of the City of Livermore, Patterson Reservoir is located within the County of Alameda approximately 1 mile east of the City of Livermore.

COMMENTS AND RECOMMENDATIONS

CDFW offers the following comments and recommendations to assist DWR in adequately identifying and/or mitigating the Project's significant, or potentially significant, direct and indirect impacts on biological resources.

COMMENT 1: Mitigation Measure BIO-2 and BIO-11 – Deferred Mitigation

Issue: Mitigation Measure BIO-2 and BIO-11 states that the Project will have permanent and temporary impacts to long-styled sand-spurrey (California Rare Plant Rank [CRPR] 1B2) and waters of the United States and that the impacts are significant and require mitigation. However, the IS/MND does not provide enforceable Project mitigation measures to reduce potential impacts to long-styled sand-spurrey and waters of the United States to less-than-significant levels. Instead, the IS/MND provides a list of mitigation options for compensation of permanent and temporary impacts without committing to any of the options.

Supporting evidence: CEQA Guidelines, section 15126.4, subd. (a)(1)(B) does not allow for mitigation measures to be developed at a later time.

Recommendation: CDFW recommends that to compensate for impacts to long-styled sand-spurrey and waters of the United States that DWR identifies specific enforceable mitigation measures that the Project will implement to compensate for the Project's permanent and temporary impacts to long-styled sand-spurrey and waters of the United States.

COMMENT 2: Mitigation Measure BIO-2 – Permanent Impact Mitigation Measure

Issue: The IS/MND provides various mitigation measure options to compensate for permanent impacts to long-styled sand-spurrey. One of the compensation options is the creation of a new long-styled sand-spurrey population.
Evidence impact would be significant: The creation of a new population of special status plant species is difficult and most often fails to result in a new self-sustaining population.

Recommendation: CDFW recommends that the Project compensate for permanent impacts to long-styled sand-spurrey by acquiring and preserving lands that contain existing long-styled sand-spurrey populations instead of creating a new population. The land acquired should be preserved in perpetuity through a conservation easement.

Comment 3: California Tiger Salamander – Clifton Court Forebay Dam

Issue: The IS/MND states that there is a moderate probability of California tiger salamander (CTS) to be present at the Clifton Court Forebay; however, Mitigation Measure BIO-5, which is meant to avoid take of CTS, is not sufficient to avoid take. Note that in the event CTS are found on-site and a finalized CESA Incidental Take Permit has not been obtained to conduct the Project, significant project delays could occur. Therefore, CDFW recommends the Project apply for an Incidental Take Permit early on prior to Project implementation. If CTS are within the Project area, then it is questionable whether the Project could achieve complete take avoidance of the species. Only established protocol level surveys for CTS, that take up to two years to complete, would be sufficient to determine the species-status within the Project footprint.

Supporting Evidence: Grading, collapsing and filling rodent burrows will result in crushing and suffocation of CTS when they are present. These activities may also result in reducing or fragmenting breeding or non-breeding habitat.

Recommended Mitigation Measure 1: All Project activities shall begin on or after June 1 and all work activities shall be completed by October 31 of each year. All concrete or cementitious-soil slurry work shall be poured before September 15 of each year to ensure adequate curing time prior to precipitation events.

Recommended Mitigation Measure 2: Project activities shall be restricted to dry weather. Project activities shall be timed with awareness of precipitation forecasts and potential increases in stream flows. Work within the stream and riparian corridor shall cease when the National Weather Service (NWS) 24-hour weather forecast indicates a 40 percent chance or higher of precipitation of at least 0.10-inch of precipitation. All necessary erosion control measures shall be implemented prior to the onset of precipitation or inundation. Any construction equipment and materials shall be removed if inundation is likely. Work halted due to precipitation may resume after a dry out period of 24-hours and when the NWS 24-hour weather forecast indicates less than a 40 percent chance of precipitation. If the rain event is more than a 0.25-inch per 24-hour rain event, Project activities shall not recommence until there is a dry out period of 24 hours after the rain event ceases.
Recommended Mitigation Measure 3: A qualified biologist or biological monitor shall inspect the work area each day prior to mobilization of equipment and starting work. If the qualified biologist or biological monitor determines the work areas are not occupied by sensitive species, equipment may be moved into the work area under the observation of the qualified biologist or biological monitor and Project activities may begin.

Recommended Mitigation Measure 4: A qualified biologist shall inspect all ruts and holes, etc. for CTS immediately prior to and during burrow excavation or removal. The qualified biologist shall survey the open areas adjacent to ongoing construction. Multiple biologists may be necessary to survey the area appropriately. If CTS is observed, Project activities shall immediately stop and the Project shall contact U.S. Fish and Wildlife Service (USFWS) and CDFW. Project activities shall not reconvene until the Project has demonstrated compliance with the federal Endangered Species Act (ESA) and CESA.

Recommended Mitigation Measure 5: Permittee shall excavate all burrows by hand (e.g., shovels and non-powered hand-held tools) under the direction of a qualified biologist. If any CTS are found during excavation, Project activities shall immediately stop and the Project shall contact USFWS and CDFW. Project activities shall not reconvene until the Project has demonstrated compliance with ESA and CESA.

Recommended Mitigation Measure 6: After a burrow excavation is complete, the Project shall immediately fill the burrow that same day.

Comment 4: Mitigation Measure Bio-5

Issue: Mitigation Measure Bio-5 of the IS/MND states that within 30 days prior to clearing existing vegetation for staging areas south of the dam (i.e., between Skinner Fish Facility and intake channel), an approved biologist shall survey for the presence of potential underground refugia for CTS (i.e., small mammal burrows). If potential refugia are observed, they shall be covered with plywood to prevent collapse from temporary heavy equipment traffic. An approved biologist shall monitor and guide the placement of plywood over burrows. However, placing plywood over burrows could potentially cause take of CTS.

Evidence impact would be significant: Placing plywood over burrows can result in trapping CTS within the burrows.

Recommendation: To avoid take of CTS, CDFW recommends that plywood not be placed over burrows to provide a staging area between the Skinner Fish Facility and intake channel. CDFW recommends having an approved qualified biologist survey the staging area at least seven days prior to staging area establishment to identify and flag all burrows located within the staging area. The qualified biologist shall then establish a staging area where no burrows are located and would not be impacted by the Project.
Comment 5: Mitigation Measure Bio-7

**Issue:** Mitigation Measure Bio-7 of the IS/MND states that nesting bird season is from March 15 to August 31 and that nesting bird surveys will be conducted within seven days prior to construction activities involving vegetation removal. However, birds, such as raptors, have been found to nest from February 1 to September 15 and could be impacted by other Project activities not associated with vegetation removal.

**Evidence impact would be significant:** If nesting bird surveys are not conducted during the entire range of the nesting bird season for all Project activities, the Project can result in destruction of an active bird nest and cause avoidable disturbances to nesting birds.

**Recommended Revised Mitigation Measure BIO-7:** A qualified biologist shall conduct pre-construction surveys for nesting birds and bird nests no more than seven days prior to any construction activity and shall resurvey if there is a four day or more lapse in construction activities. Surveys shall occur during the nesting season (February 1 to September 15). Surveys shall cover the Project footprint and potential nest habitat and features within 250 feet for all birds, and 1,000 feet for raptors and tri-colored blackbird. If the biologist does not find any nests but potential habitat would be removed, the biologist shall conduct a final nesting survey within the habitat to be removed and within 250 feet of the habitat within 48 hours of the activity to confirm the absence of nests. Any construction activity that occurs from September 15 to October 15, outside the nesting season, shall not require pre-construction nesting bird surveys.

Comment 6: Mitigation Measure Bio-7 – Swainson’s Hawk

**Issue:** Mitigation Measure Bio-7 of the IS/MND states that a qualified biologist shall conduct pre-construction surveys for nesting birds, including Swainson’s hawk, no more than seven days prior to any construction activity involving vegetation removal during the nesting season (March 15 to September 15). However, CDFW’s species-specific protocol-level surveys that were developed to maximize the probability of locating a Swainson’s hawk nest should be required to reduce impacts to a level of less-than-significant.

**Evidence impact would be significant:** Conducting non protocol level surveys for Swainson’s hawk would decrease the probability of locating and avoiding impacts to nesting Swainson’s hawks. Not following established survey protocols could result in failure to identify a nest, cause failure of unidentified nests, and reduce the nesting success rates of nesting Swainson’s hawks.

**Recommended Mitigation Measure 8:** If Project activities will occur during the Swainson’s hawk nesting season (March 15 to September 15), a qualified biologist shall conduct protocol level nesting surveys for Swainson’s hawk within a 0.5-mile
radius of the Project site. Surveys shall follow the Recommended Timing and Methodology for Swainson’s Hawk Nesting Surveys in California’s Central Valley (2000), available online here: https://www.wildlife.ca.gov/Conservation/Survey-Protocols#377281284-birds. After surveys, if a Swainson’s hawk nest is identified, project activities shall occur within 0.5-mile of the nest.

Comment 7: Mitigation Measure BIO-8 – Avoid and Minimize Impacts to Burrowing Owl

Issue: Mitigation Measure BIO-8 of the IS/MND states that a qualified biologist shall conduct pre-construction surveys for burrowing owls, no more than 14 days prior to initiation of any construction activity within burrowing owl habitat areas during nesting bird season (March 15 to August 31). However, protocol surveys that have been developed to maximize the probability of locating nesting burrowing owls and reduce the potential for burrowing owl nest failure as a result of the Project require a minimum of four surveys to be conducted prior to construction activities and identifies that the breeding season in California is from February 1 to August 31. Mitigation Measure BIO-8 goes on to state that if a no-activity zone cannot be established a qualified biologist will develop a site-specific plan to minimize the potential to affect the reproductive success of the owls but does not identify specific enforceable measures.

Evidence impact would be significant: If burrowing owl protocol level surveys are not conducted during the appropriate time period, the Project can cause avoidable impacts to burrowing owl. In California, the burrowing owl breeding season extends from February 1 to August 31 (Haug et al. 1993, Thompsen 1971).

Recommended Mitigation Measure 9: If Project activities will occur during the burrowing owl breeding season (February 1 to August 31) or non-breeding season (September 1 to January 31) a qualified biologist (that is knowledgeable about the burrowing owl, including its natural history, habitat requirements, seasonal movements and range, to survey and monitor for burrowing owls) shall conduct complete necessary burrowing owl habitat surveys, impact assessments, and prepare associated reports within all locations subject to Project activities. Methodology shall follow the recommendations and guidelines provided within the 2012 Staff Report on Burrowing owl Mitigation, available online here: https://www.wildlife.ca.gov/Conservation/Survey-Protocols#377281284-birds and as described below.

Burrowing owl surveys shall be conducted by the qualified biologist in accordance with the Staff Report on Burrowing Owl Mitigation (2012). As such, the qualified biologist shall conduct four survey visits: 1) at least one site visit between 15 February and 15 April, and 2) a minimum of three survey visits, at least three weeks apart between 15 April and 15 July, with at least one visit after 15 June. If burrowing owls are identified during surveys, then DWR shall notify CDFW within three business days of determining that a burrowing owl is occupying the Project site to
Sara Paiva
California Department of Water Resources

discuss the observed location, activities and behavior of the burrowing owl(s) and appropriate avoidance and minimization measures.

REGULATORY REQUIREMENTS

California Endangered Species Act

Please be advised that a CESA Permit must be obtained if the Project has the potential to result in “take” of plants or animals listed under CESA, either during construction or over the life of the Project. Issuance of a CESA Permit is subject to CEQA documentation; the CEQA document must specify impacts, mitigation measures, and a mitigation monitoring and reporting program. If the Project will impact CESA listed species, early consultation is encouraged, as significant modification to the Project and mitigation measures may be required in order to obtain a CESA Permit.

CEQA requires a Mandatory Finding of Significance if a project is likely to substantially impact threatened or endangered species [CEQA section 21001(c), 21083, & CEQA Guidelines section 15380, 15064, 15065]. Impacts must be avoided or mitigated to less-than-significant levels unless the CEQA Lead Agency makes and supports Findings of Overriding Consideration (FOC). The CEQA Lead Agency’s FOC does not eliminate the Project proponent’s obligation to comply with Fish and Game Code section 2080.

Lake and Streambed Alteration Program

Notification is required for any activity that will substantially divert or obstruct the natural flow; change or use material from the bed, channel, or bank including associated riparian or wetland resources; or deposit or dispose of material where it may pass into a river, lake or stream. Work within ephemeral streams, washes, watercourses with a subsurface flow, and floodplains are subject to notification requirements. CDFW, as a Responsible Agency under CEQA, will consider the CEQA document for the Project. CDFW may not execute the final LSA Agreement until it has complied with CEQA (Public Resources Code § 21000 et seq.) as the responsible agency.

FILING FEES

CDFW anticipates that the Project will have an impact on fish and/or wildlife, and assessment of filing fees is necessary (Fish and Game Code, section 711.4; Pub. Resources Code, section 21089). Fees are payable upon filing of the Notice of Determination by the Lead Agency and serve to help defray the cost of environmental review by CDFW.

Thank you for the opportunity to comment on the Project’s IS/MND. If you have any questions regarding this letter or for further coordination with CDFW, please contact Monica Oey, Senior Environmental Scientist (Specialist), at (707) 428-2088 or Monica.Oey@wildlife.ca.gov regarding the Clifton Court Forebay, or Marcia Gregsrud, Environmental Scientist, at (707) 644-2812 or Marcia.Greysrud@wildlife.ca.gov regarding the Dyer Dam and Patterson Dam.
REFERENCES


Response to Comment Letter A

California Department of Fish and Wildlife–Bay Delta Region
Stephanie Fong
December 29, 2021

A-1 This comment states that the California Department of Fish and Wildlife (CDFW) is both a Trustee Agency and a Responsible Agency, as defined in the California Environmental Quality Act (CEQA), and summarizes the proposed Delta Dams Rodent Burrow Remediation Project (Project).

The comment does not specifically address the environmental effects of the Project and does not identify any inadequacies or inaccuracies in the IS. Thus, no response is required.

A-2 CDFW comments that Mitigation Measures BIO-2 and BIO-11 do not provide enforceable measures to reduce potential impacts to long-styled sand-spurrey (Spergularia macrotheca var. longistyla) and waters of the United States to less-than-significant levels because these measures provide a list of compensatory mitigation options without committing to any of the options. The comment recommends that the California Department of Water Resources (DWR) identify specific enforceable mitigation measures that the Project will implement to compensate for permanent and temporary impacts to long-styled sand-spurrey and waters of the United States.

Mitigation Measures BIO-2 and BIO-11 have been revised to provide more specificity on how compensatory mitigation would be accomplished. The full text of the revised mitigation measures is shown on pages 6, 11, 12, 73, and 83 of this Final IS, and the individual revisions are summarized in the following responses.

The comment is correct that Mitigation Measure BIO-2 identifies two options for mitigation. One option is to protect an existing population of long-styled sand spurrey, and the other option is to create a new population or expand an existing population. The comment is not correct that Mitigation Measure BIO-2 is not enforceable. It commits DWR to implementing one of the two identified options. Revisions have been made to this measure to provide greater specificity regarding performance criteria that must be attained under the option to create a new population or expand an existing population. DWR will work with CDFW to select one of these two options and further define the specific mitigation actions. Mitigation Measure BIO-2 meets the requirements of State of California CEQA Guidelines (CEQA Guidelines) Section 15126.4(a)(1)(B) because it identifies the performance standards that must be met to ensure that the Project does not have a substantial adverse effect on this species, identifies the “type(s) of potential action(s) that can feasibly achieve that performance standard and that will considered, analyzed, and potentially incorporated in the mitigation measure,” and commits DWR to attaining the identified performance standards.

The comment is also correct that Mitigation Measure BIO-11 identifies three options for mitigation: obtain mitigation bank or in-lieu fee program credits to compensate for loss of aquatic resources, and/or undertake permittee-responsible compensatory mitigation. Mitigation Measure BIO-11 has been revised to provide examples of the in-lieu fee programs and mitigation banks that would apply to the Project facilities. Specifically, the National Fish and Wildlife Foundation’s Sacramento District California In-Lieu Fee Program is applicable to Clifton Court Forebay. Cayetano Mitigation Bank is pending agency approvals. If approved and established, the bank is expected to have a service area
that includes both Dyer Dam and Patterson Dam, and to provide credits for the types of aquatic resources that would be affected by the Project’s activities at both sites. Additional revisions have been made to Mitigation Measure BIO-11 to recognize this potential mitigation option and to provide greater specificity in the performance standards that must be attained under the permittee-responsible compensatory mitigation.

The comment is not correct that Mitigation Measure BIO-11 is not enforceable. It commits DWR to implementing one of the two identified options. Mitigation Measure BIO-11 also meets the mitigation measure requirements under CEQA Guidelines Section 15126.4(a)(1)(B) because it identifies applicable performance standards, identifies the potential actions that can achieve those standards, and commits DWR to attaining those standards.

A-3 CDFW comments that the option to create a new long-styled sand-spurrey population as compensation for permanent impacts on the existing population at Clifton Court Forebay would be difficult and that efforts to create new special-status plant populations often fail. It recommends that the Project compensate for permanent impacts on this species by acquiring or preserving lands that contain existing populations instead of creating a new one.

Implementation of the Project would result in disturbance to 121 individual plants within a single existing population located in the southwestern portion of the Project site at Clifton Court Forebay. Figure 31 shows this existing population and the areas of permanent and temporary impacts to the population. As discussed in Response to Comment A-2, Mitigation Measure BIO-2 allows either creating a new long-styled sand-spurrey population or expanding an existing population. Expansion of an existing population could be accomplished within the Clifton Court Forebay property because there is an existing population of long-styled sand-spurrey located south of the proposed Project site. The presence of this existing population indicates that soil and hydrologic conditions are appropriate to support this species.

Under the option to create a new population and the option to expand an existing population, Mitigation Measure BIO-2 has been revised to present more details on the content of and performance criteria for the special-status plant mitigation plan required to be prepared for any plant relocation or propagation efforts undertaken to comply with this measure. Specifically, this plan must include “(1) seed/propagule collection methods, (2) identification of receiver sites or locations for relocated or propagated plants and rationale for their selection, (3) success criteria for population establishment, including a not-to-exceed threshold for invasive species cover, (4) 5 years of maintenance and monitoring, (5) the adaptive management approaches that would be used to evaluate monitoring results and adjust management actions, if necessary, and (6) financial assurances for the funding of special-status plant mitigation.” The requirements to identify success criteria, conduct maintenance and monitoring, implement adaptive management approaches, and provide financial assurances for the implementation of the special-status plant mitigation plan would contribute to the successful implementation of this measure. Therefore, as stated in Response to Comment A-2, Mitigation Measure BIO-2 meets the mitigation measure requirements under CEQA Guidelines Section 15126.4(a)(1)(B) because it identifies applicable performance standards, identifies the potential actions that can achieve those standards, and commits DWR to attaining those standards.

A-4 CDFW comments that Mitigation Measure BIO-5 is not sufficient to avoid take of California tiger salamander (Ambystoma californiense) potentially occurring at Clifton Court Forebay, and
recommends that the Project apply for an Incidental Take Permit before Project implementation. CDFW also notes that only protocol-level surveys for California tiger salamander, which can take up to 2 years, would be sufficient to determine the species’ status within the Project footprint.

The potential for California tiger salamander occurrence in the Clifton Court Forebay Project site is low, not moderate. The “moderate” potential to occur indicated in Table 14 of the Draft IS was an error that has been corrected in this Final IS. Appendix D of the Biological Resources Existing Conditions Report (which is included with this IS as Appendix B) contains the correct “low” potential to occur determination and rationale.

As indicated in both the IS and Appendix B, the area where there is a low potential for California tiger salamander to occur in the Clifton Court Forebay Project site is limited to a 0.9-mile-long strip of grassland and iodine bush scrub southwest of the dam embankment/access road east of the Skinner Fish Facility. California tiger salamander is not expected to occur in most of the Clifton Court Forebay Project site (including burrow remediation areas), and the only reason the grassland strip southwest of the Clifton Court Forebay is acknowledged as potential habitat is because it is within dispersal distance (1.2 miles) of a seasonal pool that appeared on March 2017 aerial imagery between the California Aqueduct and Bruns Road. The same feature does not appear on April 2018 or April 2019 aerial imagery, and it is unknown if it ever supported breeding tiger salamanders. All of the known occurrences in the Project vicinity are isolated from the Project site by the California Aqueduct (Appendix B). As shown in Figure RTC-1, Potential California Tiger Salamander Habitat Southwest of Clifton Court Forebay, this 0.9-mile-long strip is the only portion of the Project site located within the 1.2-mile California tiger salamander dispersal distance measured from the potential off-site habitat for this species. There are two distinct staging areas identified within this strip, one in the westernmost portion of the strip and one in the easternmost portion, as well as a narrow strip of construction access along the existing embankment toe road in the eastern portion of the potential California tiger salamander dispersal area, as shown on Figure 8, Clifton Court Forebay Proposed Activities, and shown in more detail in Figures RTC-2A and RTC-2B, California Tiger Salamander Habitat at Clifton Court Forebay.

Even if this feature or adjacent grassland were occupied by the species, individuals would have to cross Byron Highway to access the Project site. Because Byron Highway carries a moderate volume of traffic—approximately 25,000 vehicles per day on the segment between Holey Road and Mountain House Road in 2018 (County of Contra Costa 2022)—it represents a meaningful barrier to California tiger salamander passage. In addition, the dam embankment below the access road (i.e., burrow remediation area) is subject to ongoing maintenance activities (including the existing Rodent Abatement/Control Plan that uses poison bait stations) that is included in each dam’s annual Preventive Maintenance Plan, as discussed in Section 3A, Project Overview, and therefore is unsuitable for California tiger salamander refuge during the dry season (rodent and vector control programs are a potential source of chemical pollution adversely affecting California tiger salamanders [USFWS 2017]). Only the less-disturbed grassland/scrub areas are considered to have low potential to support California tiger salamanders, as indicated in Figures RTC-2A and RTC-2B.

In summary, the likelihood of California tiger salamander occurrence in burrows adjacent to or proximate to the southwest edge of Clifton Court Forebay is very low. California tiger salamander use of this area is dependent on off-site habitat to the southwest being occupied, which is unlikely because the feature that appeared to hold water in March 2017 no longer appears to do so, based
on April 2018 and 2019 aerial imagery. However, DWR acknowledges that determining California tiger salamander presence or absence requires protocol-level surveys, and therefore this Final IS includes Mitigation Measure BIO-5 with minor revisions made to avoid take in the unlikely event that this species is present. Text has been added to Mitigation Measure BIO-5 stating that no animals would be handled under this measure, and if any California tiger salamanders are found during construction, Project activities would be stopped and consultation with CDFW and the U.S. Fish and Wildlife Service would be reinitiated.

A-5 CDFW comments that placing plywood over burrows in staging areas as proposed under Mitigation Measure BIO-5 can result in trapping California tiger salamanders within the burrows and causing take. Instead, CDFW recommends that an approved biologist survey proposed staging areas “at least seven days prior to staging area establishment to identify and flag all burrows located within the staging area” and establish the staging area “where no burrows are located and would not be impacted by the Project.”

Mitigation Measure BIO-5 requires that an approved biologist survey proposed staging areas. As presented in the Draft IS, this measure allowed for the survey to occur up to 30 days prior to removal of existing vegetation in staging areas. As recommended by CDFW, Mitigation Measure BIO-5 has been revised to require that this survey occur 7 days prior to removal of existing vegetation within the staging areas that have a low potential to support California tiger salamander, as shown on pages 8, 9, 74, and 75. Mitigation Measure BIO-5 has also been revised to require that staging areas be located where no burrows are located, and to remove the option to place plywood over burrows as a protection measure.

A-6 CDFW comments that the bird nesting season as defined in Mitigation Measure BIO-7 is inadequate to protect nesting birds “during the entire range of the nesting bird season [from February 1 through September 15].” CDFW recommends three modifications to this measure: (1) require preconstruction nesting bird surveys throughout this longer period; (2) require preconstruction nesting bird surveys for a larger area (i.e., within 250 feet of potential nesting habitat for all birds and 1,000 feet for raptors and tricolored blackbird [Agelaius tricolor], instead of 100 feet and 300 feet, respectively); and (3) conduct an additional survey if there is a “four day or more lapse in construction activities,” compared to the 15-day or more lapse identified in the Draft IS and proposed Mitigated Negative Declaration.

Mitigation Measure BIO-7 has been revised consistent with this comment to require that nesting bird surveys be repeated if there is a 4-day or greater lapse in construction activities, as shown on pages 9, 10, and 76.

The nesting season as defined in Mitigation Measure BIO-7 is adequate to avoid destruction of an active bird nest and to avoid disturbances to nesting birds because of the types of nesting habitat in the Project area and the work window restrictions applied to the Project. Although some bird species in the region initiate pair-formation or egg-laying in February (e.g., great horned owl [Bubo virginianus], Anna’s hummingbird [Calypte anna]), habitat for such species is either absent from the Project footprint or would not be impacted in February due to work restrictions related to other biological resources. For example, the highest-quality nesting habitat within the Clifton Court Forebay footprint is in the iodine bush scrub and grassland areas south of the forebay, but work will not begin in this area until June due to the dry-season work window that has been added to Mitigation Measure
This work window requirement specific to the Project site at Clifton Court Forebay has also been added to Mitigation Measure BIO-7. Nesting habitat within the Project work areas at Dyer Dam and Patterson Dam is limited to ruderal grassland in proposed staging areas that does not support trees or shrubs suitable for nesting by these species. The nesting season as defined in Mitigation Measure BIO-7 was also based on the tricolored blackbird species avoidance and minimization measure in the adopted East Alameda County Conservation Strategy (BIRD-3 in Table 3-3 in ICF International 2010).

Similarly, the prescribed 100-foot and 300-foot buffer nest survey areas are adequate to identify active nests that could be indirectly impacted by Project disturbance because existing disturbance levels are high (e.g., vehicle and pedestrian traffic along levee roads, recreational fishing and boating) and Dudek biologists have observed bird nests within shorter distances of active construction areas at similar or less-disturbed sites, including red-winged blackbird (Agelaius phoeniceus) colonies in mustard patches closer than 50 feet from high-frequency scraper roads.

In conclusion, DWR has incorporated some of CDFW’s recommended revisions to Mitigation Measure BIO-7 while keeping the nest season start date at March 15 and keeping the 100- and 300-foot survey areas, which are sufficient to ensure that potential impacts to nesting birds would remain less than significant because a dry-season work window for work at Clifton Court Forebay has been added to both Mitigation Measures BIO-5 and BIO-7, and because the nesting habitats at Dyer Dam and Patterson Dam do not support the vegetation required by bird species that initiate nesting activities earlier in the year.

CDFW comments that conducting non-protocol-level surveys for Swainson’s hawk (Buteo swainsoni) would decrease the probability of locating, and therefore avoiding impacts to, active Swainson’s hawk nests. This comment recommends that Mitigation Measure BIO-7 be revised to require protocol-level nesting surveys in accordance with the Recommended Timing and Methodology for Swainson’s Hawk Nesting Surveys in California’s Central Valley (SHTAC 2000) (SHTAC Survey Recommendations) within a 0.5-mile radius of the Project site before any commencement of any activities between March 15 and September 15, and that no Project activities occur within 0.5 miles of any nests found during the survey.

Protocol-level surveys for nesting Swainson’s hawks have already been conducted and need not be repeated to avoid impacts during Project implementation. Biologists conducted surveys for nesting Swainson’s hawks throughout the Project site in 2021 using the SHTAC Survey Recommendations and DWR has abundant data on previous years’ nests in the Clifton Court Forebay vicinity (none have been found near Dyer or Patterson Reservoirs). In addition, the SHTAC Survey Recommendations were not intended to serve as a “one size fits all” survey protocol for every project that must be followed to the letter every year (Bradbury 2012), especially at sites where much is already known about where and when Swainson’s hawks have previously nested. In areas where Swainson’s hawks have previously nested despite nearby human-created noise and visual disturbance, such as the waterways surrounding Clifton Court Forebay, the level of risk from activities that are greater than 600 feet from a nest is low, as indicated in the “Determining a Project’s Potential for Impacting Swainson’s Hawks” matrix on the last page of the SHTAC Survey Recommendations (SHTAC 2000). Based on the results of the protocol surveys already conducted, the abundant data on past Swainson’s hawk nesting behavior in the Clifton Court Forebay vicinity, and the SHTAC Survey Recommendations, the survey requirements for Swainson’s hawk in Mitigation Measure BIO-7 (i.e.,
survey for nests within 0.25 miles of Project activities and apply nest buffers based on the abovementioned matrix in the SHTAC Survey Recommendations) are adequate to identify and protect nesting Swainson's hawks before and during Project implementation.

A-8 CDFW comments that if burrowing owl (Athene cunicularia) protocol surveys (i.e., in accordance with its 2012 Staff Report on Burrowing Owl Mitigation; 2012 Staff Report [CDFG 2012]) are not conducted during the appropriate time period (February 1 through August 31), the Project could cause avoidable impacts to burrowing owl. This comment recommends revising Mitigation Measure BIO-8 to require that a qualified biologist “complete necessary burrowing owl habitat surveys, impact assessments, and prepare associated reports within all locations subject to Project activities” following recommendations and guidelines in the 2012 Staff Report, including at least four survey visits between February 15 and July 15 subject to the timing requirements in the 2012 Staff Report.

Protocol-level surveys for burrowing owl have already been conducted and need not be repeated to avoid impacts to individual owls or pairs during Project implementation. Biologists conducted a habitat assessment and complete breeding season burrowing owl survey throughout the Project site in 2021 using recommendations and guidelines in the 2012 Staff Report. Biologists also conducted many other wildlife surveys throughout the Project site in 2021, and DWR biologists have many years of cumulative experience conducting protocol-level burrowing owl surveys and making wildlife observations on the Project site. Multiple survey visits during the breeding season and nonbreeding season are warranted at sites where occupancy status is unknown and to inform the environmental baseline for assessing a project’s impacts, and this was the intent of the 2021 surveys. Nowhere in the 2012 Staff Report is it explicitly stated or implied that at least four survey visits during the breeding and/or nonbreeding season must be completed every year of a multi-year project to determine burrowing owl presence or absence, which is why Mitigation Measure BIO-8 was adapted from the “take avoidance survey methodology” discussed on page 29 of the Staff Report (CDFG 2012). DWR acknowledges that defining March 15 as the start of the nesting (i.e., breeding) season departs from the February 1 date in the 2012 Staff Report, but this definition is consistent with the burrowing owl avoidance and minimization measure found in the East Alameda County Conservation Strategy (BIO-2 in Table 3-3 in ICF International 2010). Therefore, the survey and burrowing owl avoidance requirements in Mitigation Measure BIO-8 are consistent with the intent of the 2012 Staff Report and adequate to identify and protect burrows occupied by burrowing owls at the time of Project implementation.

A-9 The comment summarizes regulatory requirements under the California Endangered Species Act and Lake and Streambed Alteration Program. The comment also identifies that filing fees will be required to be paid upon filing of the Notice of Determination for this Project.

DWR’s obligation to comply with the California Endangered Species Act and Lake and Streambed Alteration Program are acknowledged in Section 3A, specifically on page 35 under the subheading “Other public agencies whose approval is required,” and in Section 3.4, Biological Resources. DWR acknowledges that fees will be paid upon filing of the Notice of Determination for this Project. This comment does not specifically address the environmental effects of the proposed Project, and does not identify any inadequacies or inaccuracies in the IS and Mitigated Negative Declaration; therefore, no additional response is required.
Potential California Tiger Salamander Habitat Southwest of Clifton Court Forebay

SOURCE: ESRI World Imagery

FIGURE RTC-1
**Vegetation Communities**

**Bog and Marsh**
- Allenroflea occidentalis / Distichlis spicata
- Provisional Association*

**Allenroflea occidentalis Association***

**Atriplex lentiformis Association**
- *Schoenoepilectus acutus Association***

**Grass and Herb Dominated**
- Lagurus perennis - Hordeum marinus - Ranunculus californicus Semi-natural Association
- *Wild oats and annual brome grasslands (Avena spp. - Bromus spp.) Semi-Natural Alliance

**Disturbed and Developed**
- Open water
- Disturbed Habitat
- Urban/Developed
- *Sensitive Vegetation Community

---

**Low potential for CTS to occur in burrows in grassland and iodine bush scrub away from road embankment/burrow remediation area**

**CTS not expected to occur in burrows in road embankment/burrow remediation areas due to regular maintenance**
SOURCE: DWR 05/12/2021; ESRI World Imagery

Very low potential for CTS to occur in burrows in grassland and iodine bush scrub away from road embankment

Staging Area outside CTS dispersal distance but would apply burrow protections and install exclusion fencing as extra precaution

**Vegetation Communities**

**Bog and Marsh**
- *Allenroflea occidentalis / Distichlis spicata Provisional Association*
- *Allenroflea occidentalis Association*
- *Atriplex lentiformis Association*
- *Juncus arcticus var. balticus - (var. mexicanus) Association*

**Grass and Herb Dominated**
- *Brassica nigra Semi-natural Association*
- *Wild oats and annual brome grasslands (Avena spp. - Bromus spp.) Semi-Natural Alliance*

**Disturbed and Developed**
- *General Agriculture*
- *Disturbed Habitat*
- *Urban/Developed*

*Sensitive Vegetation Community*
San Francisco Bay Regional Water Quality Control Board

Received via electronic mail: No hard copy to follow

December 30, 2021

California Department of Water Resources

ATTN: Sara Paiva-Lowry, Senior Environmental Scientist
(Sara.Paiva-Lowry@water.ca.gov)
P.O. Box 942836
Sacramento, CA 94236

Subject: San Francisco Bay Regional Water Quality Control Board Comments on the Mitigated Negative Declaration, Delta Dams Rodent Burrow Remediation Project
SCH No. 2021120060

Dear Ms. Paiva-Lowry:

San Francisco Bay Regional Water Quality Control Board (Water Board) staff appreciates the opportunity to review the Mitigated Negative Declaration, Delta Dams Rodent Burrow Remediation Project (MND). The MND evaluates the potential environmental impacts associated with implementing the Delta Dams Rodent Burrow Remediation Project (Project).

Project Summary. The earthen embankment dams at Clifton Court Forebay, Dyer Reservoir, and Patterson Reservoir have been subject to ongoing rodent burrowing throughout their service life. Rodent burrows are a recognized hazard to dams and levees because they can promote piping and internal erosion that can ultimately lead to dam failure. The California Department of Water Resources (DWR) proposes to undertake the Project to remediate these conditions and implement other maintenance and repair activities for the project facilities to improve the stability and safety of each dam. Specifically, the Project involves collapsing and/or excavating burrows, backfilling the dam surface, and compacting the soil. In some locations, wire and/or rock would be placed to provide permanent armoring to deter future rodent burrowing. Additional maintenance and repair measures include intake channel repair and removal of trees around a sump at Clifton Court Forebay, drainage ditch repair and remediation of erosion along the entrance road at Dyer Reservoir, and outlet drainage channel improvements at Patterson Reservoir. Work at the Clifton Court Forebay will occur within the jurisdiction of the Central Valley.
Regional Water Quality Control Board. Therefore, this comment letter only addresses the work at Dyer Reservoir and Patterson Reservoir.

Summary. As discussed further below, the MND does not yet include the information necessary to fully evaluate the Project’s reasonably foreseeable impacts to waters of the State, nor does it propose specific mitigation to address those impacts, sufficient to reduce them to less than significant levels. The Project will impact several channels that are waters of the State. These impacts will be associated with measures to stabilize eroding banks and to support channel crossings for access roads. However, the MND does not include designs for these channel modifications. Without this information, Water Board staff are not able to assess the magnitude of the Project’s impacts to water quality and habitat value in the jurisdictional channels. In addition, the MND lacks a reviewable mitigation proposal. The MND states that mitigation will either be provided by purchasing credits at a mitigation bank or an in-lieu fee program or by constructing a permittee-responsible mitigation project. Dyer and Patterson reservoirs are not located within the service areas of existing mitigation banks and in-lieu fee programs and the MND does not include a description of a permittee-responsible mitigation project. Without a mitigation proposal to review, we cannot assess if the Project’s reasonably foreseeable impacts to waters of the State will be mitigated to less than significant levels. The MND should be revised to include this information and recirculated for comment. Also, the MND indicates that DWR may have performed unauthorized work in waters of the State; this issue must be resolved.

Comment 1. The text of the MND indicates that the DWR may have placed unauthorized fill in waters of the State.

Text in Section 3A.4-4, North Access Road Drainage Ditch, describes ongoing erosion in a water of the State at Dyer Dam and proposes measures to stabilize this eroding channel:

Surface runoff is collected by a V-shaped ditch and stormwater control feature that runs parallel to the north access road west of Dyer Dam and Reservoir. This runoff is conveyed downstream of Dyer Dam. The V-shaped ditch has an unlined segment that runs along the western dam toe road adjacent to Dyer Canal. The embankment between the unlined V-shaped ditch and aqueduct has been breached in recent storm events. These stormwater control features have been subject to ongoing failure that can be attributed to high drainage velocities focused on the unlined segments of the V-shaped ditch, poor foundation/embankment material, and rodent burrowing along the reach. There are two areas near existing Pacific Gas and Electric Company (PG&E) power poles that have failed and required temporary repair measures to contain the drainage ditch flows. Emergency repairs were performed using corrugated metal pipes and backfill material to stabilize the V-shaped ditch and reduce internal erosion/instability of the adjacent embankment slope. The failures allowed eroded material to flow into Dyer Canal, which severely degraded water quality.
Approximately 1,300 linear feet of the existing V-shaped ditch and stormwater control features are proposed for improvements that include regrading and concrete lining to improve drainage and structural integrity and to reduce erosion, as shown in Figure 13. Remediation of the existing embankment slope includes limited excavation, backfilling, compaction, and concrete lining. Backfill, grouting, and/or soil-cement slurry would be imported and used to backfill cavities, cracks, or holes. The embankment slope would be restored where it shows signs of instability and where recent internal erosion occurred during the V-shaped ditch failures and stormwater control feature failures. The improvement area is estimated at 0.62 acres and the adjacent access road provides sufficient construction access to perform improvements.

The V-shaped ditch is a jurisdictional water of the State. Based on the MND text quoted above, the repairs performed in the ditch consisted of activities subject to Water Board jurisdiction, and probably subject to the jurisdiction of the U.S. Army Corps of Engineers (Corps) and the California Department of Fish and Wildlife (CDFW). Resolving the regulatory status of these repairs may increase the amount of mitigation required for the Project.

The proposed work in the channel includes placing concrete lining along 1,300 linear feet of the channel. Water Board staff have participated in monthly interagency meetings with the DWR’s Project team since January 2021 and provided comments on draft application materials in our July 1, 2021, email to DWR (See attachment). In the monthly meetings and in the email, we explained that lining an earthen channel with concrete is regulated as fill of a water of the State. To obtain authorization for the work, DWR will need to demonstrate that the design is the least-impacting alternative sufficient to accomplish the Project purpose and provide mitigation for its impacts.

We also noted that lining a channel with concrete does not dissipate hydraulic energy, but only moves it further down the channel to locations in the bank that will remain vulnerable to erosion. We requested that DWR consult with an experienced fluvial geomorphologist to develop a channel stabilization plan with less significant impacts on the channel. In July 2021, we were informed that DWR was working with a fluvial geomorphologist to revise the channel stabilization design, but we have not yet seen a proposed design revision. The MND was issued with a channel armorining design that we have indicated is not likely to obtain authorization. The MND should have been circulated with the revised design so that a design that is likely to be permissible could be reviewed during the CEQA review process.

We have noted that the Project’s impacts will require mitigation. In general, mitigation should be in-kind (e.g., mitigation for channel impacts should be comprised of improvements to other channels, creeks, etc.), and on-site, or as close to on-site as possible. Because it can be challenging to identify channel mitigation projects, and particularly of the length impacted here, 1,300 linear feet, it is important to identify likely mitigation early in the project process. While mitigation amounts may vary depending on the Project’s final impacts and proposed mitigation, the MND should identify as a point of departure the restoration or enhancement of at least 1,300 linear feet of channel to mitigate the proposed concrete lining impact.
DWR has suggested that the concrete lining may be considered a “worst case” scenario that may be used to assess the adequacy of proposed mitigation. Because the MND does not yet evaluate alternative designs, it is premature to determine that the proposed concrete lining encompasses the range of potential impacts for other designs. Also, since the MND does not yet propose mitigation for identified impacts (See Comment 5), it is not yet possible to assess if the Project’s impacts to channels, either actual impacts or “worst case” impacts, can be mitigated to less than significant levels.

Please revise the MND to include: the length of channel that will be stabilized, designs for the channel modifications that are likely to be acceptable to the Water Board, and a detailed mitigation proposal for impacts to waters of the State at Dyer Reservoir and Patterson Reservoir. The revised MND should then be recirculated for review by all stakeholders.

Comment 2. Project impacts to waters of the State are not quantified at the Patterson Reservoir site.

Text in Section 3A.5-5, Surface Drainage Improvements, of the MND describes proposed work in channels near Patterson Reservoir:

The proposed Project includes minor modifications and improvements to drainage features in upland areas northwest of Patterson Dam that currently experience sheet flow, as shown on Figure 18. This work is expected to occur between May and October in the years 2022 through 2026. A damaged 18-inch-diameter corrugated metal pipe culvert crossing near the toe access road and a second 12-inch-diameter corrugated metal pipe culvert crossing near the maintenance building would both be replaced with improved high-density polyethylene culverts. Existing drainage features upstream and downstream of the culverts would be modified to convey water more efficiently to the main western drainage channel. The improvements may include excavating, regrading, and/or lining of the drainage features and culverts.

Replacement of existing culverts may not require mitigation if the replacement culverts have the same length as the existing culverts. But potential modifications to channels to convey water more efficiently will require mitigation if they result in the placement of new hardscape (e.g., rock riprap or concrete lining) into the channel. Since the MND does not provide the length of channel to be modified or a design for the modifications, the MND does not yet include information sufficient to assess the significance of proposed impacts to waters of the State at Patterson Reservoir.

Please revise the MND to include: the length of channel that will be modified, designs for the channel modifications, and a detailed mitigation proposal for impacts to waters of the State at Patterson Reservoir. The revised MND should then be recirculated for review by all stakeholders.
Comment 3. In the discussion of impacts to biological resources in Section 3.4 of the MND, waters of the State are not quantified in linear feet at Dyer Reservoir and Patterson Reservoir.

The discussion of waters of the State in Section 3.4, Biological Resources, in the MND includes Table 11, Acres of USACE Potential Waters of the United States by Project Facility. This table summarizes waters of the State at Dyer and Patterson Reservoirs in acres. For linear features, impacts and mitigation must also be quantified in linear feet. Please revise Section 3.4 and Table 11 to include linear feet. We previously pointed this out in our July 1, 2021, email on the draft application materials.

Comment 4. Subsection c of Section 3.4, Biological Resources, should be revised to quantify impacts to waters of the State in linear feet as well as in acres.

Text on pages 77 and 78 presents the acres of temporary and permanent impacts to wetlands and non-wetland waters at Dyer and Patterson Reservoirs. Please revise the MND to include the linear feet of wetlands and non-wetland waters that will be permanently impacted by Project implementation.

Comment 5. Mitigation Measure BIO-11 in Section 3.4, Biological Resources, should be revised to provide a proposed mitigation project.

Mitigation Measure BIO-11 proposes the following mitigation for permanent impacts to waters of the State.

Compensatory mitigation for permanent impacts shall occur either at a mitigation bank, within an in-lieu fee program, or through on-site or off-site permittee-responsible mitigation, and shall occur at a ratio no less than 1:1 for the impacts to jurisdictional waters or at a ratio determined in the jurisdictional waters permits. If a mitigation bank or in-lieu fee program is not utilized and DWR proceeds with permittee-responsible mitigation, a waters mitigation and monitoring plan shall be prepared that outlines the compensatory mitigation in compliance with requirements from applicable regulatory agencies (i.e., U.S. Army Corps of Engineers [USACE], Regional Water Quality Control Board [RWQCB], and California Department of Fish and Wildlife [CDFW]). Suitable mitigation lands provided for species and vegetation communities may be used for jurisdictional waters of the United States/state mitigation.

If required, the wetland mitigation and monitoring plan shall be developed in coordination with CDFW, USACE, and RWQCB and shall detail mitigation and monitoring obligations for impacts to wetlands and other waters as a result of construction activities. The plan shall quantify the total acreage affected; annual success criteria; mitigation sites; monitoring and reporting requirements; and site-specific plans to compensate for wetland or other waters losses resulting from the Project.
Mitigation Measure BIO-11 lacks sufficient detail to be adequate for compliance with the requirements of the California Environmental Quality Act (CEQA). As we have pointed out in the monthly meetings with DWR staff and resource agency staff, as well as our July 1, 2021, emailed comments on the draft application materials, there are no mitigation banks or In-Lieu Fee programs for impacts to wetlands or non-wetland channels that have service areas that include Dyer and Patterson Reservoirs. Therefore, impacts to waters of the State at these reservoirs will require permittee-responsible mitigation. The MND does not provide a permittee-responsible mitigation project(s) that can be reviewed in compliance with the requirements of CEQA.

Under CEQA, proposed mitigation measures should be presented in sufficient detail for readers of the CEQA document to evaluate the likelihood that the proposed remedy will reduce impacts to a less than significant level. CEQA requires that mitigation measures for each significant environmental effect be adequate, timely, and resolved by the lead agency. In an adequate CEQA document, mitigation measures must be feasible and fully enforceable through permit conditions, agreements, or other legally binding instruments (CEQA Guidelines Section 15126.4). Mitigation measures to be identified at some future time are not acceptable. It has been determined by court ruling that such mitigation measures would be improperly exempted from the process of public and governmental scrutiny which is required under the California Environmental Quality Act.

Comment 6. Subsection a of Section 3.10, Hydrology and Water Quality, should be revised to acknowledge that placing riprap or concrete lining in a channel is an impact to a water of the State that requires mitigation.

The discussion of impacts in Section 3.10(a) does not acknowledge that placing rock riprap or concrete lining in a channel impacts beneficial uses of waters of the State. Please revise the MND to identify this impact and to provide specific mitigation projects to address the identified impact.

Comment 7. Subsection c of Section 3.10, Hydrology and Water Quality, should be revised to acknowledge that placing riprap or concrete lining in a channel is likely to result in erosion in other, unarmored reaches of the channels.

As we noted in our July 1, 2021, email to DWR, armoring a portion of a channel does not mitigate erosive hydraulic energy, but transfers that energy to other portions of the channel bank. Please revise the MND to address the transfer of energy that will be associated with armoring portions of channel banks.

Summary of Comments.

In its present form, the MND lacks an adequate discussion of impacts and proposed mitigation measures to support the issuance of Section 401 Water Quality Certification or Waste Discharge Requirements. Impacts to channels that are jurisdictional waters of the State are not yet fully described or quantified in the MND and the development of mitigation measures has been inappropriately deferred to after the completion of the
CEQA review process. The MND should be revised and re-circulated. Re-circulation is necessary to allow for full review and comment by the public and government agencies on the Project’s impacts to waters of the State and proposed mitigation measures for those impacts. The following areas require further evaluation in the revised MND:

- Quantification of impacts to jurisdictional channels at Dyer and Patterson Reservoirs in acres and linear feet.
- Designs for the proposed channel armoring at Dyer and Patterson Reservoirs and designs for the proposed channel modifications to improve water conveyance at Patterson Reservoir. These designs should minimize the placement of hardscape in jurisdictional channels.
- A specific mitigation proposal(s) for impacts to jurisdictional channels at Dyer and Patterson Reservoirs; this mitigation proposal must provide adequate mitigation in terms of acres and linear feet.

Since an MND should provide both proposed impacts and proposed mitigation measures for public and government agency review, provision of this information in a Final MND is inappropriate, since this information would not have been subject to public and government agency review before the Final MND was adopted.

If you have any questions, please contact me via e-mail to brian.wines@waterboards.ca.gov.

Sincerely,

Brian Wines
Water Resource Control Engineer
South and East Bay Watershed Section

Attachment: July 1, 2021, email from Water Board staff providing comments on draft application materials for the Project

cc: State Clearinghouse (state.clearinghouse@opr.ca.gov)
CDFW, Marcia Grefsrud (marcia.grefsrud@wildlife.ca.gov)
Corps, Gregory Brown (Gregory.g.brown@usace.army.mil)
USFWS
Ryan Olah (ryan.olah@fws.gov)
Kim Squires (kim.squires@fws.gov)
Dudek, Laurie Monarres (lmonarres@dudek.com)
Hi Laurie

You should not mail the application fee to our office until a final application is ready for submission. I have reviewed the draft application materials, and it appears that the Project is months away from having a final application that would result in an issued Certification.

Here are my notes on the draft application materials.

Draft Application Form

The type of mitigation (bank, permittee responsible) is not yet identified in the application.

It is probably a good idea to not sign draft applications (and don’t mail in fees for draft applications).

Supplemental Application Materials

Section 2, Project Information, page 1. The directions to Dyer Reservoir have been pasted into the section that should contain the directions to Patterson Reservoir.

Section 2, Project Description, page 3. The discussion of adding concrete lining to v-ditches and rock riprap to channels lacks sufficient detail. Similarly, the 35% designs for work at both reservoirs lack necessary detail with respect to concrete lining and rock riprap installation. Based on the information that has been provided so far, the current project will not mitigate erosive flows, but will only move erosive forces downstream of the current project footprint.

Concrete lining of channels increases the velocity of flowing water, resulting in water with higher energy. This often results in erosion at the transition from concrete v-ditches to earthen channels. Similarly, while rock riprap bank armoring provides local stabilization, it also transfers erosive energy to the opposite bank, to the channel invert, or downstream.

The proposed channel stabilization measures should be reviewed by an experienced fluvial geomorphologist to ensure that stabilization measures contribute to establishing dynamic equilibrium between the watershed and the channels, rather than transferring erosive forces to other locations in the watershed. To the maximum extent feasible, channels should be stabilized with vegetation. Where erosive forces cannot be sufficiently controlled by vegetation, new hardscape should be limited to minimum amount necessary to stabilize the channel. In channel reaches with higher gradients, the use of cascades or step pools to dissipate energy should be considered. In areas that lack stabilizing vegetation, the project design should include measures to promote improved cover by vegetation.

Section 7, Cumulative Impacts, page 10. The discussion of cumulative impacts should address the ways in which adding hardscape to the on-site channels is likely to increase erosion of channels downstream of the Project sites.
Section 8, Avoidance and Minimization Measures, page 10. The discussion of avoidance and minimization measures must be revised to consider alternatives to new concrete channel lining and new rock riprap channel lining.

Section 11, Compensatory Mitigation, page 13. Impacts to channels and mitigation for those impacts must be quantified in linear feet, as well as acres. The application is incomplete, because it lacks even a draft mitigation plan. The discussion of impacts appears to inappropriately conflate waters of the U.S. and waters of the State. Federal jurisdiction extends up to the ordinary high water mark (OHWM). State jurisdiction extends up to the top of bank.

At this time, there are no mitigation banks with credits available for impacts to creek channels with service areas that include the project sites. Therefore, permittee responsible mitigation must be developed. Mitigation channels must be designed by a fluvial geomorphologist with experience in channel restoration and stabilization.

Aquatic Resources Delineation Report

Appendix D, page D-2. The discussion of jurisdiction in channels inappropriately conflates waters of the U.S. and waters of the State. Federal jurisdiction extends up to the OHWM. State jurisdiction extends up to the top of bank. I have pointed this out to Dudek staff in the past and this inaccuracy should not continue to be present in Dudek documents.

Brian Wines
Water Resource Control Engineer
Watershed Management Division
San Francisco Bay Regional Water Quality Control Board

From: Laurie Monarres <lmonarres@dudek.com>
Sent: Friday, June 25, 2021 10:33 AM
To: Wines, Brian@Waterboards <Brian.Wines@waterboards.ca.gov>
Cc: Snow, Gerald@DWR <Gerald.Snow@water.ca.gov>; Paiva-Lowry, Sara@DWR <Sara.Paiva-Lowry@water.ca.gov>
Subject: 1 of 5 - DRAFT Delta Dams Rodent Burrow Remediation Project 401 Application

Hi Brian,

I hope all is well! On behalf of DWR, I am submitting a draft application package for the Delta Dams Rodent Burrow Remediation Project at Dyer and Patterson Dams. We are also mailing the application fee check to your office and additional draft application materials will be submitted in the coming weeks. Please don’t hesitate to contact me if you have any questions as you begin your review.

Note that this is the first of five emails containing application documents.
Thank you!
Laurie

Laurie Monarres
Principal/Senior Regulatory Specialist

1630 San Pablo Ave, Suite 300, Oakland, CA 94612
O: 510.601.2515  C: 415.987.7485
www.dudek.com
Response to Comment Letter B

San Francisco Bay Regional Water Quality Control Board
Brian Wines
December 30, 2021

B-1 This comment provides an introduction and general summary of the proposed Delta Dams Rodent Burrow Remediation Project (Project) and notes that the comment letter addresses Project activities at Dyer Dam and at Patterson Dam because these facilities are within the San Francisco Bay region.

The comment does not raise specific issues related to the environmental effects of the Project, and does not identify any inadequacies or inaccuracies in the environmental analysis; therefore, no response is required.

B-2 The comment provides a general summary of the specific comments that follow. Each concern in this comment is addressed and responded to below; therefore, no additional response is required.

B-3 The comment references text within the Draft IS that describes emergency repairs and maintenance activities performed within an existing, unlined v-shaped ditch at Dyer Dam. The comment states that this ditch is a waters of the state and that these prior emergency repairs and maintenance activities were conducted without obtaining permits from the Regional Water Quality Control Board (RWQCB). The comment also states that the proposed action of lining this ditch with concrete is regulated as fill of a water of the state and that to obtain authorization for the work, the California Department of Water Resources (DWR) must demonstrate that the design is the least-impacting alternative sufficient to accomplish the Project’s purpose and must provide mitigation for the impact. Further, the comment states that lining a channel with concrete does not dissipate hydraulic energy, and instead moves that energy downstream where it can result in increased erosion; that the IS does not include mitigation for the proposed concrete lining of the v-shaped ditch; and that the IS should be revised to identify the length of channel proposed to be stabilized, include appropriate designs for the channel modifications, and present a detailed mitigation proposal for impacts to waters of the state, and then be recirculated for review by the public and public agencies.

As stated on page 291 and shown on page 26 of this Final IS, the Project Description has been revised to remove concrete lining of the v-shaped ditch at Dyer Dam from the proposed Project. Thus, the Project would not result in any adverse effects to this ditch, potential changes in hydraulic energy, or potential increases in erosion downstream of this ditch. Because this component of the Project has been eliminated, no mitigation is required and no further response is warranted.

B-4 The comment states that the 12- and 18-inch-diameter corrugated metal pipe culverts at Patterson Dam may be waters of the state, and therefore the proposed modifications to these culverts may require RWQCB approval and mitigation. The comment also states that the IS does not adequately describe these proposed actions and should be revised to identify the length of channel proposed to be modified, designs for the channel modifications, and a detailed mitigation proposal for impacts to waters of the state. The comment states that the revised IS should be recirculated for review by all stakeholders with this information included.
As stated on page 291 and shown on page 30 of this Final IS, the Project Description has been revised to remove modifications to the 12- and 18-inch-diameter culverts at Patterson Dam from the proposed Project. Thus, the Project would not result in any adverse effects to these drainage features. Because this component of the Project has been eliminated, no mitigation is required and no further response is warranted.

**B-5** The comment states that Section 3.4, Biological Resources, and Table 11, Acres of USACE Potential Waters of the United States by Project Facility, should also include linear feet for relevant aquatic resources.

Section 3.4 and Table 11 have been revised to include linear feet for applicable aquatic resource features.

**B-6** The comment states that text on Draft IS pages 77 and 78 identifies acres of temporary and permanent impacts, but should also include linear feet of permanent impacts.

The referenced text has been revised to include linear feet of wetlands and non-wetland waters that will be permanently impacted by Project implementation.

**B-7** The comment presents a portion of the text of Mitigation Measure BIO-11 as presented in the Draft IS and states that this measure does not contain sufficient detail to comply with the California Environmental Quality Act (CEQA) because there are no mitigation banks with a service area that includes Dyer Dam and Patterson Dam for impacts to the types of aquatic resources that would be affected at these facilities.

Mitigation Measure BIO-11 has been revised to provide additional details related to mitigation for permanent impacts to waters of the state, as shown on pages 11, 12, and 83 of this Final IS. Impacts to waters of the state are anticipated to be fulfilled through the purchase of credits at an approved mitigation bank. Currently, one mitigation bank is pending: Cayetano Mitigation Bank. The mitigation measure retains the option for permittee-responsible mitigation. Revisions to this mitigation measure include adding examples of mitigation banks and in-lieu fee programs, adding a performance criteria that compensatory mitigation must prevent the net loss of the functions and values of jurisdictional waters, and adding detailed content requirements and performance criteria for the required Compensatory Mitigation and Monitoring Plan.

As discussed in Response to Comment A-2, Mitigation Measure BIO-11 as revised meets the mitigation measure requirements under State of California CEQA Guidelines Section 15126.4(a)(1)(B) because it identifies applicable performance standards, identifies the potential actions that can achieve those standards, and commits DWR to attaining those standards.

**B-8** This comment states that Section 3.10(a), Hydrology and Water Quality, does not acknowledge that placing rock riprap or concrete lining in a water of the state would result in an impact.

As discussed for Response to Comment B-3, the Project Description has been revised to remove concrete lining of the v-shaped ditch at Dyer Dam from the proposed Project; thus, it is not necessary for Section 3.10 to discuss concrete lining in a water of the state. In addition, text has been added to Section 3.10 in this Final IS regarding the potential effects of placing riprap and rock/vegetation control measures within waters of the state.
This comment states that Section 3.10 does not acknowledge that placing rock riprap or concrete lining in a channel can result in erosion in other, unarmored reaches of the channel.

As discussed above for Response to Comment B-8, the Project Description has been revised to remove concrete lining of the v-shaped ditch at Dyer Dam from the proposed Project; thus, it is not necessary for Section 3.10 to discuss concrete lining in a water of the state. In addition, text has been added to Section 3.10 of this Final IS regarding the potential effects of placing riprap and rock/vegetation control measures within waters of the state.

This comment summarizes the specific comments described in the comment letter, and reiterates that the IS should be revised to quantify impacts to jurisdictional channels at Dyer Dam and Patterson Dam in acres and linear feet, include designs for the proposed channel armoring/modifications at Dyer Dam and Patterson Dam, and provide more specific mitigation proposals for impacts to jurisdictional channels.

The IS has been revised to include quantification of impacts to jurisdictional resources at Dyer Dam and Patterson Dam in acres and linear feet. This information is provided in the tables and text of this Final IS, where appropriate. As discussed in Responses to Comments B-3 and B-4, the Project Description has been revised to omit concrete lining of the v-ditch at Dyer Dam and improvements to the 12- and 18-inch-diameter culverts at Patterson Dam; thus, no additional mitigation is required and no further response is warranted.
Central Valley Regional Water Quality Control Board

3 January 2022

Sara Paiva-Lowry
Department of Water Resources
P. O. Box 942836
Sacramento, CA 94236
Sara.Paiva-Lowry@water.ca.gov

COMMENTS TO REQUEST FOR REVIEW FOR THE MITIGATED NEGATIVE DECLARATION, DELTA DAMS RODENT BURROW REMEDIATION PROJECT, SCH#2021120060, ALAMEDA, CONTRA COSTA, AND SAN JOAQUIN COUNTIES

Pursuant to the State Clearinghouse’s 3 December 2021 request, the Central Valley Regional Water Quality Control Board (Central Valley Water Board) has reviewed the Request for Review for the Mitigated Negative Declaration for the Delta Dams Rodent Burrow Remediation Project, located in Alameda, Contra Costa, and San Joaquin Counties.

Our agency is delegated with the responsibility of protecting the quality of surface and groundwaters of the state; therefore our comments will address concerns surrounding those issues.

I. Regulatory Setting

**Basin Plan**

The Central Valley Water Board is required to formulate and adopt Basin Plans for all areas within the Central Valley region under Section 13240 of the Porter-Cologne Water Quality Control Act. Each Basin Plan must contain water quality objectives to ensure the reasonable protection of beneficial uses, as well as a program of implementation for achieving water quality objectives with the Basin Plans. Federal regulations require each state to adopt water quality standards to protect the public health or welfare, enhance the quality of water and serve the purposes of the Clean Water Act. In California, the beneficial uses, water quality objectives, and the Antidegradation Policy are the State’s water quality standards. Water quality standards are also contained in the National Toxics Rule, 40 CFR Section 131.36, and the California Toxics Rule, 40 CFR Section 131.38.

The Basin Plan is subject to modification as necessary, considering applicable laws, policies, technologies, water quality conditions and priorities. The original Basin Plans were adopted in 1975, and have been updated and revised periodically as required, using Basin Plan amendments. Once the Central Valley Water Board has adopted a Basin Plan amendment in noticed public hearings, it must be approved by the State Water Resources Control Board (State Water Board), Office of Administrative Law (OAL) and in some cases, the United States Environmental
Delta Dams Rodent Burrow Remediation Project
Alameda, Contra Costa, and San Joaquin Counties

Protection Agency (USEPA). Basin Plan amendments only become effective after they have been approved by the OAL and in some cases, the USEPA. Every three (3) years, a review of the Basin Plan is completed that assesses the appropriateness of existing standards and evaluates and prioritizes Basin Planning issues. For more information on the Water Quality Control Plan for the Sacramento and San Joaquin River Basins, please visit our website:
http://www.waterboards.ca.gov/centralvalley/water_issues/basin_plans/

**Antidegradation Considerations**

All wastewater discharges must comply with the Antidegradation Policy (State Water Board Resolution 68-16) and the Antidegradation Implementation Policy contained in the Basin Plan. The Antidegradation Implementation Policy is available on page 74 at:

In part it states:

*Any discharge of waste to high quality waters must apply best practicable treatment or control not only to prevent a condition of pollution or nuisance from occurring, but also to maintain the highest water quality possible consistent with the maximum benefit to the people of the State.*

This information must be presented as an analysis of the impacts and potential impacts of the discharge on water quality, as measured by background concentrations and applicable water quality objectives.

The antidegradation analysis is a mandatory element in the National Pollutant Discharge Elimination System and land discharge Waste Discharge Requirements (WDRs) permitting processes. The environmental review document should evaluate potential impacts to both surface and groundwater quality.

**II. Permitting Requirements**

**Construction Storm Water General Permit**

Dischargers whose project disturb one or more acres of soil or where projects disturb less than one acre but are part of a larger common plan of development that in total disturbs one or more acres, are required to obtain coverage under the General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (Construction General Permit), Construction General Permit Order No. 2009-0009-DWQ. Construction activity subject to this permit includes clearing, grading, grubbing, disturbances to the ground, such as stockpiling, or excavation, but does not include regular maintenance activities performed to restore the original line, grade, or capacity of the facility. The Construction General Permit requires the development and implementation of a Storm Water Pollution Prevention Plan (SWPPP). For more information on the Construction General Permit, visit the State Water Resources Control Board website at:
Clean Water Act Section 404 Permit
If the project will involve the discharge of dredged or fill material in navigable waters or wetlands, a permit pursuant to Section 404 of the Clean Water Act may be needed from the United States Army Corps of Engineers (USACE). If a Section 404 permit is required by the USACE, the Central Valley Water Board will review the permit application to ensure that discharge will not violate water quality standards. If the project requires surface water drainage realignment, the applicant is advised to contact the Department of Fish and Game for information on Streambed Alteration Permit requirements. If you have any questions regarding the Clean Water Act Section 404 permits, please contact the Regulatory Division of the Sacramento District of USACE at (916) 557-5250.

Clean Water Act Section 401 Permit – Water Quality Certification
If an USACE permit (e.g., Non-Reporting Nationwide Permit, Nationwide Permit, Letter of Permission, Individual Permit, Regional General Permit, Programmatic General Permit), or any other federal permit (e.g., Section 10 of the Rivers and Harbors Act or Section 9 from the United States Coast Guard), is required for this project due to the disturbance of waters of the United States (such as streams and wetlands), then a Water Quality Certification must be obtained from the Central Valley Water Board prior to initiation of project activities. There are no waivers for 401 Water Quality Certifications. For more information on the Water Quality Certification, visit the Central Valley Water Board website at:
https://www.waterboards.ca.gov/centralvalley/water_issues/water_quality_certification/

Waste Discharge Requirements – Discharges to Waters of the State
If USACE determines that only non-jurisdictional waters of the State (i.e., "non-federal" waters of the State) are present in the proposed project area, the proposed project may require a Waste Discharge Requirement (WDR) permit to be issued by Central Valley Water Board. Under the California Porter-Cologne Water Quality Control Act, discharges to all waters of the State, including all wetlands and other waters of the State including, but not limited to, isolated wetlands, are subject to State regulation. For more information on the Waste Discharges to Surface Water NPDES Program and WDR processes, visit the Central Valley Water Board website at:
https://www.waterboards.ca.gov/centralvalley/water_issues/waste_to_surface_water/
Projects involving excavation or fill activities impacting less than 0.2 acre or 400 linear feet of non-jurisdictional waters of the state and projects involving dredging activities impacting less than 50 cubic yards of non-jurisdictional waters of the state may be eligible for coverage under the State Water Resources Control Board Water Quality Order No. 2004-0004-DWQ (General Order 2004-0004). For more information on the General Order 2004-0004, visit the State Water Resources Control Board website at:

**Dewatering Permit**

If the proposed project includes construction or groundwater dewatering to be discharged to land, the proponent may apply for coverage under State Water Board General Water Quality Order (Low Threat General Order) 2003-0003 or the Central Valley Water Board’s Waiver of Report of Waste Discharge and Waste Discharge Requirements (Low Threat Waiver) R5-2018-0085. Small temporary construction dewatering projects are projects that discharge groundwater to land from excavation activities or dewatering of underground utility vaults. Dischargers seeking coverage under the General Order or Waiver must file a Notice of Intent with the Central Valley Water Board prior to beginning discharge.

For more information regarding the Low Threat General Order and the application process, visit the Central Valley Water Board website at:

For more information regarding the Low Threat Waiver and the application process, visit the Central Valley Water Board website at:

**Limited Threat General NPDES Permit**

If the proposed project includes construction dewatering and it is necessary to discharge the groundwater to waters of the United States, the proposed project will require coverage under a National Pollutant Discharge Elimination System (NPDES) permit. Dewatering discharges are typically considered a low or limited threat to water quality and may be covered under the General Order for Limited Threat Discharges to Surface Water (Limited Threat General Order). A complete Notice of Intent must be submitted to the Central Valley Water Board to obtain coverage under the Limited Threat General Order. For more information regarding the Limited Threat General Order and the application process, visit the Central Valley Water Board website at:
If you have questions regarding these comments, please contact me at (916) 464-4856 or Nicholas.White@waterboards.ca.gov.

Nicholas White
Water Resource Control Engineer

cc: State Clearinghouse unit, Governor’s Office of Planning and Research, Sacramento
Response to Comment Letter C

Central Valley Regional Water Quality Control Board
Nicholas White
January 3, 2022

C-1 This comment identifies that the Central Valley Regional Water Quality Control Board (RWQCB) has reviewed the Draft IS and Mitigated Negative Declaration for the proposed Delta Dams Rodent Burrow Remediation Project (Project), and is providing comments related to protecting the quality of surface water and groundwaters of the state.

The comment does not address the environmental effects of the proposed Project or identify any inadequacies or inaccuracies in the IS; therefore, no response is required.

C-2 The comment summarizes requirements under the Porter-Cologne Water Quality Control Act applicable to the Central Valley RWQCB in developing and adopting Basin Plans for all areas within the Central Valley. The comment also summarizes the process for amending a Basin Plan.

A brief summary of the Sacramento River Basin and San Joaquin River Basin Plan (Basin Plan) has been added to Section 3.10, Hydrology and Water Quality. The Project does not propose or require any amendments to the Basin Plan. Thus, this comment does not specifically address the environmental effects of the proposed Project, and does not identify any inadequacies or inaccuracies in the IS. No response is required.

C-3 The comment states that all wastewater discharges must comply with the State Antidegradation Policy, provides a link to the policy text, and includes an excerpt of text from this policy. The comment notes that an antidegradation analysis is a mandatory element in the National Pollutant Discharge Elimination System and in the Waste Discharge Requirements permitting processes. The comment concludes that the IS should evaluate potential impacts to both surface water and groundwater quality.

Potential impacts to surface water and groundwater quality are discussed in Section 3.10. The California Department of Water Resources’ (DWR) obligation to comply with the National Pollutant Discharge Elimination System and the Waste Discharge Requirements permitting processes are acknowledged on page 35 under the subheading “Other public agencies whose approval is required.” This comment does not specifically address the environmental effects of the proposed Project and does not identify any inadequacies or inaccuracies in the IS; therefore, no additional response is required.

C-4 The comment states that projects that disturb 1 or more acres of soil are required to obtain coverage under the Construction Storm Water General Permit, which includes a requirement to prepare a Stormwater Pollution Prevention Plan (SWPPP).

The Project requirement for coverage under the Construction Storm Water General Permit, including preparation of a SWPPP, is discussed in the Impact Analysis portion of Section 3.10(a). In this discussion, the IS states that Project activities “would affect more than 1 acre of land at each of the individual three DWR facilities affected by the Project, and thus a separate SWPPP could be prepared for each individual facility, or a single SWPPP could be prepared for the entire Project.” This comment does not specifically address the environmental effects of the Project and does not identify any inadequacies or inaccuracies in the IS; therefore, no additional response is required.
This comment summarizes permitting requirements under Clean Water Act Section 404 for projects that involve discharge of dredged or fill material in a water of the United States, and notes that where a Clean Water Act Section 404 permit from the U.S. Army Corps of Engineers is needed, the Central Valley RWQCB will review the permit application to ensure that discharge will not violate water quality standards. The comment advises that where a project would realign a surface water drainage feature, the Streambed Alteration Agreement requirements from the California Department of Fish and Wildlife may also apply.

DWR’s obligations to obtain permits under Clean Water Act Sections 404 and 401 and to obtain a Streambed Alteration Agreement are acknowledged on page 35 under the subheading “Other public agencies whose approval is required.” This comment does not specifically address the environmental effects of the Project and does not identify any inadequacies or inaccuracies in the IS; therefore, no additional response is required.

The comment summarizes permitting requirements under Clean Water Act Section 401 regarding Water Quality Certification.

DWR’s obligation to obtain a Water Quality Certification under Clean Water Act Section 401 is acknowledged on page 35 under the subheading “Other public agencies whose approval is required.” This comment does not specifically address the environmental effects of the Project and does not identify any inadequacies or inaccuracies in the IS; therefore, no additional response is required.

The comment summarizes Waste Discharge Requirements for water quality protection when a project involves discharges to waters of the state.

The Project requirement for complying with Waste Discharge Requirements is acknowledged on page 35 under the subheading “Other public agencies whose approval is required.” Additionally, the Project’s potential effects related to water quality are discussed in the Impact Analysis portion in Section 3.10(a). In that discussion, the IS concludes that, with implementation of the required SWPPP, “the Project would result in less-than-significant impacts associated with potential violations of water quality standards or waste discharge requirements or other degradation of water quality.” This comment does not specifically address the environmental effects of the Project and does not identify any inadequacies or inaccuracies in the IS; therefore, no additional response is required.

The comment summarizes regulations and requirements for obtaining a Dewatering Permit when a project would require discharge of groundwater to the ground surface.

The Project would involve remediation of rodent burrows along the earthen embankment dams of three water storage reservoirs. Minor excavation of the embankment face would occur, but excavation would not extend below the natural ground surface into any groundwater basins. Thus, a dewatering permit is not expected to be necessary for this Project.

The comment describes a “Limited Threat General NPDES Permit,” which is required when a project involves construction dewatering and discharge of that groundwater to waters of the United States.

As discussed in Response to Comment C-8, Project implementation is not expected to involve excavation into any groundwater basin; thus, dewatering is not expected to be necessary, and the Limited Threat General NPDES Permit would not be applicable.
Responses to Comments References


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Appendix A
Emissions Calculations
EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Delta Dams Rodent Burrowing Remediation Project
Contra Costa County, Annual

1.0 Project Characteristics

1.1 Land Usage

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1.3 User Entered Comments & Non-Default Data

Land Use - Clifton Court Forebay = permanent: 46 acres and temporary: 33.03 acres
Dyer Reservoir = permanent: 8.4 acres and temporary: 7.3 acres
Construction Phase - Work completed at CCF site September 2021 through October 2021 and all sites from May 2022 through October 2022.
Off-road Equipment - Default equipment assumed.
**EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied**

Off-road Equipment - Default equipment assumed.

Off-road Equipment - Default equipment assumed.

Trips and VMT - Updated trip lengths based on distance to closest material facilities within area. Updated vendor trips to account for water trucks (two water trucks).

Grading - Material import based on project specific information. Distributed total over all phases.

### Vehicle Emission Factors -

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### EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

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### 3.0 Construction Detail

#### Construction Phase

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<td>9/21/2021</td>
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<td>Grading</td>
<td>9/22/2021</td>
<td>10/28/2021</td>
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<td>5/21/2022</td>
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**Acres of Grading (Site Preparation Phase):** 41.23

**Acres of Grading (Grading Phase):** 37.8

**Acres of Paving:** 0

**Residential Indoor:** 0; **Residential Outdoor:** 0; **Non-Residential Indoor:** 0; **Non-Residential Outdoor:** 0; **Striped Parking Area:** 0 (Architectural Coating – sqft)
EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

### OffRoad Equipment

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<td>Graders</td>
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<td>Tractors/Loaders/Backhoes</td>
<td>4</td>
<td>8.00</td>
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<td>0.37</td>
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<td>Excavators</td>
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<td>Graders</td>
<td>1</td>
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<td>187</td>
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<td>1</td>
<td>8.00</td>
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<td>0.48</td>
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<td>Tractors/Loaders/Backhoes</td>
<td>2</td>
<td>8.00</td>
<td>97</td>
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<td>Drainage Channel/Intake Channel/Tree Removal</td>
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### 3.1 Mitigation Measures Construction

#### 3.2 Staging/Access 1 - 2021

**Unmitigated Construction On-Site**

| Category            | ROG  | NOx  | CO   | SO2  | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4   | N2O   | CO2e  |
|---------------------|------|------|------|------|---------------|--------------|------------|----------------|---------------|-------------|-----------|----------|-----------|----------|-------|-------|-------|
| Fugitive Dust       | 0.1251 | 0.0000 | 0.1251 | 0.0588 | 0.0000       | 0.0588       | 0.0000     | 0.0000         | 0.0000       | 0.0000     | 0.0000   | 0.0000   | 0.0000   | 0.0000   |
| Off-Road            | 0.0292 | 0.3037 | 0.1587 | 2.9000e-004 | 0.0153       | 0.0153       | 0.0141     | 0.0141         | 25.0768      | 25.0768    | 8.1100e-003 | 0.0000   | 25.2796  |
| Total               | 0.0292 | 0.3037 | 0.1587 | 2.9000e-004 | 0.1251       | 0.0153       | 0.1404     | 0.0141         | 25.0768      | 25.0768    | 8.1100e-003 | 0.0000   | 25.2796  |

**Unmitigated Construction Off-Site**

| Category            | ROG  | NOx  | CO   | SO2  | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4   | N2O   | CO2e  |
|---------------------|------|------|------|------|---------------|--------------|------------|----------------|---------------|-------------|-----------|----------|-----------|----------|-------|-------|-------|
| Hauling             | 5.2100e-003 | 0.1491 | 0.0328 | 4.6000e-004 | 0.0119       | 1.9900e-003 | 0.0138     | 3.2100e-003 | 3.4000e-003 | 5.1100e-003 | 0.0000   | 45.5742  | 45.5742  | 1.5300e-003 | 47.7643 |
| Vendor              | 1.0000e-004 | 1.9000e-003 | 5.8000e-004 | 1.0000e-005 | 1.8000e-004 | 3.0000e-005 | 2.1000e-004 | 5.0000e-005 | 6.0000e-005 | 0.0000     | 0.5844   | 0.5844   | 1.0000e-005 | 0.6102  |
| Worker              | 2.3000e-004 | 1.7000e-004 | 1.9800e-003 | 1.0000e-005 | 5.9000e-004 | 0.0000      | 6.0000e-004 | 1.6000e-004 | 1.6000e-004 | 0.0000     | 0.4925   | 0.4925   | 2.0000e-005 | 0.4975  |
| Total               | 5.5400e-003 | 0.1452 | 0.0353 | 4.8000e-004 | 0.0127       | 1.9600e-003 | 0.0146     | 3.4800e-003 | 1.8700e-003 | 5.3500e-003 | 0.0000   | 46.6511  | 46.6511  | 1.5600e-003 | 48.8721 |
### Mitigated Construction On-Site

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<th>Exhaust PM10</th>
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<th>Exhaust PM2.5</th>
<th>PM2.5 Total</th>
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<th>N2O</th>
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### Mitigated Construction Off-Site

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<th>N2O</th>
<th>CO2e</th>
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### EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

#### 3.3 High Priority Repairs - 2021

**Unmitigated Construction On-Site**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

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Mitigated Construction Off-Site

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### EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

#### 3.4 Staging/Access 2 - 2022

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**Unmitigated Construction Off-Site**

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CalEEMod Version: CalEEMod.2020.4.0

Date: 7/30/2021 1:34 PM
EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

**Mitigated Construction On-Site**

| Category         | ROG | NOx | CO  | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4  | N2O  | CO2e |
|------------------|-----|-----|-----|-----|----------------|--------------|------------|---------------|---------------|-------------|-----------|----------|----------|----------|------|------|------|
| Fugitive Dust    | 0.2057 | 0.0000 | 0.2057 | 0.1100 | 0.1100 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Off-Road         | 0.0238 | 0.2481 | 0.1477 | 2.9000e-004 | 0.0121 | 0.0121 | 0.0111 | 0.0111 | 0.0000 | 25.0795 | 25.0795 | 8.1100e-003 | 0.0000 | 25.2823 |
| Total            | 0.0238 | 0.2481 | 0.1477 | 2.9000e-004 | 0.2057 | 0.0121 | 0.2178 | 0.1100 | 0.0111 | 0.1212 | 0.0000 | 25.0795 | 25.0795 | 8.1100e-003 | 0.0000 | 25.2823 |

**Mitigated Construction Off-Site**

| Category | ROG  | NOx  | CO  | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4  | N2O  | CO2e |
|----------|------|------|-----|-----|----------------|--------------|------------|---------------|---------------|-------------|-----------|----------|----------|----------|------|------|------|
| Hauling  | 6.9600e-003 | 0.2480 | 0.0570 | 9.0000e-004 | 0.0238 | 2.1700e-003 | 0.0259 | 6.5000e-003 | 2.0800e-003 | 8.6100e-003 | 0.0000 | 88.8479 | 88.8479 | 2.9100e-003 | 0.0141 | 93.1166 |
| Vendor   | 7.0000e-005 | 1.3800e-003 | 4.9000e-004 | 1.0000e-004 | 1.8000e-004 | 2.0000e-005 | 2.0000e-005 | 5.0000e-005 | 2.0000e-005 | 7.0000e-005 | 0.0000 | 0.5708 | 0.5708 | 1.0000e-005 | 0.0959 | 1.4687 |
| Worker   | 6.3000e-004 | 4.6000e-004 | 5.4500e-003 | 2.0000e-005 | 1.7800e-003 | 1.7900e-003 | 1.7900e-003 | 4.7000e-004 | 1.0000e-005 | 4.8000e-004 | 0.0000 | 1.4330 | 1.4330 | 5.0000e-005 | 0.5400e-005 | 1.4468 |
| Total    | 7.6600e-003 | 0.2501 | 0.0630 | 9.3000e-004 | 0.0257 | 2.2000e-003 | 0.0279 | 7.0500e-003 | 2.1100e-003 | 9.1600e-003 | 0.0000 | 90.8517 | 90.8517 | 2.9700e-003 | 0.0142 | 95.1593 |
### 3.5 Burrow Remediation - 2022

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

### 3.6 Drainage Channel/Intake Channel/Tree Removal - 2022

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

**Mitigated Construction On-Site**

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**Mitigated Construction Off-Site**

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**EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied**

**Delta Dams Rodent Burrowing Remediation Project**
Contra Costa County, Summer

### 1.0 Project Characteristics

#### 1.1 Land Usage

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#### 1.2 Other Project Characteristics

- **Urbanization**: Rural
- **Climate Zone**: 4
- **Wind Speed (m/s)**: 2.2
- **Precipitation Freq (Days)**: 58
- **Operational Year**: 2023
- **Utility Company**: Pacific Gas & Electric Company
- **CO2 Intensity (lb/MWhr)**: 641.35
- **CH4 Intensity (lb/MWhr)**: 0.029
- **N2O Intensity (lb/MWhr)**: 0.006

#### 1.3 User Entered Comments & Non-Default Data

- **Land Use - Clifton Court Forebay** = permanent: 46 acres and temporary: 33.03 acres
- **Construction Phase** - Work completed at CCF site September 2021 through October 2021 and all sites from May 2022 through October 2022.
- **Off-road Equipment** - Default equipment assumed.
- **Utilization** - Default equipment assumed.
- **Utilization** - Default equipment assumed.
**EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied**

- Off-road Equipment - Default equipment assumed.
- Off-road Equipment - Default equipment assumed.
- Trips and VMT - Updated trip lengths based on distance to closest material facilities within area. Updated vendor trips to account for water trucks (two water trucks).
- Grading - Material import based on project specific information. Distributed total over all phases.

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

### 2.0 Emissions Summary

#### 2.1 Overall Construction (Maximum Daily Emission)

##### Unmitigated Construction

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<th>PM2.5 Total</th>
<th>Bio- CO2</th>
<th>NBio- CO2</th>
<th>Total CO2</th>
<th>CH4</th>
<th>N2O</th>
<th>CO2e</th>
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<tbody>
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<td>19.8189</td>
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<tr>
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<td>65.2765</td>
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<tr>
<td>Maximum</td>
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<td>65.2765</td>
<td>34.4871</td>
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<td>30.9630</td>
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<td>32.8687</td>
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##### Mitigated Construction

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<th>Exhaust PM10</th>
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<th>Fugitive PM2.5</th>
<th>Exhaust PM2.5</th>
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<th>Bio- CO2</th>
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<td>33.9487</td>
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<td>17,053.5919</td>
<td>17,053.5919</td>
<td>2.1732</td>
<td>2.0870</td>
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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

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<th>Exhaust PM10</th>
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### 3.0 Construction Detail

#### Construction Phase

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<th>End Date</th>
<th>Num Days</th>
<th>Num Days Week</th>
<th>Phase Description</th>
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<td>9/21/2021</td>
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<td></td>
<td>15</td>
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<tr>
<td>2</td>
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<td>Grading</td>
<td>9/1/2021</td>
<td>9/22/2021</td>
<td>5</td>
<td></td>
<td>27</td>
</tr>
<tr>
<td>3</td>
<td>Staging/Access 2</td>
<td>Site Preparation</td>
<td>5/1/2022</td>
<td>5/20/2022</td>
<td>5</td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>4</td>
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<td>Site Preparation</td>
<td>5/2/2022</td>
<td>5/21/2022</td>
<td>5</td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>5</td>
<td>Drainage Channel/Intake</td>
<td>Site Preparation</td>
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**Acres of Grading (Site Preparation Phase): 41.23**

**Acres of Grading (Grading Phase): 37.8**

**Acres of Paving: 0**

**Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating –**
EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

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<th>Offroad Equipment Type</th>
<th>Amount</th>
<th>Usage Hours</th>
<th>Horse Power</th>
<th>Load Factor</th>
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<td>247</td>
<td>0.40</td>
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<tr>
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<td>Tractors/Loaders/Backhoes</td>
<td>4</td>
<td>8.00</td>
<td>97</td>
<td>0.37</td>
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<tr>
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<td>Excavators</td>
<td>2</td>
<td>8.00</td>
<td>156</td>
<td>0.38</td>
</tr>
<tr>
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<td>Graders</td>
<td>1</td>
<td>8.00</td>
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<td>0.41</td>
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<tr>
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<td>Rubber Tired Dozers</td>
<td>1</td>
<td>8.00</td>
<td>247</td>
<td>0.40</td>
</tr>
<tr>
<td>High Priority Repairs</td>
<td>Scrapers</td>
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<td>8.00</td>
<td>367</td>
<td>0.48</td>
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<td>8.00</td>
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<td>0.40</td>
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<tr>
<td>Staging/Access 2</td>
<td>Tractors/Loaders/Backhoes</td>
<td>4</td>
<td>8.00</td>
<td>97</td>
<td>0.37</td>
</tr>
<tr>
<td>Burrow Remediation</td>
<td>Excavators</td>
<td>2</td>
<td>8.00</td>
<td>156</td>
<td>0.38</td>
</tr>
<tr>
<td>Burrow Remediation</td>
<td>Graders</td>
<td>1</td>
<td>8.00</td>
<td>187</td>
<td>0.41</td>
</tr>
<tr>
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<td>Rubber Tired Dozers</td>
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<td>8.00</td>
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<td>0.40</td>
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<tr>
<td>Burrow Remediation</td>
<td>Scrapers</td>
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<td>8.00</td>
<td>367</td>
<td>0.48</td>
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<tr>
<td>Burrow Remediation</td>
<td>Tractors/Loaders/Backhoes</td>
<td>2</td>
<td>8.00</td>
<td>97</td>
<td>0.37</td>
</tr>
<tr>
<td>Drainage Channel/Intake Channel/Tree Removal</td>
<td>Rubber Tired Dozers</td>
<td>3</td>
<td>8.00</td>
<td>247</td>
<td>0.40</td>
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<tr>
<td>Drainage Channel/Intake Channel/Tree Removal</td>
<td>Tractors/Loaders/Backhoes</td>
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## Trips and VMT

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<tr>
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<th>Vendor Trip Number</th>
<th>Hauling Trip Number</th>
<th>Worker Trip Length</th>
<th>Vendor Trip Length</th>
<th>Hauling Trip Length</th>
<th>Worker Vehicle Class</th>
<th>Vendor Vehicle Class</th>
<th>Hauling Vehicle Class</th>
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<tbody>
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<td>4.00</td>
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<td>15.00</td>
<td>LD_Mix</td>
<td>HDT_Mix</td>
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<tr>
<td>High Priority Repairs</td>
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<td>20.00</td>
<td>4.00</td>
<td>1,867.00</td>
<td>10.80</td>
<td>6.60</td>
<td>15.00</td>
<td>LD_Mix</td>
<td>HDT_Mix</td>
<td>HHDT</td>
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<td>Staging/Access 2</td>
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<td>30.00</td>
<td>4.00</td>
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<td>10.80</td>
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<td>15.00</td>
<td>LD_Mix</td>
<td>HDT_Mix</td>
<td>HHDT</td>
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<tr>
<td>Burrow Remediation</td>
<td>8</td>
<td>60.00</td>
<td>4.00</td>
<td>3,734.00</td>
<td>10.80</td>
<td>6.60</td>
<td>15.00</td>
<td>LD_Mix</td>
<td>HDT_Mix</td>
<td>HHDT</td>
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<tr>
<td>Drainage Channel/Intake</td>
<td>4</td>
<td>60.00</td>
<td>4.00</td>
<td>3,734.00</td>
<td>10.80</td>
<td>6.60</td>
<td>15.00</td>
<td>LD_Mix</td>
<td>HDT_Mix</td>
<td>HHDT</td>
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</tbody>
</table>
### 3.1 Mitigation Measures Construction

#### 3.2 Staging/Access 1 - 2021

**Unmitigated Construction On-Site**

| Category          | ROG  | NOx  | CO   | SO2  | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio-CO2 | NBio-CO2 | Total CO2 | CH4 | N2O | CO2e |
|-------------------|------|------|------|------|---------------|--------------|------------|---------------|---------------|------------|----------|---------|-----------|-----------|-----|-----|------|
| Fugitive Dust     |      |      |      |      | 16.6805       | 0.0000       | 16.6805    | 7.8354        | 0.0000        | 7.8354     | 0.0000   | 0.0000   |           |       |     |      |
| Off-Road          | 3.8882| 40.4971| 21.1543| 0.0380| 2.0445        | 2.0445       | 1.8809    | 1.8809        | 0.0000        | 0.0000    | 0.0000   | 0.0000   | 3,685.6569| 3,685.6569| 1.1920|     |      |
| **Total**         | 3.8882| 40.4971| 21.1543| 0.0380| 2.0445        | 18.7250      | 7.8354    | 1.8809        | 9.7163        | 3,685.6569| 3,685.6569| 1.1920   | 3,715.4573|       |     |      |

**Unmitigated Construction Off-Site**

| Category          | ROG  | NOx  | CO   | SO2  | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio-CO2 | NBio-CO2 | Total CO2 | CH4 | N2O | CO2e |
|-------------------|------|------|------|------|---------------|--------------|------------|---------------|---------------|------------|----------|---------|-----------|-----------|-----|-----|------|
| Hauling           | 0.7000| 18.4301| 4.3346| 0.0615| 1.8328        | 0.2568       | 1.8897     | 0.4476        | 0.2457        | 0.6933     | 6,697.6698| 6,697.6698| 0.2258    | 1.0612   | 7,019.5434|   |     |      |
| Vendor            | 0.0135| 0.2444| 0.0765| 8.0000e-004| 0.0245        | 4.25000e-003| 0.0288    | 7.05000e-003| 4.07000e-003| 0.0111     | 85.8862  | 85.8862  | 2.0800e-003| 0.0126   | 89.6811 |   |     |      |
| Worker            | 0.0334| 0.0205| 0.2928| 7.7000e-004| 0.0822        | 4.40000e-004| 0.0826    | 4.10000e-004| 0.0222        |           | 78.2520  | 78.2520  | 2.3300e-003| 2.0800e-003| 78.9312|   |     |      |
| **Total**         | 0.7468| 18.6951| 4.7039| 0.0631| 1.7395        | 0.2615       | 2.0010    | 0.4764        | 0.2502        | 0.7266     | 6,861.8079 | 6,861.8079 | 0.2302    | 1.0758   | 7,188.1556|   |     |      |
EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

### Mitigated Construction On-Site

| Category       | ROG  | NOx  | CO   | SO2  | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|----------------|------|------|------|------|---------------|--------------|------------|---------------|---------------|------------|-----------|----------|-----------|----------|-----|-----|------|
| Fugitive Dust  |      |      |      |      | 16.6805       | 0.0000       | 16.6805    | 7.8354        | 0.0000        | 7.8354     | 0.0000    | 0.0000   | 0.0000   |          |     |     |      |
| Off-Road       | 3.882| 40.497| 21.154| 0.0380| 2.0445        | 2.0445       | 1.8809     | 1.8809        | 0.0000        | 3.6856569 | 3.6856569 | 1.1920   | 3.7154573|     |     |      |

### Mitigated Construction Off-Site

| Category       | ROG  | NOx  | CO   | SO2  | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio- CO2 | NBio- CO2 | Total CO2 | CH4 | N2O | CO2e |
|----------------|------|------|------|------|---------------|--------------|------------|---------------|---------------|------------|-----------|----------|-----------|----------|-----|-----|------|
| Hauling        | 0.7000 | 18.4301 | 4.3346 | 0.0615 | 1.8328       | 0.2568       | 1.8897     | 0.4476        | 0.2457        | 0.6933     | 6.6976698 | 6.6976698 | 0.2258   | 1.0612   | 7.0195434|     |     |      |
| Vendor         | 0.0135 | 0.2444 | 0.0765 | 8.0000e-004 | 0.0265       | 4.2500e-003 | 0.0288    | 7.3500e-003   | 4.0700e-003   | 0.0111     | 85.8862    | 85.8862   | 2.08006e-003 | 0.0126   | 89.8817 |     |      |
| Worker         | 0.0334 | 0.0205 | 0.2928 | 7.7000e-004 | 0.0822       | 4.4000e-004 | 0.0826    | 4.1000e-004   | 0.0222        | 78.2520    | 78.2520   | 2.33000e-003 | 2.08000e-003 | 78.9312 |     |      |     |
| **Total**      | 0.7465 | 18.6951 | 4.7039 | 0.0631 | 1.7395       | 0.2615       | 2.0010    | 0.4764        | 0.2502        | 0.7266     | 6.8618079  | 6.8618079 | 0.2302   | 1.0758   | 7.1881556|     |     |      |
### 3.3 High Priority Repairs - 2021

#### Unmitigated Construction On-Site

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<th>SO2</th>
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<th>Fugitive PM2.5</th>
<th>Exhaust PM2.5</th>
<th>PM2.5 Total</th>
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#### Unmitigated Construction Off-Site

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<th>SO2</th>
<th>Fugitive PM10</th>
<th>Exhaust PM10</th>
<th>PM10 Total</th>
<th>Fugitive PM2.5</th>
<th>Exhaust PM2.5</th>
<th>PM2.5 Total</th>
<th>Bio-CO2</th>
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<th>Total CO2</th>
<th>CH4</th>
<th>N2O</th>
<th>CO2e</th>
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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

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### EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

#### 3.4 Staging/Access 2 - 2022

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**Unmitigated Construction Off-Site**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

### Mitigated Construction On-Site

| Category       | ROG | NOx | CO  | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio-CO2 | NBio-CO2 | Total CO2 | CH4 | N2O | CO2e |
|----------------|-----|-----|-----|-----|---------------|--------------|------------|----------------|---------------|------------|----------|---------|----------|----------|-----|-----|------|
| Fugitive Dust  |     |     |     |     | 27.4261       | 0.0000       | 27.4261    | 14.6713        | 0.0000        | 14.6713    | 0.0000   | 0.0000  | 0.0000   |          |     |     |      |
| Off-Road       | 3.1701 | 33.0835 | 19.6978 | 0.0380 | 1.6126 | 1.6126 | 1.4836 | 1.4836 | 0.0000 | 3.686.0619 | 3.686.0619 | 1.1922 | 3,715.8655 |

### Mitigated Construction Off-Site

| Category       | ROG  | NOx  | CO  | SO2  | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio-CO2 | NBio-CO2 | Total CO2 | CH4  | N2O  | CO2e |
|----------------|------|------|-----|------|---------------|--------------|------------|----------------|---------------|------------|----------|---------|----------|----------|-----|-----|------|
| Hauling        | 0.9388 | 31.9053 | 7.5417 | 0.1198 | 3.2660        | 0.2896       | 3.5556      | 0.8953         | 0.2771        | 1.1723     | 13,056.0274 | 13,056.0274 | 0.4290 | 2.0690 | 13,683.303 |
| Vendor         | 8.7800e-003 | 0.2034 | 0.0647 | 7.8000e-004 | 0.0245 | 2.2800e-003 | 0.0268 | 7.0500e-003 | 2.1900e-003 | 9.2400e-003 | 83.8826 | 83.8826 | 1.8500e-003 | 0.0122 | 87.5677 |
| Worker         | 0.0928 | 0.0543 | 0.8050 | 2.2500e-003 | 0.2464 | 1.2600e-003 | 0.2477 | 0.0654 | 1.1600e-003 | 0.0665 | 227.6201 | 227.6201 | 6.3000e-003 | 5.7700e-003 | 229.4964 |
| Total          | 1.0403 | 32.1930 | 8.4115 | 0.1228 | 3.5369 | 0.2931 | 3.8301 | 0.9677 | 0.2804 | 1.2481 | 13,367.5301 | 13,367.5301 | 0.4372 | 2.0870 | 14,000.372 |
### EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

#### 3.5 Burrow Remediation - 2022

**Unmitigated Construction On-Site**

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**Unmitigated Construction Off-Site**

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### EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

#### 3.6 Drainage Channel/Intake Channel/Tree Removal - 2022

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## EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

### Mitigated Construction On-Site

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Delta Dams Rodent Burrowing Remediation Project
Contra Costa County, Winter

1.0 Project Characteristics

1.1 Land Usage

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1.2 Other Project Characteristics

- Urbanization: Rural
- Wind Speed (m/s): 2.2
- Precipitation Freq (Days): 58
- Climate Zone: 4
- Operational Year: 2023
- Utility Company: Pacific Gas & Electric Company
- CO2 Intensity (lb/MWhr): 641.35
- CH4 Intensity (lb/MWhr): 0.029
- N2O Intensity (lb/MWhr): 0.006

1.3 User Entered Comments & Non-Default Data

- Land Use - Clifton Court Forebay = permanent: 46 acres and temporary: 33.03 acres
- Construction Phase - Work completed at CCF site September 2021 through October 2021 and all sites from May 2022 through October 2022.
- Off-road Equipment - Default equipment assumed.
**EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied**

- Off-road Equipment - Default equipment assumed.
- Off-road Equipment - Default equipment assumed.
- Trips and VMT - Updated trip lengths based on distance to closest material facilities within area. Updated vendor trips to account for water trucks (two water trucks).
- Grading - Material import based on project specific information. Distributed total over all phases.

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### EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

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2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

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Mitigated Construction

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<th>Exhaust PM2.5</th>
<th>PM2.5 Total</th>
<th>Bio- CO2</th>
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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

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<th>Exhaust PM2.5</th>
<th>PM2.5 Total</th>
<th>Bio-CO2</th>
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<th>End Date</th>
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<th>Num Days</th>
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<td>9/21/2021</td>
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<td>15</td>
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<tr>
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<td>Grading</td>
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<td>10/28/2021</td>
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<td>27</td>
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<td>Site Preparation</td>
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<td>5/20/2022</td>
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<td>15</td>
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<td>Site Preparation</td>
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<td>7/1/2022</td>
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<tr>
<td>5</td>
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Acres of Grading (Site Preparation Phase): 41.23

Acres of Grading (Grading Phase): 37.8

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating –
### EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

#### OffRoad Equipment

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<th>Horse Power</th>
<th>Load Factor</th>
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<td>8.00</td>
<td>158</td>
<td>0.38</td>
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<td>Graders</td>
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<td>0.40</td>
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<td>0.37</td>
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<td>Excavators</td>
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<tr>
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<td>Graders</td>
<td>1</td>
<td>8.00</td>
<td>187</td>
<td>0.41</td>
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<tr>
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<tr>
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<td>Tractors/Loaders/Backhoes</td>
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<td>Drainage Channel/Intake Channel/Tree Removal</td>
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<tr>
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### EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

#### Trips and VMT

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<th>Vendor Trip Number</th>
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<th>Vendor Trip Length</th>
<th>Hauling Trip Length</th>
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<td>LD_Mix</td>
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### EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

#### 3.1 Mitigation Measures Construction

#### 3.2 Staging/Access 1 - 2021

**Unmitigated Construction On-Site**

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<th>Exhaust PM10</th>
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<th>Fugitive PM2.5</th>
<th>Exhaust PM2.5</th>
<th>PM2.5 Total</th>
<th>Bio- CO2</th>
<th>NBio- CO2</th>
<th>Total CO2</th>
<th>CH4</th>
<th>N2O</th>
<th>CO2e</th>
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**Unmitigated Construction Off-Site**

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<th>Exhaust PM10</th>
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<th>Fugitive PM2.5</th>
<th>Exhaust PM2.5</th>
<th>PM2.5 Total</th>
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<th>Total CO2</th>
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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

**Mitigated Construction On-Site**

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**Mitigated Construction Off-Site**

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### EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

#### 3.3 High Priority Repairs - 2021

#### Unmitigated Construction On-Site

| Category          | ROG | NOx | CO  | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio-CO2 | NBio-CO2 | Total CO2 | CH4  | N2O  | CO2e  |
|-------------------|-----|-----|-----|-----|---------------|--------------|------------|---------------|--------------|------------|----------|---------|----------|----------|------|------|-------|
| Fugitive Dust     |     |     |     |     | 18.7230       | 0.0000       | 18.7230    | 9.6103        | 0.0000       | 9.6103     | 0.0000   | 0.0000   |          |        |      |       |
| Off-Road          | 4.1912 | 46.3998 | 30.8785 | 0.0620 | 1.9833       | 1.9833       | 1.8265     | 1.8265        | 6,007.0434 | 6,007.0434 | 1.9428   | 6,055.6134 |
| Total             | 4.1912 | 46.3998 | 30.8785 | 0.0620 | 18.7230      | 1.9833       | 20.7083    | 9.6103        | 1.8265       | 11.4368    | 6,007.0434 | 6,007.0434 | 1.9428   | 6,055.6134 |

#### Unmitigated Construction Off-Site

| Category | ROG | NOx | CO  | SO2 | Fugitive PM10 | Exhaust PM10 | PM10 Total | Fugitive PM2.5 | Exhaust PM2.5 | PM2.5 Total | Bio-CO2 | NBio-CO2 | Total CO2 | CH4  | N2O  | CO2e  |
|----------|-----|-----|-----|-----|---------------|--------------|------------|---------------|--------------|------------|----------|---------|----------|----------|------|------|-------|
| Hauling  | 0.3824 | 10.7819 | 2.4556 | 0.0342 | 0.9071       | 0.1429       | 1.0500     | 0.2487        | 0.1367       | 0.3854     | 3,721.7013 | 3,721.7013 | 0.1250   | 0.5897 | 3,900.5532 |
| Vendor   | 0.0134 | 0.2573 | 0.0791 | 8.0000e-004 | 0.0245 | 4.2800e-003 | 0.0288      | 7.0500e-003 | 4.0800e-003 | 0.0111     | 85.8905  | 85.8905 | 2.0700e-003 | 0.0126 | 2.0177e-003 |
| Worker   | 0.0649 | 0.0507 | 0.5423 | 1.4200e-003 | 0.1643 | 8.9000e-004 | 0.1652 | 0.0436 | 8.2000e-004 | 0.0444 | 143.2151 | 143.2151 | 5.3100e-003 | 144.7794 |
| Total    | 0.4607 | 11.0899 | 3.0769 | 0.0364 | 1.0959      | 0.1480       | 1.2440     | 0.2993        | 0.1416       | 0.4409     | 3,950.8069 | 3,950.8069 | 0.1324   | 0.6071 | 4,135.0239 |
EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

### Mitigated Construction On-Site

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# EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

## 3.4 Staging/Access 2 - 2022

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### Unmitigated Construction Off-Site

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

**Mitigated Construction On-Site**

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**Mitigated Construction Off-Site**

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### EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

#### 3.5 Burrow Remediation - 2022

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**Unmitigated Construction Off-Site**

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Biological Resources Existing Conditions Report for the Delta Dams Rodent Burrow Remediation Project
Alameda and Contra Costa Counties, California

Prepared for:
California Department of Water Resources
1416 Ninth Street, Room 604
Sacramento, California 95814
Contact: Sara Paiva-Lowry

Prepared by:
DUDEK
Contact: Laurie Monarres
Email: lmonarres@dudek.com

SEPTEMBER 2021 JUNE 2022
# Table of Contents

## ACRONYMS AND ABBREVIATIONS

EXECUTIVE SUMMARY

<table>
<thead>
<tr>
<th>SECTION</th>
<th>PAGE NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>1.1 Purpose of the Report</td>
<td>1</td>
</tr>
<tr>
<td>1.2 Project Description</td>
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</tr>
<tr>
<td>1.2.1 Clifton Court Forebay Dam</td>
<td>1</td>
</tr>
<tr>
<td>1.2.2 Dyer Dam</td>
<td>3</td>
</tr>
<tr>
<td>1.2.3 Patterson Dam</td>
<td>5</td>
</tr>
<tr>
<td>1.3 Site Description and Location</td>
<td>7</td>
</tr>
<tr>
<td>1.3.1 Clifton Court Forebay Dam</td>
<td>7</td>
</tr>
<tr>
<td>1.3.2 Dyer Dam</td>
<td>8</td>
</tr>
<tr>
<td>1.3.3 Patterson Dam</td>
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</tr>
<tr>
<td>2 APPLICABLE STATUTES AND REGULATIONS</td>
<td>11</td>
</tr>
<tr>
<td>2.1 Federal</td>
<td>11</td>
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<tr>
<td>2.1.1 Federal Endangered Species Act</td>
<td>11</td>
</tr>
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<td>2.1.2 Migratory Bird Treaty Act</td>
<td>11</td>
</tr>
<tr>
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<td>12</td>
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<td>2.2.2 California Fish and Game Code</td>
<td>13</td>
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<td>2.2.3 Porter–Cologne Water Quality Control Act</td>
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<td>15</td>
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<tr>
<td>3 SURVEY METHODS</td>
<td>17</td>
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<tr>
<td>3.1 Literature Review</td>
<td>17</td>
</tr>
<tr>
<td>3.2 Field Surveys</td>
<td>17</td>
</tr>
<tr>
<td>3.2.1 Resource Mapping</td>
<td>19</td>
</tr>
<tr>
<td>3.2.2 Flora</td>
<td>19</td>
</tr>
<tr>
<td>3.2.3 Fauna</td>
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<tr>
<td>3.2.4 Aquatic Resources Delineation</td>
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</tr>
<tr>
<td>3.2.5 Special-Status Plant Surveys</td>
<td>21</td>
</tr>
<tr>
<td>3.2.6 Special-Status Wildlife Surveys</td>
<td>21</td>
</tr>
<tr>
<td>3.2.7 Wildlife Surveys for Delta Field Division Habitat Conservation Plan</td>
<td>23</td>
</tr>
</tbody>
</table>
3.3 Survey Limitations .................................................................................................. 24
3.3.1 Flora .................................................................................................................. 24
3.3.2 Fauna .................................................................................................................. 24

4 ENVIRONMENTAL SETTING (EXISTING CONDITIONS) ............................................ 25
4.1 Vegetation Communities and Land Cover Types .................................................. 25
4.1.1 Bog and Marsh ..................................................................................................... 28
4.1.2 Disturbed and Developed ..................................................................................... 33
4.1.3 Dune .................................................................................................................... 34
4.1.4 Grass and Herb Dominated ................................................................................... 35
4.1.5 Riparian ............................................................................................................... 37
4.1.6 Scrub .................................................................................................................... 40
4.2 Jurisdictional Aquatic Resources .......................................................................... 40
4.2.1 USACE Potential Waters of the United States .................................................. 41
4.2.2 RWQCB Potential Waters of the State ................................................................. 41
4.2.3 CDFW-Jurisdictional Waters .............................................................................. 42
4.3 Botany – Plant Diversity ....................................................................................... 43
4.4 Zoology – Wildlife Diversity .................................................................................. 43
4.4.1 Invertebrates ....................................................................................................... 44
4.4.2 Fishes ................................................................................................................... 44
4.4.3 Reptiles and Amphibians ..................................................................................... 44
4.4.4 Birds .................................................................................................................... 44
4.4.5 Mammals ............................................................................................................. 44
4.5 Sensitive Biological Resources ............................................................................. 45
4.5.1 Sensitive Natural Communities .......................................................................... 45
4.5.2 Special-Status Plant Species .............................................................................. 46
4.5.3 Special-Status Wildlife Species .......................................................................... 48
4.5.4 Wildlife Movement .............................................................................................. 71

5 REFERENCES AND PREPARERS .............................................................................. 77
5.1 References Cited .................................................................................................... 77
5.2 List of Preparers ...................................................................................................... 85

TABLES
1 Soils within the Clifton Court Forebay Dam Study Area .................................................. 7
2 Soils within the Dyer Dam Study Area .......................................................................... 8
3 Soils within the Patterson Dam Study Area .................................................................... 9
4 Schedule of Surveys Conducted by Dudek, Clifton Court Forebay Dam ....................... 17
5 Schedule of Surveys Conducted by Dudek, Dyer Dam .................................................... 18
6 Schedule of Surveys Conducted by Dudek, Patterson Dam ........................................... 19
Vegetation Communities within the Project Site ................................................................. 26
Acres of USACE Potential Waters of the United States by Biological Resources Study Area ................................................................. 41
Acres of RWQCB Potential Waters of the State by Biological Resources Study Area ................................................................. 42
Acres of CDFW-Jurisdictional Waters by Biological Resources Study Area ................................................................. 42
Sensitive Natural Communities by Biological Resources Study Area ................................................................. 45
Wildlife Game Camera Study Preliminary Results ........................................................................ 74

FIGURES

1 Project Location ................................................................................................................... 87
2A Soils–Clifton Court Forebay Dam .................................................................................... 89
2B Soils–Dyer Dam .............................................................................................................. 91
2C Soils–Patterson Dam ....................................................................................................... 93
3 Hydrologic Setting .......................................................................................................... 95
4A Biological Study Area–Clifton Court Forebay Dam ......................................................... 97
4B Biological Study Area–Dyer Dam .................................................................................. 99
4C Biological Study Area–Patterson Dam ......................................................................... 101
5A Vegetation Communities–Clifton Court Forebay Dam .................................................. 103
5B Vegetation Communities–Dyer Dam ............................................................................. 105
5C Vegetation Communities–Patterson Dam ..................................................................... 107
6A USACE-Delineated Aquatic Resources–Clifton Court Forebay Dam ............................ 109
6B USACE-Jurisdictional Areas–Dyer Dam ....................................................................... 111
6C USACE-Jurisdictional Areas–Patterson Dam ................................................................. 113
7A RWQCB-Delineated Aquatic Resources–Clifton Court Forebay Dam .......................... 115
7B RWQCB-Jurisdictional Areas–Dyer Dam ................................................................... 117
7C RWQCB-Jurisdictional Areas–Patterson Dam ............................................................... 119
8A CDFW-Jurisdictional Areas–Clifton Court Forebay Dam ............................................ 121
8B CDFW-Jurisdictional Areas–Dyer Dam ..................................................................... 123
8C CDFW-Jurisdictional Areas–Patterson Dam ................................................................. 125
9 Special-Status Plants–Clifton Court Forebay Dam ......................................................... 127
10A Wildlife Camera Stations–Dyer Reservoir ................................................................. 129
10B Wildlife Camera Stations–Patterson Reservoir .......................................................... 131
11A Wildlife Camera Stations Results–Dyer Reservoir ..................................................... 133
11B Wildlife Camera Stations Results–Patterson Reservoir ............................................. 135
12A Wildlife Camera Stations Direction and Viewscape–Dyer Reservoir ........................... 137
12B Wildlife Camera Stations Direction and Viewscape–Dyer Reservoir ........................... 139
APPENDICES

A  Plant Species Observed within the Project Site
B  Wildlife Species Observed within the Project Site
C  Special-Status Plant Species’ Potential to Occur within the Project Site
D  Special-Status Wildlife Species’ Potential to Occur within the Project Site
## Acronyms and Abbreviations

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Executive Summary

The California Department of Water Resources (DWR) is proposing the Delta Dams Rodent Burrow Remediation Project (Project) to address dam stability and safety concerns at Clifton Court Forebay Dam in eastern Contra Costa County and Dyer Dam and Patterson Dam in eastern Alameda County. The Project would involve rodent burrow repairs and restoration measures, ongoing monitoring, and permanent measures to prevent future burrowing where warranted. DWR also proposes to implement a Rodent Burrow Maintenance and Monitoring Plan, which describes a program for routine inspections, burrow collapse, excavation, compaction, and backfilling. The purpose of this report is to describe the existing conditions of biological resources within the Project site in terms of vegetation, wildlife, special-status species and their habitat, jurisdictional aquatic resources, and wildlife movement. This report is also intended to provide biological support for analysis of the Project under the California Environmental Quality Act (CEQA) as well as applications to the California Department of Fish and Wildlife (CDFW) for an Incidental Take Permit pursuant to Section 2081 of the California Endangered Species Act and a Lake and Streambed Alteration Agreement pursuant to Section 1602 of the California Fish and Game Code.

Biological resources were identified through an extensive literature review and field surveys of the Project site at each dam. This report describes biological resources identified during surveys conducted from December 2020 to mid-June 2021, as well as special-status plants or animals for which suitable habitat is present and that could be identified before the completion of surveys in August 2021. Focused special-status species surveys and assessments included special-status plant surveys; a multispecies burrow assessment to identify habitat for burrowing owl (Athene cunicularia), San Joaquin kit fox (Vulpes macrotis mutica) and American badger (Taxidea taxus); subsequent protocol-level surveys for burrowing owl and San Joaquin kit fox; and a Swainson’s hawk (Buteo swainsoni) nesting survey. Eagle surveys and a wildlife game camera study conducted for a future Habitat Conservation Plan (HCP) within DWR’s Delta Field Division were conducted concurrently with Project surveys and were also used to inform the report.

In total, 32 vegetation communities or land cover types were mapped within the Project site. Disturbed and developed land cover types comprise most of the overall Project site because of their extent at Clifton Court Forebay Dam, but are slightly less extensive than grassland and associated herbaceous communities at Dyer Dam and Patterson Dam. Approximately 15 acres of riparian communities and 2.4 acres of scrub (coyote brush [Baccharis pilularis] scrub) are only present at Clifton Court Forebay Dam. Bog and marsh communities occur at all three dams but comprise a higher percentage of total land cover at Clifton Court Forebay Dam (15%) than at Dyer Dam and Patterson Dam (3.4% at both). In total, 12 sensitive natural communities (CDFW 2020) were mapped, including alkali heath marsh (1.9 acres), America bulrush marsh (1.8 acres), hardstem and California bulrush marshes (0.2 acres), two associations of iodine bush scrub (5.4 acres of Allenrolfea occidentalis/Distichlis spicata Provisional Association and 7.5 acres of A. occidentalis Association), California brome–blue wildrye prairie (2.6 acres), needle grass–melic grass grassland (17.9 acres), arroyo willow thickets (less than 0.05 acres), button willow thickets (1.4 acres), Gooding’s willow–red willow riparian woodland and forest (7.6 acres), Hind’s walnut and related stands (1.2 acres), and red alder forest (0.3 acres). Most of these communities occur at Clifton Court Forebay. These and other communities are described in Section 4.1, Vegetation Communities and Land Cover Types, and Section 4.5.1, Sensitive Natural Communities.

Jurisdictional aquatic resources include waters of the United States under the U.S. Army Corps of Engineers (USACE) and Regional Water Quality Control Board (RWQCB) jurisdiction and CDFW-jurisdictional waters. Jurisdictional aquatic resources are summarized in Section 4.2.
Dudek detected two special-status plant species during focused surveys of the Project site through April 2021: long-styled sand-spurrey (*Spergularia macrotheca* var. *longistyla*), which has a California Rare Plant Rank (CRPR) of 1B (considered rare throughout their range) and woolly rose-mallow (*Hibiscus lasiocarpus* var. *occidentalis*) (CRPR 1B). Both species were observed in the southern portion of the Clifton Court Forebay Dam biological resources study area. Special-status plant species are described in Section 4.5.2.

Twenty-two (22) special-status wildlife species have been directly observed or are considered to have high potential to occur within or adjacent to the Project site. Vernal pool fairy shrimp (*Branchinecta lynchi*) has been observed in alkali grassland south of Clifton Court Forebay and may still occur there. Six special-status fish species are known to occur in or near Clifton Court Forebay: green sturgeon (*Acipenser medirostris*), Central Valley steelhead (*Oncorhynchus mykiss*), Sacramento River winter-run Chinook salmon (*Oncorhynchus tshawytscha*), Central Valley spring-run Chinook salmon, delta smelt (*Hypomesus transpacificus*), and longfin smelt (*Spirinchus thaleichthys*). California tiger salamander (*Ambystoma californiense*) and California red-legged frog (*Rana draytonii*) have been observed near all three dams and suitable habitat is present. Swainson’s hawk (*Buteo swainsoni*) is known to nest in riparian habitat at Clifton Court Forebay but does not occur at Dyer Dam or Patterson Dam. Suitable habitat for burrowing owl (*Athene cunicularia*) occurs at all three dams and the species or its sign was observed during 2021 field surveys. Other special-status bird species for which suitable nesting habitat occurs in or near the Project site include northern harrier (*Circus hudsonius*), white-tailed kite (*Elanus leucurus*), loggerhead shrike (*Lanius ludovicianus*), "Modesto" song sparrow (*Melospiza melodia*) at Clifton Court Forebay, and tricolored blackbird (*Agelaius tricolor*). The Project site is within the northern range of San Joaquin kit fox (*Vulpes macrotis mutica*) but there are few recent occurrences in the vicinity. Suitable habitat for American badger (*Taxidea taxus*) is present at all three dams and sign was observed in the Clifton Court Forebay Dam and Patterson Dam study areas. Additional information on these and other special-status wildlife species is provided in Section 4.5.3.

Wildlife movement through the Project site is constrained by existing water delivery infrastructure (i.e., canals, reservoirs, access roads, facility fencing) so most medium- to large-bodied terrestrial species likely use the multiple overchutes, underchutes, and road crossings to move across or around the reservoirs and aqueducts at the three dams. The Dyer Dam and Patterson Dam Project sites are in the regional “Mt. Diablo-Diablo Range” critical linkage mapped by the Critical Linkages: Bay Area and Beyond project (Penrod et al. 2013) that extends from the southeast flank of Mt. Diablo down to Del Puerto Canyon. Local movement at these sites is less constrained than at Clifton Court Forebay because of large expanses of nearby annual grassland, but wildlife must still cross or move around the South Bay Aqueduct and reservoirs.
1 Introduction

1.1 Purpose of the Report

The California Department of Water Resources (DWR) Delta Dams Rodent Burrow Remediation Project (Project) would involve rodent burrow repairs and restoration measures, ongoing monitoring, and permanent measures to prevent future burrowing where warranted. There are three dams that are part of the overall Project—Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam. For each site, the Project components were buffered by 300 feet to create a biological resources study area (or study area); open reservoir waters, private lands, and sediment or stormwater basins within the 300-foot buffer were considered when assessing species’ potential to occur, but were excluded from resource mapping. Because some of the biological resources on each site differ, each site is described separately in this report.

The purpose of this biological resources existing conditions report is to describe the existing conditions of biological resources within the Project site in terms of vegetation, wildlife, special-status species and their habitat, jurisdictional aquatic resources, and wildlife movement. This biological resources existing conditions report will be used in the California Environmental Quality Act (CEQA) document to describe the sensitive biological resources that occur or could potentially occur on the Project site. Additionally, this report is intended to provide biological support for upcoming application to the U.S. Army Corps of Engineers (USACE), Regional Water Quality Control Board (RWQCB), and California Department of Fish and Wildlife (CDFW).

1.2 Project Description

The Project would involve rodent burrow remediation (burrow collapse, excavation, compaction, and backfilling), erosion prevention measures, restoration measures, ongoing monitoring, and permanent measures to prevent future burrowing where warranted. These measures are described in DWR’s proposed Rodent Burrow Maintenance and Monitoring Plan. Initial remediation actions would be taken in 2021 and 2022. Ongoing monitoring would continue in future years, and additional remediation and restoration measures may be warranted.

A more detailed description of the Project sites (Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam) is provided in Section 1.3, Site Description and Location. For additional Project description information and figures depicting the Project, see the Initial Study for the Delta Dams Rodent Burrow Remediation Project (DWR 2021).

1.2.1 Clifton Court Forebay Dam

Burrowing activity has been identified at locations in all portions of the approximately 8-mile-long Clifton Court Forebay Dam. The most extensive burrowing—and therefore the most severe damage—occurs mostly along three segments (in the northwest corner, along the central portion of the western side, and along central and eastern portions of the southern side), while less widespread individual burrow holes and burrow clusters occur throughout all reaches of the dam. Burrow remediation activities are expected to affect a total of 37.5 acres of the downstream face of Clifton Court Forebay Dam. Rodent burrow remediation work to restore the dam embankments and complete burrow prevention measures would take place over 1 to 2 years. After construction, any materials not used or reused in the Project would be hauled off site and reused, disposed of in a landfill, or recycled at a recycling facility. Construction would include clearing and grubbing of trees and shrubs, including any stumps. Cleared and grubbed...
vegetation would be removed from the site and disposed of at an approved location. Construction would occur continuously during daylight hours between May and October in each year that construction takes place, with no work occurring for 24 hours following a rain event.

Where shallow ruts and near-surface deformations occur, DWR would fill and compact these areas with native soil of similar type to that of the downstream dam embankment slope. This would require use of lightweight and heavy construction equipment such as skid-steer, dozer, backhoe, skip-loader, soil compactor, excavator, and water truck. Fill material would be delivered to the site from a stockpile location using dump trucks or light-duty trucks. No export of soil is anticipated for excavation and recompaction of the dam face, but some limited import may be needed while armoring the dam. Rock, bedding material, mesh, or other suitable materials required for armoring would be imported to the site via the existing or proposed construction access roads and staged in staging areas or access roads.

Clifton Court Forebay Dam has a seepage collection system consisting of perimeter drainage channels and several collection sumps. The drainage channels capture seepage water and convey it into the sumps, which continuously pump water back into the forebay. Sump No. 4 is located at the northwest end of the dam and several large trees within its footprint are proposed to be removed in the fall of 2021 one of the project implementation years (2022 through 2026) to prevent leaves and limbs from obstructing the intake pump screens.

DWR has identified a high-priority repair area at the Clifton Court Forebay intake channel to restore the slope and install permanent improvement measures to prevent animal burrowing. The repairs include excavation, grouting, backfill, and recompaction; installation of PVC-coated steel wire mesh and bedding material; and placement of permanent armoring rock. This work would occur on the downstream slope (channel side) from the downstream crest (at approximately 16.5 feet above mean sea level) to an elevation of 4 feet, and be performed during low tideflow conditions to avoid working directly within waters. Clearing and grubbing would occur on the downstream slope to remove debris, vegetation, and existing riprap remains from original construction of the dam. Restoration of the dam intake channel slope would require excavating to a depth of approximately 2 feet. After excavation has exposed subgrade, any holes or cavities that remain would be grouted as needed. Grouting is expected to be performed on a limited basis and as determined by the field engineer. Once grouting is complete, the excavated areas would be backfilled and recompacted in lifts, back to the original design slope. The embankment slope would be backfilled with a combination of impervious native soil, cementitious-soil slurry, or similar embankment material. It is anticipated that any excavation and recompaction of the dam’s face would result in minor import or export of materials. Following the recompaction effort, a layer of bedding material (6 inches thick) and wire mesh would be placed over the restored embankment slope. The bedding material and PVC-coated steel wire mesh would be placed on the entire remediation area. An 18-inch-thick layer of large armoring rock would be placed over the bedding material and PVC wire mesh to deter future animal burrowing and prevent erosion within the intake channel slope due to wave action.

1.2.1.1 Project Location, Access, and Staging

Clifton Court Forebay is located in Contra Costa County, California. The primary access to the dam is via Byron Highway to Clifton Court Road, and a secondary access is provided from Byron Highway via the Skinner Fish Facility entrance. The primary access point provides access to the west, north, and east dam segments. Typical access to the south dam segment is also from Clifton Court Road, but this access point is subject to traffic load restrictions because it passes over the intake control structure bridge. Thus, the additional access point through the Skinner Fish Facility entrance would provide access to the southern dam embankment and intake channel.
for heavy haul trucks or construction equipment. Clifton Court Forebay Dam is approximately 8 miles long, impounds 28,653 acre-feet, and serves as the intake point and northernmost terminus of the California Aqueduct. The dam embankment has a maximum height of 30 feet and a crest width of 20 feet. The overall crest length of the dam is 36,500 feet (6.9 miles).

DWR has identified 11 staging areas around the perimeter of the dam totaling approximately 10.4 acres. Staging areas would be used to stockpile material needed to implement the burrow remediation, including filling of ruts and deformations. The materials would include rock, bedding material, wire mesh, or other materials required for armoring and/or backfilling the burrow holes.

In addition to the access provided by the dam’s paved crest roadway, existing maintenance roads may be used along the dam toe. An additional maximum of 10.6 acres of permanent toe access roads may be necessary for construction and long-term operations and maintenance. It is anticipated that any excavation and recompaction of the dam’s face will require import. Rock, bedding material, wire mesh, or other materials required for armoring and/or backfilling the burrow holes, will be imported to the site via the existing crest and maintenance access roads. Placement of materials will be achieved from the dam crest and toe.

1.2.1.2 Construction Equipment

The following construction equipment would be used to implement the proposed dam remediation efforts:

- concrete truck
- skid-steer
- scraper
- grader
- dozer
- backhoe
- mobile grout mixing plant
- concrete pump truck
- skip-loader
- soil compactor
- excavator
- dump truck
- water truck

1.2.2 Dyer Dam

Dyer Dam is a relatively small dam, and rodent burrowing within its downstream embankment is relatively dense. DWR’s Division of Safety of Dams classifies Dyer Dam as high hazard, indicating that its failure is likely to result in the loss of at least one human life. These factors make Dyer Dam a candidate for excavation, recompaction, and permanent armoring with wire mesh and rock. Burrowing occurs on all sides of Dyer Dam, with the west side categorized as high priority and the north, east, and south sides categorized as medium priority. This includes significant burrowing that has been observed along the east side of the dam in a slope above the crest roadway. While this area is not within the dam prism, repairs are warranted to remediate burrowing activity that could ultimately result in instability, potential embankment failure, and increased annual maintenance. Remediation is expected to be required on approximately 5.54 acres of the dam.

Where shallow ruts and near-surface deformations occur, these areas would be filled with native soil of similar type to that of the downstream dam embankment slope and this soil would be compacted. Depending on location, size, burrow cluster density, and depths, burrow holes may alternatively be excavated and backfilled. Then native
soil, cementitious-soil slurry, low pressure grout, and/or similar embankment material would be used to backfill holes and would be compacted level with the surrounding ground. For zones where heavy construction equipment cannot be used, burrows may be filled by hand and/or lightweight equipment. Permanent armoring with wire mesh and rock would be placed on the dam embankment to deter future rodent burrowing. Equipment for these activities would include lightweight and heavy equipment such as skid-steer, grader, dozer, backhoe, skip-loader, soil compactor, excavator, and water trucks. Some fill material would be needed to offset shrinkage of the excavated and recompacted material. Imported fill materials would be delivered to the site using dump trucks or light-duty trucks.

Surface runoff is collected by a V-shaped ditch and stormwater control feature that runs parallel to the north access road west of Dyer Reservoir. Segments of the existing V-shaped ditch are unlined, while others are concrete lined. These stormwater control features have been subject to ongoing failure that can be attributed to high drainage velocities focused on the unlined segments of the V-shaped ditch design, poor foundation/embankment material, and rodent burrowing along this reach. Approximately 1,300 linear feet of the existing V-shaped ditch and stormwater control features are proposed for improvements that include regrading and concrete lining to improve drainage and reduce erosion. Remediation of the existing embankment slope includes limited excavation, backfilling and compaction, and concrete lining. Minor imported backfill, grouting, or soil-cement slurry may be used to backfill cavities, cracks, or holes. The embankment slope would be restored where it shows signs of instability and where recent internal erosion occurred during the V-shaped ditch and stormwater control feature failures.

Directly south of these ditch and stormwater control features, ongoing erosion is also occurring along a portion of the south side of Entrance Road, which intersects with the South Bay Aqueduct. At this location, erosion along Entrance Road is evident from deep furrows developing within interspersed areas of riprap. Similar to the original stabilization methods, the bank slope along the southern side of Entrance Road will be stabilized using riprap. Fill and riprap material would be delivered using dump trucks or light-duty trucks staged in staging areas or access roads. A combination of soil fill and riprap will be placed in between the existing riprap at this location to repair and stabilize the eroding slope. Additionally, accumulated sediment downstream of the culvert pipes under the road will be excavated and removed to an upland disposal location.

1.2.2.1 Project Location, Access, and Staging

Dyer Reservoir is located in the Altamont Hills, approximately 7 miles northeast of Livermore in Alameda County. Dyer Dam can be accessed from Dyer Road via the existing entrance road serving the reservoir facility. Access to the entire toe of the dam and the dam facility is provided by an existing gravel road, which provides access to a paved roadway atop the crest of the dam via ramps on the north and south side of the reservoir. Existing gravel access roads and the paved crest road would provide access to the western embankment slope, while the eastern embankment slope would be accessed from the paved crest road and from the upper settling pond maintenance road.

DWR has identified three staging areas for remediation activities at Dyer Reservoir and Dam. The staging areas would be located on both existing improved areas and undisturbed areas and would total approximately 5.11 acres. Staging Area 1 is a rectangular area along the western side of the South Bay Aqueduct; Staging Area 2 is a roughly triangular area south of the southeast corner of the dam; and Staging Area 3 is a roughly triangular area east of the settling pond.
1.2.2.2 Construction Equipment

The following construction equipment would be used to implement the proposed dam remediation efforts:

- skid-steer
- dozer
- backhoe
- grader
- skip-loader
- soil compactor
- excavator
- scraper
- water truck
- dump trucks
- flatbed trucks
- concrete truck
- mobile grout mixing plant
- concrete pump truck

1.2.3 Patterson Dam

Patterson Dam is a relatively small dam with relatively dense rodent burrowing within its downstream embankment. DWR’s Division of Safety of Dams classifies Patterson Dam as high hazard, indicating that its failure is likely to result in the loss of at least one human life. These factors make Patterson Dam a candidate for excavation, recompack, and permanent armoring with wire mesh and rock. All areas of Patterson Dam are subject to high-severity burrow damage. Remediation is expected to be required for the downstream dam face and the ascending slope in the east side of the facility, adjacent to the crest road access ramp. The proposed Project would entail filling shallow ruts and near-surface deformations near the ground surface with native soil of similar type to that of the downstream dam embankment slope and compacting the fill material. Depending on location, size, burrow cluster density, and depths, burrow holes may alternatively be excavated and backfilled. Then native soil, cementitious-soil slurry, low pressure grout, and/or similar embankment material would be used to backfill holes and would be compacted level with the surrounding ground. For zones where heavy construction equipment cannot be used, burrows may be filled by hand and/or lightweight equipment. Permanent armoring with wire mesh and rock would be placed on the dam embankment to deter future rodent burrowing. Due to steep downstream slope (1.5:1 to 2:1), other suitable materials may be employed for permanent armoring. The permanent armoring area may include a buffer area, as well as a cut-off trench wall that uses controlled low-strength material beyond the dam toe. Equipment for this activity would include lightweight and heavy equipment such as skid-steer, dozer, backhoe, skip-loader, soil compactor, and excavator. If needed, fill material would be delivered to the site from a stockpile location using dump trucks and/or concrete trucks.

In order to comply with a DWR Division of Safety of Dams recommendation, the proposed Project also includes improvements to the low-level outlet drainage channel. These improvements consist of vegetation removal, minor regrading of channel invert slope, and placement of permanent vegetation barriers and erosion control. Permanent vegetation control (e.g., rock and geofabric) is proposed for approximately 180-135 linear feet of the trapezoidal channel downstream of the concrete outfall structure. A one-time vegetation clearing and removal is proposed for approximately 500-550 linear feet of the downstream drainage channel beyond the permanent drainage channel improvements within DWR’s right-of-way. Minor concrete repairs are also proposed for spalled concrete and exposed rebar at the wingwall outfall structure. A permanent maintenance road would be constructed adjacent to the permanently improved drainage channel to provide better access for annual maintenance. The maintenance road would include a vehicle turnaround area and would have a gravel surface.
The proposed Project includes minor modifications and improvements to drainage features in upland areas in the northwest of Patterson Reservoir currently experiencing sheet flow. A damaged 18-inch diameter corrugated metal pipe culvert crossing near the toe access road and a second 12-inch diameter corrugated metal pipe culvert crossing near the maintenance building would both be replaced with improved high-density polyethylene culverts. Existing drainage features upstream and downstream of the culverts would be modified to convey water more efficiently to the main western drainage channel. The improvements may include excavating, regrading, and/or lining of the drainage features and culverts.

1.2.3.1 Project Location, Access, and Staging

Patterson Reservoir is located approximately 1 mile east of Livermore. Patterson Dam can be accessed from Patterson Pass Road. Approximately 1 mile to the west, Patterson Pass Road intersects with Greenville Road, which then provides access to Interstate 580. Existing paved and gravel access roads within the Patterson Reservoir facility would provide access to most of the construction areas within this site. A temporary construction access area would be constructed north of the proposed staging area and existing settling pond on the east side of the reservoir, and a second temporary construction access area would be provided through the existing maintenance yard.

DWR has identified four staging areas for remediation activities at Patterson Dam and Reservoir, including an area at the existing maintenance yard south of the reservoir, a staging area on currently undisturbed land surrounding the existing settling pond east of the reservoir, and an area east of the temporary construction access area. These staging areas have a combined acreage of approximately 4.63 acres. Access to the staging areas would be from Patterson Pass Road on the existing paved and gravel access roads and from a new temporary construction access area. The paved toe and crest roads may be used to repair the downstream dam embankment slope; however, the crest road is narrow and would only be accessible to smaller vehicles and equipment. As noted previously, if this limitation of the crest road prevents use of heavy construction equipment in certain areas, burrows may be filled by hand and/or lightweight equipment.

1.2.3.2 Construction Equipment

The following construction equipment would be used to implement the proposed dam remediation efforts:

- skid-steer
- dozer
- backhoe
- grader
- skip-loader
- soil compactor
- excavator
- scraper
- water truck
- dump trucks
- flatbed trucks
- concrete truck
- mobile grout mixing plant
- concrete pump truck
1.3 Site Description and Location

1.3.1 Clifton Court Forebay Dam

The Clifton Court Forebay Dam study area is located 10 miles northwest of the City of Tracy in Contra Costa County. The study area is east of Byron Highway/Byron-Bethany Road (County Route J4), south of the Italian Slough, west of the West Canal, and north of the Delta–Mendota Canal (Figure 1, Project Location). The study area is within the U.S. Geological Survey 7.5-minute Clifton Court Forebay quadrangle map, Sections 13, 24, and 25 of Township 1S, Range 3E; and Sections 07, 08, 17, 18, 19, 20, 30 of Township 1S, Range 4E. The approximate geographic center of the study area is 121° 34'30.123"W, 37° 50'20.362"N.

The study area consists of the area between Clifton Court Forebay and the surrounding waterways, the California Aqueduct, Old River, Italian Slough, and the West Canal. This area includes access roads, DWR facilities, developed and disturbed habitat, and a variety of native and non-native vegetation communities. The Clifton Court Forebay Dam study area is situated within a matrix of agricultural land uses. A small residential development, Kings Island, is located within the Delta island complex located immediately to the north.

Within the Clifton Court Forebay Dam study area, average temperatures range from approximately 50°F to 73°F. The study area receives an average annual rainfall of 12.03 inches per year (WRCC 2021).

Topography

The elevations within the study area at Clifton Court Forebay Dam range from 5 feet below mean sea level to 10 feet above mean sea level.

Soils

The U.S. Department of Agriculture Soil Survey mapped most of the study area as being underlain by the following soil types (also known as soil map units): fluvaquents, Merritt loam, Ryde silt loam, Sacramento clay, Solano Loma, and water (USDA 2021) (Table 1; Figure 2A, Soils–Clifton Court Forebay Dam).

Table 1. Soils within the Clifton Court Forebay Dam Study Area

<table>
<thead>
<tr>
<th>Soil Code</th>
<th>Soil Name</th>
<th>Acreage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fc</td>
<td>Fluvaquents</td>
<td>183.3</td>
</tr>
<tr>
<td>FcF</td>
<td>Fluvaquents, 0% to 2% slopes, frequently flooded</td>
<td>0.3</td>
</tr>
<tr>
<td>Md</td>
<td>Merritt loam</td>
<td>0.3</td>
</tr>
<tr>
<td>Rh</td>
<td>Ryde silt loam</td>
<td>48.2</td>
</tr>
<tr>
<td>Sa</td>
<td>Sacramento clay</td>
<td>5.2</td>
</tr>
<tr>
<td>Sb</td>
<td>Sacramento clay, alkali</td>
<td>24.5</td>
</tr>
<tr>
<td>Sh</td>
<td>Solano loam</td>
<td>12.7</td>
</tr>
<tr>
<td>Sk</td>
<td>Solano loam, strongly alkali</td>
<td>22.3</td>
</tr>
<tr>
<td>W</td>
<td>Water</td>
<td>62.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>359.3</strong></td>
</tr>
</tbody>
</table>

Sources: USDA 2021.
Note: Totals may not sum due to rounding.
Hydrology

The Clifton Court Forebay Dam study area is located within the Clifton Court Forebay subwatershed (Hydrologic Unit Code 12 180400030605), which drains 15,707 acres of the Old River Watershed (Hydrologic Unit Code 10 1804000306) (Figure 3, Hydrologic Setting).

1.3.2 Dyer Dam

The Dyer Dam study area is located northeast of Livermore in Alameda County. The study area for Dyer Dam is located east of Dyer Road, north of Altamont Pass Road. (Figure 1). The Dyer Dam study area is within the U.S. Geological Survey 7.5-minute Byron Hot Springs quadrangle, Section 17 of Township 2 South, and Range 3 East; the approximate center of the study area is longitude 121°40’24.55″W and latitude 37°45’27.09″N (37.757525; -121.673486).

The Dyer Dam study area includes the areas surrounding Dyer Reservoir and the South Bay Aqueduct, including access roads, DWR facilities, disturbed habitat, and a variety of native and non-native vegetation communities. The Altamont Landfill is east of the study area, there are some rural residences west of the study area, and the remaining areas are farmland.

Within the Dyer Dam study area, average temperatures range from approximately 50°F to 73°F. The study area receives an average annual rainfall of 12.03 inches per year (WRCC 2021).

Topography

The elevations within the Dyer Dam study area range from approximately 700 to 860 feet above mean sea level.

Soils

The U.S. Department of Agriculture Soil Survey mapped most of the site as being underlain by the following soil types (also known as soil map units): Altamont clay, Cotati fine sandy loam, and Pescadero clay (USDA 2021) (Table 2; Figure 2B, Soils–Dyer Dam).

Table 2. Soils within the Dyer Dam Study Area

<table>
<thead>
<tr>
<th>Soil Code</th>
<th>Soil Name</th>
<th>Acreage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aac</td>
<td>Altamont clay, 3% to 15% slopes</td>
<td>20.1</td>
</tr>
<tr>
<td>Aad</td>
<td>Altamont clay, 15% to 30% slopes</td>
<td>9.7</td>
</tr>
<tr>
<td>AmE2</td>
<td>Altamont clay, moderately deep, 30% to 45% slopes, eroded</td>
<td>0.6</td>
</tr>
<tr>
<td>CoC2</td>
<td>Cotati fine sandy loam, eroded</td>
<td>14.6</td>
</tr>
<tr>
<td>Pd</td>
<td>Pescadero clay</td>
<td>13.6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>58.7</strong></td>
</tr>
</tbody>
</table>

Sources: USDA 2021.

Note: Totals may not sum due to rounding.
Hydrology

The Dyer Dam study area is located within the Arroyo Las Positas Watershed Hydrologic Unit. Dyer Dam is located within the Upper Arroyo Las Positas subwatershed (180500040203) (Figure 3).

1.3.3 Patterson Dam

The Patterson Dam study area is located just east of Livermore in Alameda County. The study area for Patterson Dam is located on Patterson Pass Road, east of Greenville Road. (Figure 1). The Patterson Dam study area is within the U.S. Geological Survey 7.5-minute Altamont quadrangle, Section 6 of Township 3 South, and Range 3 East; the approximate center of the study area is longitude 121°40′49.90″W and latitude 37°41′51.60″N (37.697667; -121.680528).

The Patterson Dam study area includes the areas surrounding Patterson Reservoir and the South Bay Aqueduct, including access roads, DWR facilities, disturbed habitat, and a variety of native and non-native vegetation communities. The study area is immediately surrounded by farmland and rural residences. The limits of Livermore are approximately 1 mile to the west of the study area.

Within the Patterson Dam study area, average temperatures range from approximately 50°F to 73°F. The study area receives an average annual rainfall of 12.03 inches per year (WRCC 2021).

Topography

The elevations on the Patterson Dam study area range from approximately 645 to 700 feet above mean sea level.

Soils

The U.S. Department of Agriculture Soil Survey mapped most of the site as being underlain by the following soil types (also known as soil map units): Linne clay loam, Rincon clay loam, and San Ysidro loam (USDA 2021) (Table 3; Figure 2C, Soils–Patterson Dam).

<table>
<thead>
<tr>
<th>Soil Code</th>
<th>Soil Name</th>
<th>Hydric Rating</th>
<th>Acreage</th>
</tr>
</thead>
<tbody>
<tr>
<td>LaE2</td>
<td>Linne clay loam, 30% to 45% slopes</td>
<td>Partially hydric</td>
<td>12.6</td>
</tr>
<tr>
<td>RdB</td>
<td>Rincon clay loam, 3% to 7% slopes</td>
<td>Not hydric</td>
<td>13.8</td>
</tr>
<tr>
<td>Sy</td>
<td>San Ysidro loam</td>
<td>Partially hydric</td>
<td>8.6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>35.0</strong></td>
</tr>
</tbody>
</table>

Sources: USDA 2021.
Note: Totals may not sum due to rounding.

Hydrology

The Patterson Dam study area is located within the Arroyo Seco subwatershed (180500040203) (Figure 3).
BIOLOGICAL RESOURCES EXISTING CONDITIONS REPORT FOR THE DELTA DAMS RODENT BURROW REMEDIATION PROJECT, ALAMEDA AND CONTRA COSTA COUNTIES, CALIFORNIA

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DWR will process all required permits and adhere to all relevant regulatory requirements as required for the Project. Impacts to listed species, including take of individuals, will be covered through standard state and federal incidental take permit processes as applicable.

2.1 Federal

2.1.1 Federal Endangered Species Act

The federal Endangered Species Act (FESA) of 1973 (16 USC 1531 et seq.), as amended, is administered by the U.S. Fish and Wildlife Service (USFWS), National Oceanic and Atmospheric Administration, and National Marine Fisheries Service (NMFS). This legislation is intended to provide a means to conserve the ecosystems upon which endangered and threatened species depend, and provide programs for the conservation of those species, thus preventing extinction of plants and wildlife. As part of this regulatory act, the FESA provides for designation of Critical Habitat, defined in the FESA, Section 3(5)(A), as specific areas within the geographical range occupied by a species where physical or biological features “essential to the conservation of the species” are found and that “may require special management considerations or protection.” Critical Habitat may also include areas outside the current geographical area occupied by the species that are nonetheless “essential for the conservation of the species.” Under provisions of Section 9(a)(1)(B) of the FESA, it is unlawful to “take” any listed species. “Take” is defined in Section 3(19) of the FESA as, harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, or collecting, or attempting to engage in any such conduct.

Section 7(a)(2) of the FESA directs federal agencies to consult with USFWS for any actions they authorize, fund, or carry out that may jeopardize the continued existence of any listed species or result in the destruction or adverse modification of federally designated Critical Habitat. Consultation begins when the federal agency submits a written request for initiation to USFWS or NMFS, along with the agency’s Biological Assessment of its proposed action (if necessary), and USFWS or NMFS accepts that sufficient information has been provided to initiate consultation. If USFWS or NMFS concludes that the action is not likely to adversely affect a listed species, the action may be conducted without further review under the FESA. Otherwise, USFWS or NMFS must prepare a written Biological Opinion describing how the agency’s action will affect the listed species and its Critical Habitat.

2.1.2 Migratory Bird Treaty Act

The Migratory Bird Treaty Act prohibits the take of any migratory bird or any part, nest, or eggs of any such bird. Under the Migratory Bird Treaty Act, “take” is defined as pursuing, hunting, shooting, capturing, collecting, or killing, or attempting to do so (16 USC 703 et seq.). In December 2017, Department of the Interior Principal Deputy Solicitor Jorjani issued a memorandum (M-37050) that interprets the Migratory Bird Treaty Act’s “take” prohibition to apply only to affirmative actions that have as their purpose the taking or killing of migratory birds, their nests, or their eggs; unintentional or accidental take is not prohibited (M-37050). However, in August 2020, a federal court upheld the long-standing interpretation of the Migratory Bird Treaty Act, such that it covers intentional and unintentional take. Additionally, Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds, requires that any project with federal involvement address impacts of federal actions on migratory birds with the purpose of promoting conservation of migratory bird populations (66 FR 3853–3856). Executive Order 13186 requires federal agencies to work with USFWS to develop a memorandum of understanding. USFWS reviews actions that might affect migratory bird species.
2.1.3 Clean Water Act

Pursuant to Section 404 of the Clean Water Act, the USACE regulates the discharge of dredged and/or fill material into “waters of the United States.” The term “wetlands” (a subset of waters) is defined as “those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas” (33 CFR 328.3[b]). In the absence of wetlands, the limits of USACE jurisdiction in non-tidal waters, such as intermittent streams, extend to the “ordinary high water mark” (33 CFR 328.3[e]).

2.1.4 Bald and Golden Eagle Protection Act

Bald eagle (Haliaeetus leucocephalus) and golden eagle (Aquila chrysaetos) are federally protected under the Bald and Golden Eagle Protection Act (BGEPA), which was passed in 1940 to protect bald eagles and amended in 1962 to include golden eagles (16 USC 668 et seq.). This act prohibits the take, possession, sale, purchase, barter, offer to sell or purchase, export or import, or transport of bald eagles and golden eagles or their parts, eggs, or nests without a permit issued by USFWS. The definition of “take” includes to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb. The definition of “disturb” has been further clarified by regulation as follows: “Disturb means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle; (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior” (50 CFR 22.3).

The BGEPA prohibits any form of possession or taking of both eagle species, and the statute imposes criminal and civil sanctions, as well as an enhanced penalty provision for subsequent offenses. Further, the BGEPA provides for the forfeiture of anything used to acquire eagles in violation of the statute. The statute exempts from its prohibitions on possession the use of eagles or eagle parts for exhibition, scientific, or Native American religious uses.

In November 2009, USFWS published the Final Eagle Permit Rule (74 FR 46836–46879) providing a mechanism to permit and allow for incidental (i.e., nonpurposeful) take of bald and golden eagles pursuant to the BGEPA (16 USC 668 et seq.). The previous year, 2008, USFWS adopted Title 50, Part 22.11(a) of the Code of Federal Regulations, which provides that a permit authorizing take under the FESA, Section 10, applies with equal force to take of golden eagles authorized under the BGEPA. These regulations were followed by issuance of guidance documents for inventory and monitoring protocols and for avian protection plans. In January 2011, USFWS released its Draft Eagle Conservation Plan Guidance aimed at clarifying expectations for acquiring take permits by wind power projects, consistent with the 2009 rule (USFWS 2011).

On December 16, 2016, USFWS adopted additional regulations regarding incidental take of golden eagles and their nests (81 FR 91494 et seq.). Most of the new regulations address “programmatic eagle nonpurposeful take permits” such as those typically requested by members of the alternative energy industry, including wind farms. For example, the new regulations extend the duration of such permits from 5 to 30 years. In addition, the new regulations modify the definition of the BGEPA “preservation standard” to mean “consistent with the goals of maintaining stable or increasing breeding populations in all eagle management units and the persistence of local populations throughout the service range of each species” (81 FR 91496–91497). This process has also resulted in standardizing mitigation options for permitted take.
2.2 State

2.2.1 California Endangered Species Act

CDFW administers the California Endangered Species Act (CESA) (California Fish and Game Code, Section 2050 et seq.), which prohibits the “take” of plant and animal species designated by the Fish and Game Commission as endangered, candidate, or threatened in the State of California. Under the CESA, Section 86, take is defined as “hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill.” The CESA addresses the take of threatened, endangered, or candidate species by stating the following (California Fish and Game Code, Sections 2080–2085):

No person shall import into this state, export out of this state, or take, possess, purchase, or sell within this state, any species, or any part or product thereof, that the Commission determines to be an endangered species or a threatened species, or attempt any of those acts, except as otherwise provided in this chapter, the Native Plant Protection Act (California Fish and Game Code, Sections 1900–1913), or the California Desert Native Plants Act (Food and Agricultural Code, Section 80001).

Sections 2081(b) and (c) of the California Fish and Game Code authorize take of endangered, threatened, or candidate species if take is incidental to otherwise lawful activity and if specific criteria are met. In certain circumstances, Section 2080.1 of the CESA allows CDFW to adopt a federal incidental take statement or a 10(a) permit as its own, based on its findings that the federal permit adequately protects the species and is consistent with state law. A Section 2081(b) permit may not authorize the take of “Fully Protected” species, “specially protected mammal” species, and “specified birds” (California Fish and Game Code, Sections 3505, 3511, 4700, 4800, 5050, 5515, and 5517). If a project is planned in an area where a Fully Protected species, specially protected mammal, or a specified bird occurs, an applicant must design the project to avoid take.

2.2.2 California Fish and Game Code

2.2.2.1 Lake and Streambed Alteration Program

Under California Fish and Game Code, Section 1602, CDFW has authority to regulate work that will substantially divert or obstruct the natural flow of or substantially change or use any material from the bed, channel, or bank of any river, stream, or lake. CDFW also has authority to regulate work that will deposit or dispose of debris, water, or other material where it may pass into any river, stream, or lake. CDFW’s regulation of work in these resources takes the form of a requirement for a Lake and Streambed Alteration Agreement and is applicable to any person, state, or local governmental agency or public utility (California Fish and Game Code, Section 1601). CDFW jurisdiction includes ephemeral, intermittent, and perennial watercourses (including dry washes) and lakes characterized by the presence of (1) defined bed and banks and (2) existing fish or wildlife resources. In practice, CDFW-jurisdictional limits extend to the top of the stream or lake bank or to the outer edge of riparian vegetation, if present. In some cases, CDFW jurisdiction may extend to the edge of the 100-year floodplain. Because riparian habitats do not always support wetland hydrology or hydric soils, wetland boundaries, as defined by Clean Water Act, Section 404, sometimes include only portions of the riparian habitat adjacent to a river, stream, or lake. Therefore, jurisdictional boundaries under Section 1602 may encompass a greater area than those regulated under Clean Water Act, Section 404.
2.2.2.2 Fully Protected Species and Resident and Migratory Birds

Sections 3511, 4700, 5050, and 5515 of the California Fish and Game Code designate certain birds, mammals, reptiles and amphibians, and fish as Fully Protected species. Fully Protected species may not be taken or possessed without a permit from the Fish and Game Commission. CDFW may not authorize the take of such species except (1) for necessary scientific research, (2) for the protection of livestock, (3) when the species is a covered species under an approved natural community conservation plan, or (4) as legislatively authorized by the passing of a State Assembly Bill.

In addition, the California Fish and Game Code prohibits the needless destruction of nests or eggs of native bird species (California Fish and Game Code, Section 3503), and it states that no birds in the orders of Falconiformes or Strigiformes (birds of prey) can be taken, possessed, or destroyed (California Fish and Game Code, Section 3503.5).

For the purposes of these state regulations, CDFW currently considers an active nest as one that is under construction or in use and includes existing nests that are being modified. For example, if a hawk is adding to or maintaining an existing stick nest in a tree, then it would be considered to be active and covered under these California Fish and Game Code Sections.

2.2.2.3 California Native Plant Protection Act

The Native Plant Protection Act of 1977 (California Fish and Game Code, Sections 1900–1913) directed CDFW to carry out the legislature’s intent to “preserve, protect and enhance rare and endangered plants in this State.” The Native Plant Protection Act gave the Fish and Game Commission the power to designate native plants as “endangered” or “rare,” and prohibited take, with some exceptions, of endangered and rare plants. When the CESA was amended in 1984, it expanded on the original Native Plant Protection Act, enhanced legal protection for plants, and created the categories of “threatened” and “endangered” species to parallel the FESA. The 1984 amendments to the CESA also made the exceptions to the take prohibition set forth in Section 1913 of the Native Plant Protection Act applicable to plant species listed as threatened or endangered under the CESA. The CESA categorized all rare animals as threatened species under the CESA, but did not do so for rare plants, which resulted in three listing categories for plants in California: rare, threatened, and endangered. The Native Plant Protection Act remains part of the California Fish and Game Code, and mitigation measures for impacts to rare plants are specified in a formal agreement between CDFW and project proponents.

2.2.3 Porter–Cologne Water Quality Control Act

The intent of the Porter–Cologne Water Quality Control Act is to protect water quality and the beneficial uses of water, and it applies to both surface water and groundwater. Under this law, the State Water Resources Control Board develops statewide water quality plans, and the Regional Water Quality Control Boards (RWQCBs) develop basin plans that identify beneficial uses, water quality objectives, and implementation plans. The RWQCBs have the primary responsibility to implement the provisions of both statewide and basin plans. All waters of the state are regulated under the Porter–Cologne Water Quality Control Act, including isolated waters that are no longer regulated by USACE. Recent changes in state procedures require increased analysis and mitigation. Developments with impact to jurisdictional waters of the state must demonstrate compliance with the goals of the act by developing stormwater pollution prevention plans, standard urban stormwater mitigation plans, and other measures to obtain a Clean Water Act, Section 401 certification and/or Waste Discharge Requirement.
2.2.4 California Environmental Quality Act

CEQA requires identification of a project’s potentially significant impacts on biological resources and feasible mitigation measures and alternatives that could avoid or reduce significant impacts. The State of California CEQA Guidelines (CEQA Guidelines), Section 15380(b)(1), defines endangered animals or plants as species or subspecies whose “survival and reproduction in the wild are in immediate jeopardy from one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, disease, or other factors” (14 CCR 15000 et seq.). A rare animal or plant is defined in Section 15380(b)(2) as a species that, although not presently threatened with extinction, exists “in such small numbers throughout all or a significant portion of its range that it may become endangered if its environment worsens; or … [t]he species is likely to become endangered within the foreseeable future throughout all or a significant portion of its range and may be considered ‘threatened’ as that term is used in the federal Endangered Species Act.” Additionally, an animal or plant may be presumed to be endangered, rare, or threatened if it meets the criteria for listing, as defined further in CEQA Guidelines, Section 15380(c). CEQA also requires identification of a project’s potentially significant impacts on riparian habitats (e.g., wetlands, bays, estuaries, and marshes) and other sensitive natural communities, including habitats occupied by endangered, rare, and threatened species.

2.3 Regional

2.3.1 East Alameda County Conservation Strategy

The East Alameda County Conservation Strategy (Conservation Strategy) (ICF 2010) is a voluntary conservation plan that was collaboratively developed by local and regulatory agencies between 2007 and 2009; the final draft was completed in December 2010. The Conservation Strategy is not a formal Habitat Conservation Plan (HCP) in that it does not require local agencies to conserve species and habitat prior to approving projects that impact listed species and/or their habitat, nor does it have a corresponding programmatic incidental take permit from USFWS. Instead, it is intended to streamline state and local permitting by providing guidance on avoidance, minimization, and mitigation for project-level impacts on selected focal special-status species and sensitive habitats. Projects and activities intended to benefit from the Conservation Strategy include urban and suburban growth and a variety of road, water, and other needed infrastructure construction and maintenance activities. Because the Conservation Strategy does not have corresponding permits, individual projects may need to implement different or more avoidance, minimization, and mitigation measures than what is outlined therein. To avoid this from happening, the USFWS and CDFW participated in the development of the Conservation Strategy with the intent that it would become the blueprint for all mitigation and conservation in the region. Both agencies still refer to the Conservation Strategy when reviewing project-level impacts on focal species and their habitat. The following local agencies also participated in Conservation Strategy development:

- Alameda County Congestion Management Agency
- Alameda County Resource Conservation District
- Alameda County Waste Management Authority
- City of Dublin
- City of Livermore
- City of Pleasanton
- County of Alameda
- East Bay Regional Park District
- Natural Resources Conservation Service
- San Francisco Bay Regional Water Quality Control Board
- Zone 7 Water Agency
3 Survey Methods

Data regarding biological resources present on the Project site were obtained through a review of pertinent literature, field surveys, and mapping. Each method is described in detail in this section.

3.1 Literature Review

Special-status biological resources present or potentially present within the Project site were identified through an extensive literature search using the following sources: the USFWS Information for Planning and Consultation online tool (USFWS 2020a), the CDFW California Natural Diversity Database (CNDDB) (CDFW 2021a, 2021b, 2021c), and the California Native Plant Society (CNPS) Online Inventory of Rare and Endangered Vascular Plants (CNPS 2021a). The Soil Survey Geographic Database for California (USDA 2021) was also reviewed to identify potentially occurring special-status plants based upon known soil associations. Native plant community classifications used in this report follow a Manual of California Vegetation Online (CNPS 2021b) and California Natural Community List (CDFW 2020).

To identify “established native resident or migratory wildlife movement corridors” that could be impacted by the Project (i.e., criterion (d) of the biological resources checklist in Appendix G to the CEQA Guidelines), Dudek biologists reviewed the Critical Linkages: Bay Area and Beyond report (Penrod et al. 2013).

3.2 Field Surveys

Based on preliminary scoping conducted in October 2020, Dudek initiated biological field surveys of the Project site in December 2020. Surveys were conducted on foot and in accordance with focused survey guidelines or protocols where applicable. Survey dates, personnel, and weather conditions for each site are included in Tables 4, 5, and 6.

Table 4. Schedule of Surveys Conducted by Dudek, Clifton Court Forebay Dam

<table>
<thead>
<tr>
<th>Date</th>
<th>Hours</th>
<th>Personnel</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aquatic Resources Delineation/ Vegetation Mapping</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12/16/2020</td>
<td>7:16 a.m. to 4:46 p.m.</td>
<td>AG, CA</td>
<td>40°F–55°F; 70% cc; 0 mph wind</td>
</tr>
<tr>
<td>12/17/2020</td>
<td>7:00 a.m. to 1:37 p.m.</td>
<td>AG, CA</td>
<td>50°F–57°F; 40%–50% cc; 0–3 mph wind</td>
</tr>
<tr>
<td>1/4/2021</td>
<td>10:30 a.m. to 4:30 p.m.</td>
<td>AG, AS</td>
<td>63°F–NR; 5–15 mph wind</td>
</tr>
<tr>
<td>1/5/2021</td>
<td>7:37 a.m. to 5:37 p.m.</td>
<td>AG</td>
<td>38°F–48°F; 30%–50% cc; 5–15 mph wind</td>
</tr>
<tr>
<td>1/6/2021</td>
<td>7:38 a.m. to 1:49 p.m.</td>
<td>AG</td>
<td>34°F–38°F; 70%–100% cc; 0–10 mph wind</td>
</tr>
<tr>
<td><strong>Rare Plants</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4/14/2021</td>
<td>7:15 a.m. to 4:00 p.m.</td>
<td>JH</td>
<td>52°F–72°F; 0–10% cc; 2–4 mph wind</td>
</tr>
<tr>
<td>4/15/2021</td>
<td>7:49 a.m. to 4:00 p.m.</td>
<td>JH</td>
<td>55°F–75°F; 0% cc; 2 mph wind</td>
</tr>
<tr>
<td>4/20/2021</td>
<td>7:58 a.m. to 4:39 p.m.</td>
<td>JH</td>
<td>49°F–64°F; NR; NR</td>
</tr>
<tr>
<td>7/14/2021</td>
<td>7:49 a.m. to 3:58 p.m.</td>
<td>AG, CAA</td>
<td>63°F–89°F; 0% cc; 5 mph wind</td>
</tr>
<tr>
<td>7/15/2021</td>
<td>7:53 a.m. to 4:34 p.m.</td>
<td>AG, CAA</td>
<td>64°F–89°F; 0% cc; 4 mph wind</td>
</tr>
<tr>
<td>7/20/2021</td>
<td>7:56 a.m. to 12:34 p.m.</td>
<td>AG, CAA</td>
<td>68–79°F; 0% cc; 5–16 mph wind</td>
</tr>
<tr>
<td><strong>General Wildlife Habitat Assessment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/11/2021</td>
<td>12:55 p.m. to 3:00 p.m.</td>
<td>BO, MR</td>
<td>63°F–68°F; 0% cc; 5–10 mph wind</td>
</tr>
</tbody>
</table>
Table 4. Schedule of Surveys Conducted by Dudek, Clifton Court Forebay Dam

<table>
<thead>
<tr>
<th>Date</th>
<th>Hours</th>
<th>Personnel</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>2/24/2021</td>
<td>10:23 a.m. to 5:00 p.m.</td>
<td>AS, PK, TY</td>
<td>51°F–61°F; 0% cc; 5–21 mph wind</td>
</tr>
<tr>
<td>4/21/2021</td>
<td>6:00 a.m. to 10:00 a.m.</td>
<td>TY</td>
<td>44°F–62°F; 0% cc; 5 mph wind</td>
</tr>
<tr>
<td>4/21/2021</td>
<td>5:30 p.m. to 8:30 p.m.</td>
<td>TY</td>
<td>76°F–59°F; 0% cc; 15–20 mph wind</td>
</tr>
<tr>
<td>6/8/2021</td>
<td>5:45 a.m. to 10:30 a.m.</td>
<td>TY</td>
<td>52°F–55°F; 0% cc; 20–30 mph wind</td>
</tr>
<tr>
<td>6/8/2021</td>
<td>5:30 p.m. to 8:15 p.m.</td>
<td>TY</td>
<td>70°F–68°F; 0% cc; 20 mph wind</td>
</tr>
<tr>
<td>7/14/2021</td>
<td>7:45 a.m. to 12:06 p.m.</td>
<td>MR</td>
<td>67°F–81°F; 0% cc; 2–5 mph wind</td>
</tr>
</tbody>
</table>

Swainson’s Hawk Nesting

<table>
<thead>
<tr>
<th>Date</th>
<th>Hours</th>
<th>Personnel</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/22/2021</td>
<td>4:08 p.m. to 7:30 p.m.</td>
<td>MR, TY</td>
<td>58°F–66°F; 10%–20% cc; 7–15 mph wind</td>
</tr>
<tr>
<td>4/14/2021</td>
<td>7:15 a.m. to 12:15 p.m.; 4:30 p.m. to 8:28 p.m.</td>
<td>TY</td>
<td>43°F–72°F; 0%–10% cc; 0–5 mph wind; 74°F–54°F; 10%–20% cc; 0–15 mph wind</td>
</tr>
<tr>
<td>6/23/2021</td>
<td>6:45 a.m. to 12:00 p.m.</td>
<td>TY</td>
<td>61°F–82°F; 0% cc; 15 mph wind</td>
</tr>
</tbody>
</table>

Notes: cc = cloud cover; NR = not recorded.
Personnel: AG = Anna Godinho; AS = Allie Sennett; BO = Brock Ortega; CA = Callie Amoaku; CAA = Charles Adams; JH = Jeanette Halderman; MR = Matt Ricketts; PK = Paul Keating; TY = Tyler Young.

Table 5. Schedule of Surveys Conducted by Dudek, Dyer Dam

<table>
<thead>
<tr>
<th>Date</th>
<th>Hours</th>
<th>Personnel</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>12/15/2020</td>
<td>7:08 a.m. to 4:30 p.m.</td>
<td>AG, CA</td>
<td>35°F–55°F; 10–40% cc; 0 mph wind</td>
</tr>
</tbody>
</table>

Aquatic Resources Delineation/Vegetation Mapping

<table>
<thead>
<tr>
<th>Date</th>
<th>Hours</th>
<th>Personnel</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/5/2021</td>
<td>8:09 a.m. to 4:00 p.m.</td>
<td>CAA, KD</td>
<td>43°F–65°F; 0% cc; 0–3 mph wind</td>
</tr>
<tr>
<td>05/11/2021</td>
<td>7:14 a.m. – 4:05 p.m.</td>
<td>TB</td>
<td>67–87°F; 0% cc; 0–5 mph wind</td>
</tr>
<tr>
<td>7/21/2021</td>
<td>7:30 a.m. to 10:30 a.m.</td>
<td>AG, LB</td>
<td>63°F–75°F; 0% cc; 5–10 mph wind</td>
</tr>
</tbody>
</table>

General Wildlife Habitat Assessment

<table>
<thead>
<tr>
<th>Date</th>
<th>Hours</th>
<th>Personnel</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/11/2021</td>
<td>11:00 a.m. to 12:20 p.m.</td>
<td>BO, MR</td>
<td>55°F–60°F; 0% cc; 3–5 mph wind</td>
</tr>
</tbody>
</table>

Burrow Assessment/Burrowing Owl/San Joaquin Kit Fox

<table>
<thead>
<tr>
<th>Date</th>
<th>Hours</th>
<th>Personnel</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>2/23/2021</td>
<td>6:00 a.m. to 8:26 a.m.</td>
<td>AS, PK, TY</td>
<td>75°F–71°F; 0% cc; 5–10 mph wind</td>
</tr>
<tr>
<td>4/22/2021</td>
<td>6:00 a.m. to 8:15 a.m.</td>
<td>TY</td>
<td>42°F–50°F; 0% cc; 5–10 mph wind</td>
</tr>
<tr>
<td>6/9/2021</td>
<td>9:00 a.m. to 11:00 a.m.</td>
<td>TY</td>
<td>57°F–60°F; 5% cc; 10–15 mph wind</td>
</tr>
<tr>
<td>7/15/2021</td>
<td>7:53 p.m. to 8:45 p.m.</td>
<td>MR</td>
<td>60°F–68°F; 0% cc; 10–23 mph wind</td>
</tr>
</tbody>
</table>

Swainson’s Hawk Nesting

<table>
<thead>
<tr>
<th>Date</th>
<th>Hours</th>
<th>Personnel</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/22/2021</td>
<td>7:45 a.m. to 9:50 a.m.</td>
<td>MR, TY</td>
<td>43°F–46°F; 0% cc; 5–12 mph wind</td>
</tr>
<tr>
<td>4/13/2021</td>
<td>8:35 a.m. to 12:00 p.m.</td>
<td>TY</td>
<td>56°F–71°F; 0% cc; 12–18 mph wind</td>
</tr>
</tbody>
</table>

Notes: cc = cloud cover.
Personnel: AG = Anna Godinho; AS = Allie Sennett; BO = Brock Ortega; CA = Callie Amoaku; CAA = Charles Adams; KD = Kathleen Dayton; LB = Laura Burris; MR = Matt Ricketts; PK = Paul Keating; Tanya Baxter = TB; TY = Tyler Young.
3.2.1 Resource Mapping

Vegetation community classifications in this report follow the California Natural Community List (CDFW 2020) and were identified using descriptions from the Manual of California Vegetation Online (CNPS 2021b). Communities were mapped to the alliance level except where mapping to the association level was necessary to determine sensitivity. Specifically, where there was potential for the site to support a sensitive association listed in CDFW (2020) within an alliance otherwise not sensitive, it was mapped to the association level. An alliance and/or association is considered sensitive if indicated with a state rarity rank of S1–S3 or indicated as sensitive without a rarity ranking in the California Natural Community List (CDFW 2020). Alliances were mapped based on constituent species and membership rules as defined in the Manual of California Vegetation Online (CNPS 2021b). Non-natural land covers and unvegetated communities that do not follow CDFW (2020) were identified as disturbed habitat, general agriculture, open water, and urban/developed.

3.2.2 Flora

All plant species encountered during the field surveys were identified and recorded. Latin and common names for plant species with a California Rare Plant Rank (CRPR) (formerly CNPS List) follow the CNPS Online Inventory of Rare and Endangered Plants of California (CNPS 2020). For plant species without a CRPR, Latin names follow the Jepson Interchange List of Currently Accepted Names of Native and Naturalized Plants of California (Jepson Flora Project 2020), and common names follow the U.S. Department of Agriculture Natural Resources Conservation Service Plants Database (USDA 2020). The list of plant species observed on site is presented in Appendix A, Plant Species Observed within the Project Site.

Table 6. Schedule of Surveys Conducted by Dudek, Patterson Dam

<table>
<thead>
<tr>
<th>Date</th>
<th>Hours</th>
<th>Personnel</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>12/14/2020</td>
<td>10:41 a.m. to 5:00 p.m.</td>
<td>CA</td>
<td>59°F–62°F; 0%–10% cc; 0–1 mph wind</td>
</tr>
<tr>
<td>3/16/2021</td>
<td>8:52 a.m. to 12:19 p.m.</td>
<td>KD, PH</td>
<td>39°F–54°F; 0% cc; 0–4 mph wind</td>
</tr>
<tr>
<td>5/11/2021</td>
<td>3:20 p.m.–3:50 p.m.</td>
<td>MF, ML</td>
<td></td>
</tr>
<tr>
<td>7/20/2021</td>
<td>12:33 p.m. to 2:40 p.m.</td>
<td>AG, LB</td>
<td>78°F–84°F; 0% cc; 5–10 mph wind</td>
</tr>
<tr>
<td>1/11/2021</td>
<td>9:00 a.m. to 10:35 a.m.</td>
<td>BO, MR</td>
<td>48°F–55°F; 0% cc; 3–5 mph wind</td>
</tr>
<tr>
<td>2/23/2021</td>
<td>3:26 p.m. to 5:23 p.m.</td>
<td>AS, PK, TY</td>
<td>75°F–71°F; 0% cc; 5–10 mph wind</td>
</tr>
<tr>
<td>4/22/2021</td>
<td>8:30 a.m. to 11:30 a.m.</td>
<td>TY</td>
<td>53°F–64°F; 0% cc; 2 mph wind</td>
</tr>
<tr>
<td>6/9/2021</td>
<td>5:45 a.m. to 8:00 a.m.</td>
<td>TY</td>
<td>48°F–54°F; 5% cc; 10–15 mph wind</td>
</tr>
<tr>
<td>7/15/2021</td>
<td>6:35 p.m. to 7:33 p.m.</td>
<td>MR</td>
<td>70°F–73°F; 0% cc; 3–8 mph wind</td>
</tr>
<tr>
<td>3/22/2021</td>
<td>7:45 a.m. to 9:50 a.m.</td>
<td>MR, TY</td>
<td>43°F–46°F; 0% cc; 5–12 mph wind</td>
</tr>
<tr>
<td>4/13/2021</td>
<td>4:40 p.m. to 8:15 p.m.</td>
<td>TY</td>
<td>71°F–54°F; 0% cc; 15–20 mph wind</td>
</tr>
</tbody>
</table>

Note: cc = cloud cover.
Personnel: AG = Anna Godinho; AS = Allie Sennett; BO = Brock Ortega; CA = Callie Amoaku; KD = Kathleen Dayton; LB = Laura Burris; MF = MacKenzie Forgey; ML = Michele Laskowski; MR = Matt Ricketts; PH = Patrick Hendrix; PK = Paul Keating; TY = Tyler Young.
3.2.3 Fauna

Wildlife species detected during field surveys by sight, calls, tracks, scat, or other sign were recorded. Binoculars (8- to 10-times magnification) were used to identify observed wildlife. A list of wildlife species observed or detected on site is presented in Appendix B, Wildlife Species Observed within the Project Site.

Latin and common names of animals follow Crother (2017) for reptiles and amphibians and the American Ornithological Society (AOS 2020) for birds. Mammal names primarily follow Wilson and Reeder (2005), but some species names reflect recent changes in taxonomy.

3.2.4 Aquatic Resources Delineation

From December 2020 to January 2021, Dudek biologists conducted an aquatic resources delineation of waters of the United States/state on the Project site. Tables 4, 5, and 6 show the specific dates and times Dudek biologists conducted the aquatic resources delineation on each site. The methods for delineating USACE, CDFW, and RWQCB jurisdictional waters of the United States /state are summarized below.

**USACE Jurisdictional Methods**

The USACE wetlands delineation was performed in accordance with the 1987 U.S. Army Corps of Engineers Wetlands Delineation Manual (USACE 1987), the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (USACE 2008a), and A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States: A Delineation Manual (USACE 2008b).

**CDFW Jurisdiction Methods**

The delineation defined areas under the jurisdiction of the CDFW pursuant to Sections 1600–1603 of the California Fish and Game Code. A predominance of hydrophytic vegetation, where associated with a stream channel, was used to determine CDFW-regulated riparian areas. Streambeds under the jurisdiction of CDFW were delineated using the Cowardin method of waters classification, which defines waters boundaries by a single parameter (i.e., hydric soils, hydrophytic vegetation, or hydrology).

**RWQCB Jurisdiction Methods**

Non-wetland waters subject to RWQCB jurisdiction were delineated to the extent of the top of bank, mapped as the physical break in slope between the channel and surrounding upland. Wetland waters subject to RWQCB jurisdiction were mapped based on methods described in the 1987 Corps of Engineers Wetlands Delineation Manual (USACE 1987) and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (USACE 2008a). In 2019, the State Water Resources Control Board issued the State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State (SWRCB 2019). These procedures define wetlands that encompass “the full range of wetland types commonly recognized in California, including some features not protected under federal law, and reflects current scientific understanding of the formation and functioning of wetlands.” The State Water Resources Control Board defines wetlands as: “An area is wetland if, under normal circumstances, (1) the area has continuous or recurrent saturation of the upper substrate caused by groundwater, or shallow surface water, or both; (2) the duration of such saturation is sufficient to cause anaerobic conditions in the upper substrate; and (3) the area’s vegetation is dominated by hydrophytes or the area lacks vegetation.”
Site-specific aquatic resources delineation reports were prepared for Clifton Court Forebay Dam and Dyer and Patterson Dams and submitted to the USACE, CDFW, and RWQCB for verification.

3.2.5 Special-Status Plant Surveys

Dudek conducted focused surveys for special-status plant species in March, April, May, and July 2021, at the appropriate phenological stage (blooming and fruiting) to detect and identify target species (Appendix C, Special-Status Plant Species’ Potential to Occur within the Project Site).

Survey dates, personnel, and weather conditions for each site are included in Tables 4, 5, and 6. Field survey methods and mapping of rare plants generally conformed to CNPS Botanical Survey Guidelines (CNPS 2001), Protocols for Surveying and Evaluating Impacts to Special Status Native Populations and Natural Communities (CDFW 2018), and General Rare Plant Survey Guidelines (Cypher 2002). The assessment consisted of one survey pass that provided 100% coverage of the Project site.

Dudek biologists conducted pedestrian surveys, which consisted of walking straight-line transects with spacing of approximately 66 feet (20 meters) throughout all habitats within each biological resources study area (Figure 4A, Biological Study Area–Clifton Court Forebay Dam; Figure 4B, Biological Study Area–Dyer Dam; and Figure 4C, Biological Study Area–Patterson Dam). The species locations were mapped using Esri ArcGIS Collector as point records or polygons. The number of individuals within a polygon were estimated and the number of individuals associated with each point were directly counted. The special-status plant observations were then digitized into the geodatabase by a Dudek geographic information system (GIS) technician using ArcGIS software.

Prior to conducting each survey pass, representative populations of target species (i.e., reference sites) were visited to confirm survey timing. Reference sites for special-status plant species were identified through an analysis of past records documented in the CNDDB (CDFW 2021a), the Calflora online database (Calflora 2021), and the California Consortium of Herbaria online database (CCH 2021). Reference site visits were conducted by Dudek botanist Laura Burris on March 3 and 5, and July 9, 2021; Dudek biologists Laura Burris and Paul Keating on July 12, 2021; and DWR botanist Jane Van Susteren on February 17, 2021.

Some target species reference populations could not be located due to lack of access or because the recorded occurrences within the Project region were historic and no longer extant. Observation and herbarium records were reviewed for these species to determine appropriate bloom time (CDFW 2021a; Calflora 2021; CCH 2021).

3.2.6 Special-Status Wildlife Surveys

Dudek conducted focused surveys for burrowing owl (Athene cunicularia) and nesting Swainson’s hawks (Buteo swainsoni) and initiated camera surveys for San Joaquin kit fox from February to July 2021. In addition, special-status wildlife observed while conducting other surveys, including observations of nests or other evidence of breeding, were recorded in Esri ArcGIS Collector; the resulting information is incorporated into this report. Methodology for the three types of focused special-status wildlife surveys is described below.
3.2.6.1 Burrow Assessment, Burrowing Owl Surveys, and San Joaquin Kit Fox Surveys

Dudek conducted a multispecies burrow assessment in areas of potentially suitable habitat (e.g., grasslands, disturbed lands, roadside areas, ditches, and other open habitats where suitable burrow resources exist and are relatively flat or have low slopes) on the Project site on February 23 and 24, 2021. Survey dates, personnel, and weather conditions are included in Tables 4, 5, and 6. The assessment consisted of the biologists walking straight-line transects with a maximum spacing of approximately 66 feet (20 meters) and recording the location of all suitable burrows (e.g., those at least 4 inches [11 centimeters] in diameter or greater, and greater than 150 centimeters in depth) and/or burrow surrogates (e.g., rock cavities, pipes, culverts, debris piles) using Esri ArcGIS Collector. All burrows were investigated for sign of burrowing owl occupancy, including regurgitated castings (pellets) of prey remains, scat ( whitewash), and feathers. The locations of any observed burrowing owls were also recorded. Burrows were also investigated for sign of kit fox and American badger occupancy, including prey remains, scat, tracks, and claw/scratch marks. Surveys were conducted under good weather conditions that would permit clear detection of individuals should they occur on site. Other information, such as areas of California ground squirrel (Spermophilus beecheyi) activity, and the presence of coyotes (Canis latrans) or other canids—red fox (Vulpes vulpes) and grey fox (Urocyon cinereoargenteus)—were also documented. The burrow assessment also coincided with the first of multiple required visits for protocol-level burrowing owl surveys (CDFG 2012) and early evaluation habitat assessment for San Joaquin kit fox (USFWS 1999), discussed below.

Dudek conducted a protocol-level burrowing owl breeding season survey in accordance with Appendices C and D of CDFW’s Staff Report on Burrowing Owl Mitigation (CDFG 2012). The first survey visit coincided with the multispecies burrow assessment described above. Subsequent visits focused on revisiting areas where burrowing owls or their sign were previously observed to determine breeding status and areas with high burrow density to look for newly-arrived owls. Survey details are provided in Tables 4, 5, and 6.

The February 2021 burrow assessment also served as the “one set of walking transects” to evaluate San Joaquin kit fox habitat suitability on the Project site in accordance with the early evaluation requirements in the San Joaquin Kit Fox Survey Protocol for the Northern Range (USFWS 1999). Observations during the burrow assessment, as well as a parallel burrow assessment and wildlife game camera study for the Delta Field Division HCP (see Section 3.2.7, Wildlife Surveys for Delta Field Division Habitat Conservation Plan), indicated that subsequent spotlighting surveys were unnecessary and that the deployment of camera stations at select locations identified as suitable for kit fox movement would be sufficient to detect any kit foxes using the area. Methods for determining the number and location of camera stations were developed in coordination with USFWS and CDFW.

3.2.6.2 Swainson’s Hawk Nesting Survey

From March to July 2021, Dudek conducted Swainson’s hawk nesting surveys in accordance with Recommended Timing and Methodology for Swainson’s Hawk Nesting Surveys in California’s Central Valley (SHTAC 2000). The survey focused on inspecting individual trees and groves of trees in the study area for evidence of Swainson’s hawk nesting and also documented evidence of nesting great-horned owl (Bubo virginianus), red-tailed hawk (Buteo jamaicensis), red-shouldered hawk (Buteo lineatus), and other competitor species. Nesting habitat outside but within 0.5 miles of the study area was also surveyed with spotting scopes in accordance with the Swainson’s Hawk Technical Advisory Committee (2000) survey guidelines. Where possible, trees were examined from multiple angles for extended periods. Some areas within the 0.5-mile survey buffer, where biologists did not have access to private roads and the Project is not proposing any activities, received relatively limited coverage. Survey dates, personnel, and weather conditions are provided in Tables 4, 5, and 6.
3.2.7 Wildlife Surveys for Delta Field Division Habitat Conservation Plan

In February 2021, Dudek also began field surveys to inform a future HCP for operations and maintenance of the California State Water Project and associated facilities within DWR’s Delta Field Division. The HCP study area encompasses the entire DWR right-of-way and therefore contains the Project study area. Although the HCP wildlife surveys are being conducted separately from the Project-specific surveys described above, they cover the same areas and provide complementary information. All the above-listed surveys (burrow assessment, burrowing owl, San Joaquin kit fox, Swainson’s hawk) were also conducted within the HCP study area in 2021. Specific additional HCP survey efforts used to inform Section 4 of this report are briefly described below.

3.2.7.1 Eagle Surveys

Dudek is conducting annual ground-based surveys of the HCP study area to determine to what degree the right-of-way is being used by golden eagles and/or bald eagles, including whether the right-of-way or its immediate vicinity supports active eagle nests or is being used by eagles as part of an active nest territory. Three survey rounds were completed during the 2021 nesting season, the first during the week of March 22 through 26 by Dudek biologist Keith Babcock and Michelle Leis, the second by Keith Babcock the week of April 26 through 30, and the third by Keith Babcock and Michelle Leis the week of May 24 through 28.

3.2.7.2 Wildlife Game Camera Study

Dudek initiated a wildlife game camera study of the larger HCP study area in March 2021; a fall component of the study is anticipated to commence in September 2021. Approximately 188 potential wildlife crossings within the HCP study area are being assessed as a part of a larger game camera study (crossings provided by DWR in February 2021). Potential wildlife crossings include culverts, overchutes, siphons, bridges, and roads. Crossings determined to be unsuitable for wildlife use, such as collapsed culverts and broken overchutes, use were not assessed. Of the total camera stations established, 14 were located among 7 potential crossings within or near the Project study area: 3 crossings at Dyer Dam, and 4 crossings at Patterson Dam.

A minimum of two to four camera stations were set at each potential wildlife crossing location with one on each side of the potential wildlife crossing determined by the biologist as most suitable for capturing wildlife use through the Project study area. Additional camera stations were placed in the vicinity of the Project study area (beyond the 300-foot buffer) to capture wildlife movements at a landscape scale (refer to Section 4.5.4). Preferred camera sets either had a good direct view into the structure entrance, or view of surrounding areas that led to the structure and to guide wildlife to the structure. One type of wildlife camera was used: Browning Spec Op game cameras. Each camera was supplied with a 16 to 32-gigabyte memory SD card and high-performance AA batteries. Digital cameras were set to fire immediately upon triggering and three shots were fired per trigger event. The trigger delay was set at 0 to 1 second. Camera aperture settings were set in the mid-range for better image sharpness and to capture the widest range of the site conditions. Cameras were unbaited and no scent lure was applied. Station set-up varied based on the type of crossing assessed, as well as the surrounding conditions. One method included driving a “T” post into the ground so that the attached camera would be at the appropriate height, roughly level with the crossing. As a result, some poles were slightly tilted. Cameras were generally placed approximately 2 to 3 feet off the ground. Another method included attaching the camera to an adjacent fence or railing with zip-ties, which afforded more flexibility in angling the cameras and minimizing movement. Cable locks or chains were also used at each camera station for security as many stations were established in areas that replaced when they could be traversed by the public. Forty cameras were placed...
per session and generally covered 20 locations. Cameras were left in place for between 9 to 11 days before being moved to the next set of locations. Batteries were replaced when they reached 0.33 capacity which generally meant that they lasted for 3 to 4 rounds.

Once the cameras were collected, the SD cards were downloaded to the Dudek server and then uploaded to the University of California, Davis Road Ecology Group’s Wildlife Observer Net, which is an automated artificial intelligence photo analyzer that categorizes photos as either including animals or not, and also attempts to count the number of animals. Once Wildlife Observer Net separated photos into two categories, those that contained wildlife and those that did not, a Dudek biologist reviewed the “animal” photos to identify the species. In addition, an experienced biologist performed random spot-checks of the photos not deemed to include animal photos, reviewed the species identifications, and difficult photos.

3.7.2.3 Vernal Pool Branchiopod Surveys

Dudek conducted wet-season surveys for vernal pool branchiopods in the larger HCP study area from December 2021 to April 2022. This included sampling of seasonal wetlands in the Clifton Court Forebay biological study area in December and January 2022.

3.3 Survey Limitations

3.3.1 Flora

Direct observations of special-status plants were recorded during vegetation mapping, aquatic resources delineations, rare plant surveys, and habitat assessments. Focused surveys for special-status plants were conducted in the spring and summer of 2021. Fluctuations in annual plant populations and rates of germination are associated with variations in rainfall and other climatic conditions. Therefore, in addition to focused surveys, an emphasis was placed on conducting habitat assessments for special-status plant species (Appendix D, Special-Status Wildlife Species’ Potential to Occur within the Project Site). In addition, reference checks were conducted for occurrences of rare plants within the Project vicinity to determine appropriate survey timing.

3.3.2 Fauna

Limitations of the field surveys include a diurnal bias for most species and the absence of focused trapping for mammals and reptiles, because trapping is generally only performed for select listed species. Additionally, due to seasonal restrictions, vernal pool branchiopod (e.g., vernal pool fairy shrimp) surveys were not possible within possible aquatic habitat features in the southern portion of the Clifton Court Forebay Dam study area. Surveys were conducted mostly during the daytime to maximize potential for the detection of plants and most animals. Birds represent the largest component of the vertebrate fauna, and because they are active in the daytime, diurnal surveys maximize the number of observations of this portion of the fauna. Daytime surveys may result in fewer observations of animals that are more active at night, such as mammals. However, the San Joaquin kit fox and wildlife movement camera studies were able to capture some nighttime activity. In addition, many species of reptiles and amphibians are nocturnal and/or secretive in their habits and are difficult to observe using standard meandering transects. Despite these limitations, the survey work conducted within the Project study area was extensive and provides an adequate overall assessment of faunal resources for purposes of evaluating potential Project impacts. To account for survey limitations, special-status wildlife species having the potential occur, based on pertinent distribution, habitat preference literature, and recorded off-site observations, are included in the analysis.
4 Environmental Setting
(Existing Conditions)

4.1 Vegetation Communities and Land Cover Types

The acreages of the mapped vegetation associations and/or alliances and other land covers within the Project site are presented in Table 7, including those that are considered sensitive biological resources by CDFW under CEQA per the California Natural Community List (CDFW 2020); sensitive natural communities are included in Table 7 in bold text. The term semi-natural stands is used to distinguish between natural vegetation communities and vegetation types dominated by non-native plant species (Sawyer et al. 2009). The alliances and other land covers are grouped in Table 7 by the generalized habitat. The locations of the vegetation community alliances and land covers within the Project site are shown on Figure 5A, Vegetation Communities–Clifton Court Forebay Dam, Figure 5B, Vegetation Communities–Dyer Dam, and Figure 5C, Vegetation Communities–Patterson Dam, and are described by generalized habitat type in Sections 4.1.1 through 4.1.6.
### Table 7. Vegetation Communities within the Project Site

<table>
<thead>
<tr>
<th>General Category</th>
<th>Alliance Name</th>
<th>Vegetation Community</th>
<th>Clifton Court Forebay Dam</th>
<th>Dyer Dam</th>
<th>Patterson Dam</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bog and Marsh</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Alkali heath marsh</td>
<td><em>Frankenia salina</em> Association</td>
<td>1.9</td>
<td></td>
<td></td>
<td>1.9</td>
</tr>
<tr>
<td></td>
<td>American bulrush marsh</td>
<td><em>Schoenoplectus americanus</em> Association</td>
<td>1.8</td>
<td></td>
<td></td>
<td>1.8</td>
</tr>
<tr>
<td></td>
<td>Baltic and Mexican rush marshes</td>
<td><em>Juncus arcticus var. balticus–(var. mexicanus)</em> Association</td>
<td>0.3</td>
<td></td>
<td></td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td>Cattail marshes</td>
<td><em>Typha (latifolia, angustifolia)</em> Association</td>
<td></td>
<td>0.6</td>
<td>0.7</td>
<td>1.3</td>
</tr>
<tr>
<td></td>
<td>Common and giant reed marshes</td>
<td><em>Arundo donax</em> Semi-natural Association</td>
<td>0.9</td>
<td></td>
<td></td>
<td>0.9</td>
</tr>
<tr>
<td></td>
<td>Hardstem and California bulrush marshes</td>
<td><em>Schoenoplectus acutus</em> Association</td>
<td>0.2</td>
<td></td>
<td>0.0&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.2</td>
</tr>
<tr>
<td></td>
<td>Iodine bush scrub</td>
<td><em>Allenrolfea occidentalis/Distichlis spicata</em> Provisional Association</td>
<td>5.4</td>
<td></td>
<td></td>
<td>5.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Allenrolfea occidentalis</em> Association</td>
<td></td>
<td></td>
<td></td>
<td>7.5</td>
</tr>
<tr>
<td></td>
<td>Perennial pepper weed patches</td>
<td><em>Lepidium latifolium</em> Semi-natural Association</td>
<td>21.5</td>
<td></td>
<td></td>
<td>21.5</td>
</tr>
<tr>
<td></td>
<td>Qualibush scrub</td>
<td><em>Atriplex lentiformis</em> Association</td>
<td>7.3</td>
<td>0.1</td>
<td></td>
<td>7.4</td>
</tr>
<tr>
<td></td>
<td>Salt grass flats</td>
<td><em>Distichlis spicata</em> Association</td>
<td>0.6</td>
<td>1.3</td>
<td>0.5</td>
<td>2.3</td>
</tr>
<tr>
<td></td>
<td>Smartweed–cocklebur patches</td>
<td><em>Polygonum (amphibium, lapathifolium)</em> Association</td>
<td>7.1</td>
<td></td>
<td></td>
<td>7.1</td>
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<tr>
<td><strong>Disturbed and Developed</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>N/A</td>
<td>Disturbed Habitat</td>
<td>13.9</td>
<td>3.9</td>
<td>0.4</td>
<td>18.2</td>
</tr>
<tr>
<td></td>
<td>N/A</td>
<td>General Agriculture</td>
<td>0.0&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td></td>
<td>0.0&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>N/A</td>
<td>Open water</td>
<td>60.6</td>
<td></td>
<td>0.0&lt;sup&gt;a&lt;/sup&gt;</td>
<td>60.7</td>
</tr>
<tr>
<td></td>
<td>N/A</td>
<td>Urban/Developed</td>
<td>109.6</td>
<td>21.5</td>
<td>15.4</td>
<td>146.4</td>
</tr>
<tr>
<td><strong>Disturbed and Developed Total</strong></td>
<td></td>
<td></td>
<td>184.2</td>
<td>25.3</td>
<td>15.8</td>
<td>225.3</td>
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<tr>
<td><strong>Dune</strong></td>
<td>Ice plant mats</td>
<td><em>Carpobrotus (edulis)</em> Semi-natural Association</td>
<td>1.9</td>
<td></td>
<td></td>
<td>1.9</td>
</tr>
<tr>
<td><strong>Dune Subtotal</strong></td>
<td></td>
<td></td>
<td>1.9</td>
<td></td>
<td></td>
<td>1.9</td>
</tr>
<tr>
<td><strong>Grass and Herb Dominated</strong></td>
<td>California brome–blue wildrye prairie</td>
<td><em>Elymus glaucus</em> Association</td>
<td>2.6</td>
<td></td>
<td></td>
<td>2.6</td>
</tr>
<tr>
<td></td>
<td>Needle grass–Melic grass grassland</td>
<td><em>Needle grass–Melic grass grassland</em> (Nassella spp.–Melica spp.) Alliance</td>
<td>–</td>
<td>17.2</td>
<td>0.7</td>
<td>17.9</td>
</tr>
</tbody>
</table>

<sup>a</sup> Excludes areas designated for development.
Table 7. Vegetation Communities within the Project Site

<table>
<thead>
<tr>
<th>General Category</th>
<th>Alliance Name</th>
<th>Vegetation Community</th>
<th>Clifton Court Forebay Dam</th>
<th>Dyer Dam</th>
<th>Patterson Dam</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perennial rye grass fields</td>
<td><em>Lolium perenne–Hordeum marinum–Ranunculus californicus</em> Semi-natural Association</td>
<td></td>
<td>22.3</td>
<td>1.1</td>
<td>–</td>
<td>23.4</td>
</tr>
<tr>
<td>Poison hemlock or fennel patches</td>
<td><em>Conium maculatum</em> Semi-natural Association</td>
<td></td>
<td>12.7</td>
<td>–</td>
<td>–</td>
<td>12.7</td>
</tr>
<tr>
<td>Upland mustards or star-thistle fields</td>
<td><em>Brassica nigra</em> Semi-natural Association</td>
<td></td>
<td>18.4</td>
<td>3.6</td>
<td>5.8</td>
<td>27.9</td>
</tr>
<tr>
<td></td>
<td><em>Carduus pycnocephalus–Silybum marianum</em> Provisional Semi-natural Association</td>
<td></td>
<td>–</td>
<td>2.5</td>
<td></td>
<td>2.5</td>
</tr>
<tr>
<td></td>
<td><em>Raphanus sativus</em> Semi-natural Association</td>
<td></td>
<td>–</td>
<td>–</td>
<td>2.3</td>
<td>2.3</td>
</tr>
<tr>
<td>Wild oats and annual brome grasslands</td>
<td><em>Wild oats and annual brome grasslands (Avena spp.–Bromus spp.)</em> Semi-natural Alliance</td>
<td></td>
<td>45.6</td>
<td>6.9</td>
<td>9.2</td>
<td>61.7</td>
</tr>
<tr>
<td></td>
<td><strong>Grass and Herb Dominated Total</strong></td>
<td></td>
<td>101.6</td>
<td>31.3</td>
<td>18.0</td>
<td>150.9</td>
</tr>
<tr>
<td>Riparian</td>
<td>Arroyo willow thickets</td>
<td><em>Salix lasiolepis Association</em></td>
<td>–</td>
<td>0.0</td>
<td>–</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td>Button willow thickets</td>
<td><em>Cephalanthus occidentalis Association</em></td>
<td>1.4</td>
<td>–</td>
<td>–</td>
<td>1.4</td>
</tr>
<tr>
<td></td>
<td>Goodding’s willow–red willow riparian woodland and forest</td>
<td><em>Salix gooddingii Association</em></td>
<td>7.6</td>
<td>–</td>
<td>–</td>
<td>7.6</td>
</tr>
<tr>
<td></td>
<td>Himalayan blackberry–rattlebox–edible fig riparian scrub</td>
<td><em>Rubus armeniacus</em> Semi-natural Association</td>
<td>4.1</td>
<td>–</td>
<td>–</td>
<td>4.1</td>
</tr>
<tr>
<td></td>
<td>Hinds’s walnut and related stands</td>
<td><em>Juglans hindsii</em> Semi-natural Association</td>
<td>1.2</td>
<td>–</td>
<td>–</td>
<td>1.2</td>
</tr>
<tr>
<td></td>
<td>Red alder forest</td>
<td><em>Alnus rubra/Salix lasiolepis/Rubus spp.</em> Association</td>
<td>0.3</td>
<td>–</td>
<td>–</td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td><strong>Riparian Subtotal</strong></td>
<td></td>
<td>14.6</td>
<td>0.0</td>
<td></td>
<td>14.7</td>
</tr>
<tr>
<td>Scrub</td>
<td>Coyote brush scrub</td>
<td><em>Baccharis pilularis/Annual grass–herb Association</em></td>
<td>2.4</td>
<td>–</td>
<td>–</td>
<td>2.4</td>
</tr>
<tr>
<td></td>
<td><strong>Scrub Subtotal</strong></td>
<td></td>
<td>2.4</td>
<td>–</td>
<td>–</td>
<td>2.4</td>
</tr>
<tr>
<td></td>
<td><strong>Grand Total</strong></td>
<td></td>
<td><strong>359.3</strong></td>
<td><strong>58.7</strong></td>
<td><strong>35.0</strong></td>
<td><strong>452.9</strong></td>
</tr>
</tbody>
</table>

**Notes:** An alliance and/or association is considered **sensitive** (bolded above) if indicated with a state rarity rank of S1–S3 or indicated as sensitive without a rarity ranking in the California Natural Community List (CDFW 2020).

* 0.0 are values that are less than 0.05 acres.
4.1.1 Bog and Marsh

4.1.1.1 Alkali Heath Marsh Alliance (52.500.00)

Within the alkali heath marsh alliance, alkali heath (*Frankenia salina*) is greater than 30% cover in the herbaceous layer, sometimes co-dominant with saltgrass (*Distichlis spicata*) or other herbs and subshrubs (CNPS 2021b). Cover is open to continuous and less than 60 centimeters in height. This association occurs within coastal salt marshes, brackish marshes, alkali meadows, and alkali playas. Within the Project site there is one association in the alkali heath marsh alliance, as described below.

*Frankenia salina* Association (52.500.02)

Within the Clifton Court Forebay Dam biological resources study area, this association occurs in a small portion of the seasonally inundated lowland between Clifton Court Forebay and the West Canal, in a matrix of facultative and facultative wetland species. Within the study area, alkali heath constitutes approximate 60% relative cover and Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum*) constitutes approximately 40% relative cover.

*Frankenia salina* association comprises 1.9 acres of the Clifton Court Forebay Dam biological resources study area. This association is considered sensitive (CDFW 2020).

4.1.1.2 American Bulrush Marsh Alliance (52.111.00)

Within the American bulrush marsh alliance, American bulrush (*Schoenoplectus americanus*) is greater than 50% relative cover in the herbaceous layer with hardstem bulrush (*S. acutus*), California bulrush (*S. californicus*), common threesquare (*S. pungens*), or cattail (*Typha* spp.) (CNPS 2021b). Emergent trees and shrubs such as willow (*Salix* spp.) may be present at low cover. Cover is intermittent to continuous and less than 4 meters in height. This alliance generally occurs along streams, around ponds and lakes, and in sloughs, swamps, fresh and brackish marshes, and roadside ditches. Soils have a high organic content and are poorly aerated. Within the Project site there is one association in the American bulrush alliance, as described below.

*Schoenoplectus americanus* Association (52.111.04)

Within the Clifton Court Forebay Dam biological resources study area, this association occurs in semi-permanently flooded or seasonally inundated features such as ditches and freshwater emergent wetlands. Within the study area, American bulrush constitutes between 70% and 75% relative cover with cattails ranging from 15% to 25%; one stand of this vegetation community contains perennial pepper weed (*Lepidium latifolium*).

*Schoenoplectus americanus* association comprises 1.8 acres of the Clifton Court Forebay Dam biological resources study area. This association is considered sensitive (CDFW 2020).

4.1.1.3 Baltic and Mexican Rush Marshes Alliance (45.562.00)

Within the Baltic and Mexican rush marshes alliance, Baltic rush (*Juncus balticus*) or Mexican rush (*J. mexicanus*) is dominant or co-dominant (CNPS 2021b). This alliance generally occurs within wet and mesic meadows, along stream banks, rivers, lakes, ponds, fens, and sloughs, and within freshwater, brackish, and alkaline marshes. Soils are poorly drained, often with a thick organic layer. Within the Project site there is one association in the Baltic and Mexican rush alliance, as described below.
**Juncus arcticus var. balticus–(var. mexicanus) Association (45.562.08)**

Within the Clifton Court Forebay Dam biological resources study area, this alliance occurs in an isolated freshwater emergent wetland located south of Clifton Court Forebay. Within the study area, Baltic rush relative cover was approximately 75% with ripgut brome (*Bromus diandrus*) at 10% cover with alkali heath at 5% cover.

**Juncus arcticus var. balticus–(var. mexicanus)** association comprises 0.3 acres of the Clifton Court Forebay Dam biological resources study area. This association is not considered sensitive (CDFW 2020).

### 4.1.1.4 Cattail Marshes Alliance (52.050.00)

Within the cattail alliance, narrowleaf cattail (*Typha angustifolia*) and/or broadleaf cattail (*T. latifolia*) is greater than 50% relative cover in the herbaceous layer (CNPS 2021b) with nutsedges (*Cyperus* spp.), salt grass, barnyardgrass (*Echinochloa crus-galli*), pale spike rush (*Eleocharis macrostachya*), rushes (*Juncus* spp.), annual rabbitsfoot grass (*Polypogon monspeliensis*), knotweed (*Persicaria* spp.), or bulrush (*Schoenoplectus* spp.), among others. Emergent trees and shrubs may be present at low cover, including willows. Cover is intermittent to continuous and less than 1.5 meters in height. Soils may be clayey or silty. Within the Project site there is one association in the cattail marshes alliance, as described below.

**Typha (latifolia, angustifolia) Association (52.050.04)**

Within the Dyer Dam biological resources study area, this association occurs in semi-permanently flooded freshwater or brackish marshes. Within the Patterson Dam biological resources study area, this association occurs within the semi-permanently flooded main drainage. Within the Dyer Dam biological resources study area, this association occurs within a relocated drainage channel running north to south through the eastern portion of the study area. Within these study areas, the *Typha (latifolia, angustifolia)* association is dominated narrowleaf cattail ranging between 70% and 90% relative cover. Other species present include tall flatsedge (*Cyperus eragrostis*) and fringed willowherb (*Epilobium ciliatum*).

**Typha (latifolia, angustifolia)** association comprises 0.6 acres of the Dyer Dam biological resources study area and 0.7 acres of the Patterson Dam biological resources study area. This association is not considered sensitive (CDFW 2020).

### 4.1.1.5 Common and Giant Reed Marshes Alliance (42.081.00)

Within the common and giant reed marsh alliance, common reed (*Phragmites australis*) or giant reed (*Arundo donax*) are dominant in the herbaceous layer. This alliance occurs in riparian areas, along low-gradient streams and ditches, and within semi-permanently flooded and slightly brackish marshes and impoundments (CNPS 2021b). Within the Project site there is one association in the common and giant reed marshes alliance, as described below.

**Arundo donax Semi-Natural Association (42.080.01)**

Within the Clifton Court Forebay Dam biological resources study area, this association occurs intermittently along the riprap embankments of Old River, the West Canal, and Italian Slough, and in sporadic stands within the southern portion of the study area. The approximate relative cover for giant reed in the study area is 80%.
Arundo donax semi-natural association comprises 0.9 acres of Clifton Court Forebay Dam biological resources study area. This association is not considered sensitive (CDFW 2020).

4.1.1.6 Hardstem and California Bulrush Marshes Alliance (52.128.00)

Within the hardstem bulrush and California bulrush alliance, hardstem bulrush (Schoenoplectus acutus) and/or California bulrush (Schoenoplectus californicus) are dominant or co-dominant in the herbaceous layer (CNPS 2021b). Cover is intermittent to continuous, and less than 4 meters in height. This alliance occurs in brackish to freshwater marshes, along stream shores, bars and channels of river mouth estuaries, around ponds and lakes, in sloughs, swamps, and roadside ditches. Soils have a high organic content and are poorly aerated. Within the Project site there is one association in the hardstem and California bulrush marshes alliance, as described below.

Schoenoplectus acutus Association (52.122.01)

Within the Clifton Court Forebay Dam biological resources study area, this association occurs within semi-permanently flooded or seasonally inundated features such as ditches and freshwater emergent wetlands. Within the Patterson Dam biological study area, this association occurs within the semi-permanently flooded main drainages on site. Within these study areas, this community contains 80% relative cover of hardstem bulrush and 20% relative cover of poison hemlock (Conium maculatum).

Schoenoplectus acutus association comprises 0.2 acres of the Clifton Court Forebay Dam biological resources study area and less than 0.05 acres of the Patterson Dam biological resources study area. This association is considered sensitive (CDFW 2020).

4.1.1.7 Iodine Bush Scrub Alliance (36.120.00)

Within the iodine bush scrub alliance, iodine bush (Allenrolfea occidentalis) is greater than 2% absolute cover in the shrub canopy, and no other shrub species is present at greater or equal cover (CNPS 2021b). Shrub canopy is open to continuous, less than 2 meters in height, and includes shrubby seepweed (Suaeda nigra). Herbaceous layer is variable and consists of saltgrass and alkali seaheath. This association occurs within dry lakebed margins, hummocks, playas perches above current drainages, and seeps. Within the Project site there are two associations in the iodine bush scrub alliance, as described below.

Allenrolfea occidentalis/Distichlis spicata Provisional Association (36.120.01)

Within the Clifton Court Forebay Dam biological resources study area, this association occurs within an alkaline flat in the southern portion of the study area. Within the study area, this provisional association contains approximately 30% iodine bush and 20% Mediterranean barley; other associated species include common tarweed (Centromadia pungens ssp. pungens), quailbush (Atriplex lentiformis), and bush seepweed.

Allenrolfea occidentalis/Distichlis spicata provisional association comprises 5.4 acres of the Clifton Court Forebay Dam biological resources study area. This association is considered sensitive (CDFW 2020).
Allenrolfea occidentalis Association (36.120.04)

Within the Clifton Court Forebay Dam biological resources study area, this association occurs within a non-jurisdictional drainage and alkaline flat in the southern portion of the study area. The study area also includes a portion of a larger stand of this association to the west.

Allenrolfea occidentalis association comprises 7.5 acres of the Clifton Court Forebay Dam biological resources study area. This association is considered sensitive (CDFW 2020).

4.1.1.8 Perennial Pepper Weed Patches Alliance (52.205.00)

Within the perennial pepper weed patches alliance, perennial pepperweed (Lepidium latifolium) is present at greater than 30% absolute cover in the herbaceous layer with other non-natives present at greater than 90% cover (CNPS 2021b). Cover is open to continuous and less than 2 meters in height. This alliance generally occurs in intermittently and seasonally flooded fresh and saltwater marshes and riparian corridors. Within the Project site there is one association in the perennial pepper weed patches alliance, as described below.

Lepidium latifolium Semi-Natural Association (52.205.02)

Within the Clifton Court Forebay Dam biological resources study area, this association occurs throughout seasonally inundated lowlands of the study area. Within this study area, the Lepidium latifolium semi-natural association contains 50% to 90% perennial pepperweed.

Lepidium latifolium semi-natural association comprises 21.5 acres of the Clifton Court Forebay Dam biological resources study area. This association is not considered sensitive (CDFW 2020).

4.1.1.9 Quailbush Scrub Alliance (36.370.00)

Within the quailbush scrub alliance, quailbush or Torrey’s saltbush (Atriplex torreyi) is dominant in the shrub canopy (CNPS 2021b). Shrub cover is open to intermittent and less than 5 meters in height; herbaceous layer is variable. This alliance occurs on gentle to steep southeast and southwest-facing slopes. Soils are clays. Within the Project site there is one association in the quailbush scrub alliance, as described below.

Atriplex lentiformis Association (36.370.01)

This association occurs within semi-permanently flooded or seasonally inundated features including non-jurisdictional ditches and swales within the southern portion the Clifton Court Forebay Dam biological resources study area. It occurs within the northwest portion of the Dyer Dam biological resources study area, west of the South Bay Aqueduct. Within the study areas, the Atriplex lentiformis association occurs co-dominantly with iodine bush; the distribution of relative cover is approximately 40% relative cover of quailbush and 30% relative cover of iodine bush. Other associated species include salt grass and soft brome.

Atriplex lentiformis association comprises 7.3 acres of the Clifton Court Forebay Dam biological resources study area and 0.1 acres of the Dyer Dam biological resources study area. This association is not considered sensitive.
4.1.1.10 Salt Grass Flats Alliance

Within the salt grass flats alliance, salt grass, spiny rush (*Juncus acutus*), and/or Cooper's rush (*Juncus cooperi*) are dominant or codominant in the herbaceous layer (CNPS 2021b). Cover is open to continuous and less than 1.5 meters in height. This alliance occurs in coastal salt marshes, inland habitats such as playas, swales, and terraces along washes that may be intermittently flooded. Soils are often deep, alkaline or saline, and poorly drained. When the soil is dry, the surface usually has salt accumulations. Within the Project site there is one association in the salt grass flats alliance, as described below.

**Distichlis spicata Association (41.200.13)**

Within the Clifton Court Forebay Dam biological resources study area, this association occurs within semi-permanently flooded or seasonally inundated features including a non-jurisdictional ditch and swale within the southern portion of the study area. Within the Dyer Dam biological resources study area, this association occurs within seasonally inundated features in the western portion of the study area. Within the Patterson Dam biological resources study area, this association occurs adjacent to the semi-permanently flooded drainage to the west of Patterson Reservoir. Within these study areas salt grass varies between 50% relative cover and 75% relative cover.

*Distichlis spicata* association comprises 0.6 acres of the Clifton Court Forebay Dam biological resources study area, 1.3 acres of the Dyer Dam biological resources study area, and 0.5 acres of the Patterson Dam biological resources study area. This association is not considered sensitive (CDFW 2020).

4.1.1.11 Smartweed–Cocklebur Patches Alliance (42.207.00)

Within the smartweed–cocklebur patches alliance, smartweed (*Persicaria lapathifolia*, formerly *Polygonum lapathifolium*) and/or cocklebur (*Xanthium strumarium*), or other knotweed species (*Persicaria* spp.) are dominant or co-dominant in the herbaceous layer (CNPS 2021b). Cover is open to continuous and less than 1.5 meters in height. This alliance occurs within marshes, regularly disturbed vernally wet pools, fields, and stream terraces. Within the Project site there is one association in the smartweed–cocklebur patches alliance, as described below.

**Polygonum (amphibium, lapathifolium) Association (42.207.02)**

Within the Clifton Court Forebay Dam biological resources study area, this association occurs within a seasonally inundated lowland between the West Canal and Clifton Court Forebay within a matrix of facultative and facultative wetland species. Within the study area, the *Polygonum (amphibium, lapathifolium)* association contains approximately 30% relative cover of longroot smartweed (*Persicaria amphibia*), 30% relative cover of cocklebur (*Xanthium strumarium*), 30% relative cover of fat hen (*Atriplex prostrata*), and 10% relative cover of common sunflower (*Helianthus annuus*).

*Polygonum (amphibium, lapathifolium)* association comprises 7.1 acres of the Clifton Court Forebay Dam biological resources study area. This association is not considered sensitive.
4.1.2 Disturbed and Developed

4.1.2.1 Disturbed Habitat

Disturbed habitat within the Clifton Court Forebay Dam biological resources study area is composed of unpaved access roads associated with Clifton Court Forebay operations and maintenance. While unpaved, these areas were heavily compacted and mostly barren of vegetation. Where present, vegetation consisted of ruderal or disturbance-tolerant non-native grasses and forbs.

Disturbed habitat within the Dyer Dam biological resources study area is composed of unpaved access roads, earthen stormwater control features (e.g., drainage ditches), erosion control (e.g., riprap), and one gravel-lined staging area in the northwest. These areas are highly disturbed due to ongoing maintenance and support sparse ruderal or disturbance-tolerant non-native grasses and forbs.

Disturbed habitat within the Patterson Dam biological resources study area is limited to a landscaped hedge of oleander (Nerium oleander) along a staging area to the south of Patterson Reservoir.

Disturbed habitat comprises 13.9 acres of the Clifton Court Forebay Dam biological resources study area, 3.9 acres of the Dyer Dam biological resources study area, and 0.4 acres of the Patterson Dam biological resources study area. Disturbed habitat is not considered sensitive.

4.1.2.2 General Agriculture

The Clifton Court Forebay Dam biological resources study area is adjoined to the south by agricultural fields and associated unpaved access roads and irrigation channels. These lands contained both active and fallow row crops at the time of the field surveys.

General agriculture comprises less than 0.05 acres of Clifton Court Forebay Dam biological resources study area. General agriculture is considered sensitive is not considered sensitive.

4.1.2.3 Open Water

Within the Clifton Court Forebay Dam biological resources study area, open water consists of portions of the relatively permanent waterways surrounding Clifton Court Forebay, including Old River to the north, Italian Slough to the west, and the West Canal to the east. In addition, inundated areas of an unnamed drainage canal to the south and the engineered ditch/sump complex that circumnavigates Clifton Court Forebay contains open water. The water level within these areas likely fluctuates seasonally based on rainfall and California State Water Project operations. Open water within the Patterson Dam biological resources study area is limited to an earthen drainage channel to the east of Patterson Reservoir.

Within the Clifton Court Forebay Dam biological resources study area, open water comprises 60.6 acres of the study area. There is less 0.05 acres of open water in the Patterson Dam biological resources study area.
4.1.2.4 Urban/Developed

Most land cover within the Clifton Court Forebay Dam biological resources study area is composed of urban and developed lands (e.g., paved levee road, gravel embankments) and artificial structures associated with Clifton Court Forebay infrastructure. Urban/developed areas with the Clifton Court Forebay Dam biological resources study area also includes operations and maintenance areas including staging, parking, and laydown areas. Much of this area is devoid of vegetation due to composition of the substrate (e.g., asphalt) and maintenance activities (e.g., mowing).

Most land cover within the Dyer Dam biological resources study area is composed of urban and developed lands (e.g., access roads and staging areas) and artificial structures associated with Dyer Dam infrastructure. Developed areas also include concrete-lined stormwater control features (e.g., V-ditches). These areas are mostly devoid of vegetation due to the compaction and impermeable substrate.

Most land cover within the Patterson Dam biological resources study area is composed of urban and developed lands (e.g., access roads and staging areas) and artificial structures associated with Patterson Dam infrastructure. Developed areas also include stormwater control features (e.g., V-ditches). These areas are highly disturbed due to ongoing maintenance and support sparse ruderal or disturbance-tolerant non-native grasses and forbs.

Urban/developed lands comprise 109.6 acres of the Clifton Court Forebay Dam biological resources study area, 21.5 acres of the Dyer Dam biological resources study area, and 15.4 acres of the Patterson Dam biological resources study area. Urban/developed lands are not considered sensitive.

4.1.3 Dune

4.1.3.1 Ice Plant Mats Alliance (21.200.00)

Within the ice plant mats alliance, hottentot fig (*Carpobrotus edulis*) or other ice plant taxa are strongly dominant (greater than 80% relative cover) (CNPS 2021b). The cover is intermittent to continuous and less than 50 centimeters in height. This association generally occurs within bluffs, disturbed land, and sand dunes of immediate coastline. Within the Project site there is one association in the ice plants mats alliance, as described below.

*Carpobrotus (edulis)* Semi-Natural Association (21.200.01)

Within the Clifton Court Forebay Dam biological resources study area, this association occurs within one dense, roadside patch between Old River and Clifton Court Forebay. With the study area, the *Carpobrotus (edulis)* semi-natural association contains 90% relative cover of hottentot fig.

*Carpobrotus (edulis)* semi-natural association comprises 1.9 acres of within the Clifton Court Forebay Dam biological resources study area. This association is not considered sensitive.
4.1.4 Grass and Herb Dominated

4.1.4.1 California Brome–Blue Wildrye Prairie Alliance (41.131.00)

Within the California brome–blue wildrye alliance, California brome, seaside brome (*Bromus sitchensis* var. *maritimus*), blue wildrye, and/or western bracken fern (*Pteridium aquilinum*) are dominant or co-dominant in the herbaceous layer. Cover is open to continuous and less than 1 meter in height. This alliance occurs within basins, terraces, dry floodplains, steep mesic slopes, and forest openings. Within the Project site there is one association in the California brome–blue wildrye prairie alliance, as described below.

*Elymus glaucus* Association (41.640.01)

Within the Clifton Court Forebay Dam biological resources study area, this association occurs within seasonally inundated lowlands between Clifton Court Forebay and the West Canal, and between Clifton Court Forebay and Old River in a matrix of facultative and facultative wetland species. Within the study area, this association contains approximately 80% relative cover of blue wildrye.

*Elymus glaucus* association comprises 2.6 acres of the Clifton Court Forebay Dam biological resources study area. This association is considered sensitive (CDFW 2020).

4.1.4.2 Needle Grass–Melic Grass Grassland Alliance (41.151.00)

Purple needle grass (*Stipa pulchra*, formerly *Nassella pulchra*) is greater than 5% absolute cover in the herbaceous layer with other perennial grasses and herbs including wavyleaf soap plant (*Chlorogalum pomeridianum*), bluedicks (*Dipterostemon capitatus*), and California poppy (*Eschscholzia californica*), among others (CNPS 2021b). Cover in this alliance is open to continuous and less than 1 meter in height. This alliance generally occurs in all topographic locations. Soils may be deep with high clay content, loamy, sandy, or silty derived from mudstone, sandstone, or serpentine substrates. Within the Dyer Dam biological resources study area, this alliance occurs co-dominantly with grazed annual grassland in the north and east. This alliance occurs co-dominantly with annual grassland in the north and east of the Patterson Dam biological resources study area.

Within the Dyer Dam biological resources study area, a majority of the vegetated portion of the study area (17.2 acres) is composed of needle grass–melic grass grassland (*Nassella* spp.–*Melica* spp.) alliance. The needle grass–Melic grass grassland alliance comprises 0.7 acres of the Patterson Dam biological resources study area. This alliance is considered sensitive (CDFW 2020).

4.1.4.3 Perennial Rye Grass Fields Alliance (41.321.00)

Within the perennial rye grass field alliance, perennial rye grass (*Festuca perennis*, formerly *Lolium perenne*) is dominant or co-dominant with other non-natives in the herbaceous layer (CNPS 2021b). This association occurs in lowlands with periodic flooding, disked fields, and uplands. Within the Project site there is one association in the perennial rye grass fields alliance, as described below.
Lolium perenne–Hordeum marinum–Ranunculus californicus Semi-Natural Association (41.321.05)

Within the Clifton Court Forebay Dam biological resources study area, perennial rye grass occurred co-dominantly with mouse barley (Hordeum marinum), another facultative grass, throughout uplands and seasonally inundated depressions. Within the Dyer Dam biological resources study area, perennial rye grass occurred co-dominantly with mouse barley within the wide drainage in the southern portion of the study area.

Lolium perenne–Hordeum marinum–Ranunculus californicus semi-natural association comprises 22.3 acres of the Clifton Court Forebay Dam biological resources study area and 1.1 acres of the Dyer Dam biological resources study area. This association is not considered sensitive.

4.1.4.4 Poison Hemlock or Fennel Patches Alliance (45.556.00)

Within the poison hemlock or fennel patches alliance, poison hemlock (Conium maculatum), fennel (Foeniculum vulgare), or another non-native invasive plant of the Apiaceae family is dominant or co-dominant with other non-native plants in the herbaceous layer (CNPS 2021b). Cover is open to continuous and less than 2 meters in height. This association occurs within all topography, including wetlands. Within the Project site there is one association in the poison hemlock or fennel patches alliance, which is described below.

Conium maculatum Semi-Natural Association (45.556.01)

Within the Clifton Court Forebay Dam biological resources study area, this association occurs within seasonally inundated lowlands of the study area. Within this association, poison hemlock ranges from 70% to 75% relative cover.

Conium maculatum semi-natural association comprises 12.7 acres of the Clifton Court Forebay Dam biological resources study area. This association is not considered sensitive.

4.1.4.5 Upland Mustards or Star-Thistle Fields Alliance (42.013.00)

Black mustard (Brassica nigra), field mustard (Brassica rapa), Italian plumless thistle (Carduus pycnocephalus), Maltese star-thistle (Centaurea melitensis), yellow star-thistle (Centaurea solstitialis), cardoon (Cynara cardunculus), Geraldton carnation weed (Euphorbia terracina), shortpod mustard (Hirschfeldia incana), Dyer’s woad (Isatis tinctoria), cultivated radish (Raphanus sativus), or similar ruderal forbs are dominant in the herbaceous layer of this alliance (CNPS 2021b). Cover is open to continuous and less than 2 meters in height. Within the Project site there are three semi-natural associations in the upland mustards or star-thistle field alliance, as described below.

Brassica nigra Semi-Natural Association (42.011.01)

Within the Clifton Court Forebay Dam biological resources study area, this association occurs in uplands adjacent to annual grassland, urban/developed, and disturbed areas. Within the Dyer Dam biological resources study area, this association occurs within the upland slopes on either side of the wide drainage in the southern portion of the study area. Within the Patterson Dam study area, this association occurs on the south-facing slope of the South Bay Aqueduct embankment, and within and adjacent to the main drainages on the study area.
Brassica nigra semi-natural association comprises 18.4 acres of the Clifton Court Forebay Dam biological resources study area, 3.6 acres of the Dyer Dam biological resources study area, and 5.8 acres of the Patterson Dam biological resources study area. This association is not considered sensitive.

**Carduus pycnocephalus–Silybum marianum Provisional Semi-Natural Association (42.013.01)**

With the Dyer Dam biological resources study area, this association occurs within the upland slopes on either side of the wide drainage in the southern portion of the study area.

**Carduus pycnocephalus–Silybum marianum** provisional semi-natural association comprises 2.5 acres of the Dyer Dam biological resources study area. This association is not considered sensitive.

**Raphanus sativus Semi-Natural Association (42.011.04)**

Within the Patterson Dam biological resources study area, this association occurs northwest of the reservoir and southwest of the South Bay Aqueduct.

**Raphanus sativus** semi-natural association comprises 2.3 acres of the Patterson Dam biological resources study area. This association is not considered sensitive.

**4.1.4.6 Wild Oats and Annual Brome Grasslands Alliance (42.027.00)**

Wild oat (Avena spp.), brome (Bromus spp.), and medusahead (Elymus caput-medusae) ("annual grasses") are dominant or co-dominant (greater than 50% relative cover) in the herbaceous layer of this alliance (CNPS 2021b). A variety of forb species also occur within this alliance, including burclover (Medicago polymorpha), dove weed (Croton setiger), Russian thistle (Salsola tragus), and many others. Wild oats and annual brome grasslands occur in all topographic settings in foothills, waste places, rangelands, and openings in woodlands. Large amounts of standing dead plant material can be found during summer in years of abundant rainfall and light to moderate grazing pressure. Although annual grassland habitats consist largely of non-native annuals, these effectively prevent the reestablishment of native perennials over large areas and are considered climax communities (Kie 1988). This association occurred within highly disturbed uplands of the Clifton Court Forebay Dam biological resources study area.

Within the Dyer Dam biological resources study area this association occurs within grazed pastureland in the western and northern portion of the study area. Finally, within the Patterson Dam biological study area, this association occurred within highly disturbed uplands of the northern and eastern portions of the study area.

The wild oats and annual brome grasslands comprises 45.6 acres of the Clifton Court Forebay Dam biological resources study area, 6.9 acres of the Dyer Dam biological resources study area, and 9.2 acres of the Patterson Dam biological resources study area. This association is not considered sensitive.

**4.1.5 Riparian**

**4.1.5.1 Arroyo Willow Thickets Alliance (61.201.00)**

Within the arroyo willow thickets alliance, arroyo willow (Salix lasiolepis) is dominant or co-dominant in the tall shrub or low tree canopy (CNPS 2021b). Canopy is open to continuous and less than 10 meters in height; herbaceous layer is variable. This alliance occurs on stream banks and benches, slope seeps, and stringers along drainages.

Within the Project site there is one association in the arroyo willow thickets alliance, as described below.
**Salix lasiolepis Association (61.201.01)**

Within the Dyer Dam biological resources study area, one fragmented stand of this association occurs within an eroded side channel of the relocated drainage channel in the eastern portion of the study area. This stand consisted of several arroyo willow saplings up to 7 feet in height, covered approximately 40% of the area, with a sparse understory of ruderal grasses and forbs.

*Salix lasiolepis* association comprises less than 0.05 acres of the Dyer Dam biological resources study area. This association is considered sensitive (CDFW 2020).

### 4.1.5.2 Button Willow Thickets Alliance (63.300.00)

Within the button willow thickets alliance, button willow (*Cephalanthus occidentalis*) is dominant in the shrub or small tree canopy with willows and red osier (*Cornus sericea*) (CNPS 2021b). Canopy is continuous, intermittent, or open, and less than 6 meters in height; herbaceous later is sparse or grassy. This alliance occurs within seasonally flooded basins, sloughs, and oxbow basins on floodplains with subsurface water at the end of the growing season. Soils are poorly aerated and finely textured. Within the Project site there is one association in the button willow thickets alliance, as described below.

**Cephalanthus occidentalis Association (63.300.01)**

Within the Clifton Court Forebay Dam biological resources study area, intermittent thickets occur along and adjacent to the riprap embankments of Italian Slough. Within this study area, buttonwillow comprises 40% to 50% of the relative cover of the *Cephalanthus occidentalis* association.

*Cephalanthus occidentalis* association comprises 1.4 acres of the study area. This association is considered sensitive (CDFW 2020).

### 4.1.5.3 Goodding’s Willow–Red Willow Riparian Woodland and Forest Alliance (61.216.00)

Within the Goodding’s willow–red willow riparian woodland and forest alliance, Goodding’s willow (*Salix gooddingii*) and/or red willow (*S. laevigata*) are dominant or co-dominant in the tree or shrub canopy (CNPS 2021b). Tree canopy is open to continuous and less than 30 meters in height; shrub layer is sparse to continuous; herbaceous layer is variable. This association generally occurs on terraces along large rivers, canyons, along floodplains of streams, seeps, springs ditches, floodplains, lake edges, or low-gradient depositions. Within the Project site there is one association in the Goodding’s willow–red willow riparian woodland and forest alliance, as described below.

**Salix gooddingii Association (61.211.01)**

Within the Clifton Court Forebay Dam biological resources study area, this association occurs in a dense stand between the West Canal and Clifton Court Forebay in the northeastern corner of the study area, adjacent to two non-jurisdictional drainages. The relative percent cover of Goodding’s black willow ranges from 10% to 80%.

*Salix gooddingii* association comprises 7.6 acres of the Clifton Court Forebay Dam biological resources study area. This association is considered sensitive (CDFW 2020).
4.1.5.4 Himalayan Blackberry–Rattlebox–Edible Fig Riparian Scrub Alliance (63.906.00)

Within the Himalayan blackberry–rattlebox–edible fig riparian scrub alliance, Himalayan blackberry (*Rubus ursinus*), rattlebox (*Sesbania punicea*), or edible fig (*Ficus carica*) is dominant or co-dominant (CNPS 2021b). Shrub canopy is intermittent to continuous, and herbaceous layer is open to intermittent. Shrubs and small trees are less than 10 meters in height. This alliance occurs in pastures, forest plantations, roadsides, streambanks, river flats, floodplains, fence lines, mesic disturbed areas, and right-of-way corridors. Within the Project site there is one association in the Himalayan blackberry–rattlebox–edible fig riparian scrub alliance, as described below.

**Rubus armeniacus Semi-Natural Association (63.906.01)**

Within the Clifton Court Forebay Dam biological resources study area, this association occurs throughout the riprap embankments of Old River, the West Canal, and Italian Slough, and in several thickets within the northern and eastern portions of the study area.

*Rubus armeniacus* semi-natural association comprises 4.1 acres of the Clifton Court Forebay Dam biological resources study area. This association is not considered sensitive.

4.1.5.5 Hinds’s Walnut and Related Stands Alliance (61.810.00)

Within the Hinds’s walnut and related stands alliance, Hind’s walnut (*Juglans hindsii*) or hybrids are dominant in the tree canopy (CNPS 2021b). Tree canopy is intermittent to continuous and less than 25 meters in height; shrub layer is open to intermittent; and herbaceous layer is sparse. This association occurs within intermittently flooded or saturated riparian corridors, floodplains, stream banks, and terraces. Soils are alluvial. Within the Project site there is one association in the Hinds’s walnut and related stands alliance, as described below.

**Juglans hindsii Semi-Natural Association (61.810.02)**

Within the Clifton Court Forebay Dam biological resources study area, this association made up one remnant stand between the West Canal and Clifton Court Forebay, within a matrix of facultative and facultative wetland species. This stand contains 25% relative cover of Northern California walnut, 50% relative cover of Himalayan blackberry, and 25% tree tobacco (*Nicotiana glauca*).

*Juglans hindsii* semi-natural association comprises 1.2 acres of the Clifton Court Forebay Dam biological resources study area. This association is considered sensitive (CDFW 2020).

4.1.5.6 Red Alder Forest Alliance (61.410.00)

Within the red alder forest alliance, red alder (*Alnus rubra*) is dominant or co-dominant in the tree canopy (CNPS 2021b). Tree canopy is continuous and less than 40 meters in height; shrub layer is sparse to intermittent; herbaceous layer is open to continuous, especially with ferns and forbs. This alliance occurs in stream and river backwaters, banks, bottoms, flood plains, mouths, terraces, and slopes of all aspects. Within the Project site there is one association in the red alder alliance, as described below.
**Biological Resources Existing Conditions Report for the Delta Dams Rodent Burrow Remediation Project, Alameda and Contra Costa Counties, California**

**Alnus rubra/Salix lasiolepis/Rubus spp. Association (61.410.05)**

Within the Clifton Court Forebay Dam biological resources study area, this association occurs in a few, fragmented stands along the riprap embankment of the West Canal at the check dam into Clifton Court Forebay in the southeast corner of the study area. These stands contain approximately 20% relative cover of red alder, 10% cover of arroyo willow, 20% relative cover of hardstem bulrush, and 20% prostrate knotweed (*Polygonum aviculare*). Other associated species include Himalayan blackberry and poison hemlock.

**Baccharis pilularis/Annual Grass–Herb Association (32.060.20)**

Within the Clifton Court Forebay Dam biological resources study area, this association occurs in an upland area within the northwestern corner of the study area. The relative percent cover of coyote brush ranges from 50% to 70%.

**4.2 Jurisdictional Aquatic Resources**

Jurisdictional aquatic resources include waters (i.e., wetlands and non-wetland waters) of the United States under the jurisdiction of USACE, waters of the state under the jurisdiction of the RWQCB, and streams and lakes under the jurisdiction of CDFW. The agencies tend to have overlapping jurisdiction over many resources; however, waters of the state extend beyond USACE waters of the United States and CDFW regulates riparian vegetation beyond the limits of waters of the United States/state.

Aquatic resources delineation reports were prepared for the Project site, including the biological resources study areas for Clifton Court Forebay Dam, Dyer Dam, and Patterson Dam and submitted to the USACE, CDFW, and RWQCB for verification.

Sections 4.2.1 through 4.2.3 below summarize the jurisdictional areas by resources agency.
### 4.2.1 USACE Potential Waters of the United States

Potential waters of the United States within the Project site total 85,613.6 acres (23,926 linear feet [LF]) and are composed of 20,424.2 acres (4,884 LF) of wetlands and 64,658.94 acres (19,042 LF) of non-wetlands. Table 8 summarizes the potential USACE waters of the United States by each biological resources study area (Figure 6A, USACE - Delineated Aquatic Resources–Clifton Court Forebay Dam; Figure 6B, USACE-Jurisdictional Areas–Dyer Dam; Figure 6C, USACE-Jurisdictional Areas–Patterson Dam).

**Table 8. Acres (and Linear Feet) of USACE Potential Waters of the United States by Biological Resources Study Area**

<table>
<thead>
<tr>
<th>Feature Type</th>
<th>Clifton Court Forebay Dam</th>
<th>Dyer Dam</th>
<th>Patterson Dam</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wetland</td>
<td>18.20 (559 LF)</td>
<td>1.2 (2,206 LF)</td>
<td>1.0 (2,120 LF)</td>
<td>20.42 (4,884 LF)</td>
</tr>
<tr>
<td>Non-wetland waters</td>
<td>64.158.5 (16,649 LF)</td>
<td>0.4 (2,032 LF)</td>
<td>0.0 (362 LF)</td>
<td>58.9 (19,042 LF)</td>
</tr>
<tr>
<td>Total</td>
<td>82.458.7 (17,207 LF)</td>
<td>1.6 (4,237 LF)</td>
<td>1.0 (2,482 LF)</td>
<td>61.4 (23,926 LF)</td>
</tr>
</tbody>
</table>

**Notes:** USACE = U.S. Army Corps of Engineers.
- 0.0 are values that are less than 0.05 acres.
- Totals may not sum due to rounding.

#### Clifton Court Forebay Dam

Within the Clifton Court Forebay Dam biological resources study area, there are 82.458.7 acres (17,207 LF) of potential waters of the United States under the jurisdiction of the USACE, including 18.20 (559 LF) acres of wetlands and 64.158.5 acres (16,649 LF) of non-wetland waters.

#### Dyer Dam

Within the Dyer Dam biological resources study area, there are 1.6 acres (4,237 LF) of waters of the United States under the jurisdiction of the USACE, including 1.2 acres (2,206 LF) of wetlands and 0.4 acres (2,032 LF) of non-wetland waters.

#### Patterson Dam

Within the Patterson Dam biological resources study area, there are 1.0 acres (2,482 LF) of waters of the United States under the jurisdiction of the USACE, including 1.0 acres (2,120 LF) of wetlands and less than 0.05 acres (362 LF) of non-wetland waters.

### 4.2.2 RWQCB Potential Waters of the State

Potential waters of the state within the Project site total 87,663.9 acres (24,524 LF) and are composed of 20,425 acres (4,884 LF) of wetlands and 67,261.5 acres (19,640 LF) of non-wetlands. Table 9 summarizes the potential RWQCB waters of the state by each biological resources study area (Figure 7A, RWQCB–Delineated Aquatic Resources–Clifton Court Forebay Dam; Figure 7B, RWQCB-Jurisdictional Areas–Dyer Dam; Figure 7C, RWQCB-Jurisdictional Areas–Patterson Dam.)
Table 9. Acres (and Linear Feet) of RWQCB Potential Waters of the State by Biological Resources Study Area

<table>
<thead>
<tr>
<th>Feature Type</th>
<th>Clifton Court Forebay Dam</th>
<th>Dyer Dam</th>
<th>Patterson Dam</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wetland</td>
<td>18.20.02 (559 LF)</td>
<td>1.2 (2,206 LF)</td>
<td>1.0 (2,120 LF)</td>
<td>20.42 (4,884 LF)</td>
</tr>
<tr>
<td>Non-wetland waters</td>
<td>58.9 (17,247 LF)</td>
<td>2.4 (2,032 LF)</td>
<td>0.2 (362 LF)</td>
<td>61.5 (19,640 LF)</td>
</tr>
<tr>
<td>Total(^a)</td>
<td>(59.1 (17,805 LF))</td>
<td>3.6 (4,237 LF)</td>
<td>1.2 (4,282 LF)</td>
<td>(63.9 (24,524 LF))</td>
</tr>
</tbody>
</table>

Note: RWQCB = regional water quality control board.
\(^a\) Totals may not sum due to rounding.

Clifton Court Forebay Dam

Within the Clifton Court Forebay Dam biological resources study area, there are 82.8 acres (17,805 LF) of potential waters of the state under the jurisdiction of the RWQCB, including 18.2 acres (559 LF) of wetlands and 64.6 acres (17,247 LF) of non-wetland waters.

Dyer Dam

Within the Dyer Dam biological resources study area, there are 3.6 acres (4,237 LF) of waters of the state under the jurisdiction of the RWQCB, including 1.2 acres (2,206 LF) of wetlands and 2.4 acres (2,032 LF) of non-wetland waters.

Patterson Dam

Within the Patterson Dam biological resources study area, there are 1.2 acres (2,482 LF) of waters of the state under the jurisdiction of the RWQCB, including 1.0 acres (2,120 LF) of wetlands and 0.2 acre (362 LF) of non-wetland waters.

4.2.3 CDFW-Jurisdictional Waters

CDFW-jurisdictional waters within the Project site total 65.7 acres (30,398 LF) and are composed of 4.1 acres (10,248 LF) of riparian habitat and 61.6 acres (20,150 LF) of streambed. Table 10 summarizes the CDFW waters of the state by each biological resources study area (Figure 8A, CDFW-Jurisdictional Areas–Clifton Court Forebay Dam; Figure 8B, CDFW-Jurisdictional Areas–Dyer Dam; Figure 8C, CDFW-Jurisdictional Areas–Patterson Dam).

Table 10. Acres of CDFW-Jurisdictional Waters by Biological Resources Study Area

<table>
<thead>
<tr>
<th>Feature Type</th>
<th>Clifton Court Forebay Dam</th>
<th>Dyer Dam</th>
<th>Patterson Dam</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Riparian</td>
<td>1.9 (5,923 LF)</td>
<td>1.2 (2,206 LF)</td>
<td>1.0 (2,120 LF)</td>
<td>4.1 (10,248 LF)</td>
</tr>
<tr>
<td>Streambed</td>
<td>58.9 (17,247 LF)</td>
<td>2.5 (2,541 LF)</td>
<td>0.2 (362 LF)</td>
<td>61.6 (20,150 LF)</td>
</tr>
<tr>
<td>Total</td>
<td>60.8 (23,170 LF)</td>
<td>3.7 (4,747 LF)</td>
<td>1.2 (2,482 LF)</td>
<td>65.7 (30,398 LF)</td>
</tr>
</tbody>
</table>

Note: CDFW = California Department of Fish and Wildlife.
Clifton Court Forebay Dam

Within the Clifton Court Forebay Dam biological resources study area, there are 60.8 acres (23,170 LF) of CDFW-jurisdictional waters, including 1.9 acres (5,923 LF) of riparian habitat and 58.9 acres (17,247 LF) of streambed.

Dyer Dam

Within the Dyer Dam biological resources study area, there are 3.7 acres (4,747 LF) of CDFW-jurisdictional waters, including 1.2 acres (2,206 LF) of riparian habitat and 2.5 acres (2,541 LF) of streambed.

Patterson Dam

Within the Patterson Dam biological resources study area, there are 1.2 acres (2,482 LF) of CDFW jurisdictional waters, including 1.0 acres (2,120 LF) of riparian habitat and 0.2 acres (362 LF) of streambed.

4.3 Botany – Plant Diversity

A total of 220 species of plants were observed within the Project site during the 2021 surveys (Appendix A). Species composition includes 115 (52%) native species and 107 (48%) non-native species occurring on site.

Within the Project site, six special-status plant species were observed—long-styled sand-spurrey (*Spergularia macrotheca* var. *longistyla*; CRPR 1B.2), woolly rose-mallow (*Hibiscus lasiocarpos* var. *occidentalis*; CRPR 1B.2), brittlescale (*Atriplex depressa*; CRPR 1B.2), heartscale (*Atriplex cordulata* var. *cordulata*; CRPR 1B.2); Mason’s lilaeopsis (*Lilaeopsis masonii*; CRPR 1B.1), and Suisun Marsh aster (*Symphyotrichum lentum*; CRPR 1B.2). These species are discussed in Section 4.5.2, Special-Status Plant Species.

4.4 Zoology – Wildlife Diversity

The Project site supports habitat for common upland and some wetland wildlife species. Vegetation communities in the study areas at Dyer and Patterson Dams are primarily grass- and herb-dominated and therefore provide habitat for grassland wildlife species, while the study area at Clifton Court Forebay Dam has a wider variety of vegetation communities, including riparian scrub and woodland, scrub, and marsh, in addition to grassland and other herbaceous communities.

A total of 54 species were observed within the Project site during the 2020 and 2021 surveys. Of the total species observed, 53 (98%) of these are native wildlife species. Species observed within the Project site were recorded during focused surveys, habitat assessments, vegetation mapping, aquatic resources delineation, and sensitive plant surveys. A cumulative list of wildlife species observed during these surveys is provided in Appendix B. Special-status wildlife species that may occur but were not observed are discussed under Section 4.5.3, Special-Status Wildlife Species. Latin and common names of animals follow Crother (2017) for reptiles and amphibians, American Ornithological Society (AOS 2020) for birds, Wilson and Reeder (2005) for mammals, North American Butterfly Association (NABA 2016) for butterflies, and Moyle (2002) for fish.
4.4.1 Invertebrates

No invertebrates were identified within the Project study areas by direct observation; however, a wide variety of ants, bees, moths, butterflies, beetles, spiders, and other invertebrates undoubtedly occur within the study areas.

4.4.2 Fishes

Clifton Court Forebay is operated as a regulating reservoir within the tidally influenced region of the Delta to improve operations of the California State Water Project Harvey O. Banks Pumping Plant and water diversions to the California Aqueduct. Clifton Court Forebay is generally characterized by relatively shallow and uniform aquatic habitat with limited structural diversity.

4.4.3 Reptiles and Amphibians

Three reptile and one amphibian species were observed within the Project site—western pond turtle (Actinemys marmorata), western fence lizard (Sceloporus occidentalis), California kingsnake (Lampropeltis Californiae), and California red-legged frog (Rana draytonii). Western pond turtle and California red-legged frog are special-status species and are discussed in Section 4.5.3. Other common reptile or amphibian species that likely occur within the study areas include side-blotched lizard (Uta stansburiana), western skink (Plestiodon skiltonianus), western yellow-billed racer (Coluber constrictor mormo), gophersnake (Pituophis catenifer), western rattlesnake (Crotalus oreganus), western toad (Anaxyrus boreas halophilus), and Sierran treefrog (Pseudacris sierra).

4.4.4 Birds

A total of 46 species of birds were observed within the Project site or immediately off site during the surveys conducted in 2020 and 2021 (Appendix B). Common species observed include red-tailed hawk, turkey vulture (Cathartes aura), red-winged blackbird (Agelaius phoeniceus), common raven (Corvus corax), American crow (Corvus brachyrhynchos), house finch (Haemorhous mexicanus), northern mockingbird (Mimus polyglottos), mourning dove (Zenaida macroura), mallard (Anas platyrhynchos), and western kingbird (Tyrannus verticalis). A total of 9 special-status bird species were observed, including golden eagle, Swainson’s hawk, northern harrier (Circus hudsonius), bald eagle, burrowing owl, white-tailed kite (Elanus leucurus), loggerhead shrike (Lanius ludovicianus), song sparrow (“Modesto population”) (Melospiza melodia), and American white pelican (Pelecanus erythrorhynchos). Other non-special-status species of local interest (i.e., not rare or declining, but with local distribution and/or associated with a specific habitat type) include western meadowlark (Sturnella neglecta) and savannah sparrow (Passerculus sandwichensis).

4.4.5 Mammals

Four mammals were detected within the Project site—California ground squirrel, coyote, North American river otter (Lutra canadensis), and American badger (sign). Common species within the Project site include black-tailed jackrabbit (Lepus californicus), Botta’s pocket gopher (Thomomys bottae), California vole (Microtus californicus), and mule deer (Odocoileus hemionus). Common bat species that may occur include big brown bat (Eptesicus fuscus), Brazilian free-tailed bat (Tadarida brasiliensis), Californian myotis (Myotis californicus), canyon bat (Parastrellus hesperus), hoary bat (Lasiurus cinereus), and Yuma myotis (Myotis yumanensis).
4.5 Sensitive Biological Resources

The following resources are discussed in this section: habitat areas that are unique, are of relatively limited distribution, or are of particular value to wildlife; plant and animal species present in the Project vicinity that are given special recognition by federal, state, or local conservation agencies and organizations owing to declining, limited, or threatened populations; and wildlife corridors and habitat linkages. Sources used for determination of sensitive biological resources were included in Section 3.1, Literature Review.

4.5.1 Sensitive Natural Communities

As previously discussed, sensitive vegetation alliances and associations are indicated in the California Natural Communities List (CDFW 2020). These vegetation communities are considered sensitive natural communities for CEQA purposes. Sensitive vegetation communities found on the Project site are presented in Table 11, organized by biological resources study area. Figures 5A, 5B, and 5C show the sensitive natural communities present on the Project site.

Table 11. Sensitive Natural Communities by Biological Resources Study Area

<table>
<thead>
<tr>
<th>General Category</th>
<th>Alliance Name</th>
<th>Vegetation Community</th>
<th>Clifton Court Forebay Dam</th>
<th>Dyer Dam</th>
<th>Patterson Dam</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bog and Marsh</td>
<td>Alkali heath marsh</td>
<td><em>Frankenia salina</em> Association</td>
<td>1.9</td>
<td>—</td>
<td>—</td>
<td>1.9</td>
</tr>
<tr>
<td></td>
<td>American bulrush marsh</td>
<td><em>Schoenoplectus americanus</em> Association</td>
<td>1.8</td>
<td>—</td>
<td>—</td>
<td>1.8</td>
</tr>
<tr>
<td></td>
<td>Hardstem and California bulrush marshes</td>
<td><em>Schoenoplectus acutus</em> Association</td>
<td>0.2</td>
<td>—</td>
<td>0.0a</td>
<td>0.2</td>
</tr>
<tr>
<td></td>
<td>Iodine bush scrub</td>
<td><em>Allenrollea occidentalis</em>/<em>Distichlis spicata Provisional Association</em></td>
<td>5.4</td>
<td>—</td>
<td>—</td>
<td>5.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Allenrollea occidentalis</em> Association</td>
<td>7.5</td>
<td>—</td>
<td>—</td>
<td>7.5</td>
</tr>
<tr>
<td></td>
<td><strong>Bog and Marsh Subtotal</strong></td>
<td></td>
<td><strong>16.9</strong></td>
<td>0.0a</td>
<td><strong>16.9</strong></td>
<td></td>
</tr>
<tr>
<td>Grass and Herb Dominated</td>
<td>California brome–blue wildrye prairie</td>
<td><em>Elymus glaucus</em> Association</td>
<td>2.6</td>
<td>—</td>
<td>—</td>
<td>2.6</td>
</tr>
<tr>
<td></td>
<td>Needle grass–Melic grass grassland</td>
<td><em>Needle grass–Melic grass grassland</em> (Nassella spp.–Melica spp.) Association</td>
<td>—</td>
<td>17.2</td>
<td>0.7</td>
<td>17.9</td>
</tr>
<tr>
<td></td>
<td><strong>Grass and Herb Dominated Total</strong></td>
<td></td>
<td><strong>2.6</strong></td>
<td><strong>17.2</strong></td>
<td><strong>0.7</strong></td>
<td><strong>20.5</strong></td>
</tr>
<tr>
<td>Riparian</td>
<td>Arroyo willow thickets</td>
<td><em>Salix lasiolepis</em> Association</td>
<td>—</td>
<td>0.0a</td>
<td>—</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td>Button willow thickets</td>
<td><em>Cephalanthus occidentalis</em> Association</td>
<td>1.4</td>
<td>—</td>
<td>—</td>
<td>1.4</td>
</tr>
<tr>
<td></td>
<td>Gooding’s willow–red willow riparian woodland and forest</td>
<td><em>Salix gooddingii</em> Association</td>
<td>7.6</td>
<td>—</td>
<td>—</td>
<td>7.6</td>
</tr>
<tr>
<td></td>
<td>Hinds’s walnut and related stands</td>
<td><em>Juglans hindsii</em> Semi-natural Association</td>
<td>1.2</td>
<td>—</td>
<td>—</td>
<td>1.2</td>
</tr>
</tbody>
</table>
Table 11. Sensitive Natural Communities by Biological Resources Study Area

<table>
<thead>
<tr>
<th>General Category</th>
<th>Alliance Name</th>
<th>Vegetation Community</th>
<th>Clifton Court Forebay Dam</th>
<th>Dyer Dam</th>
<th>Patterson Dam</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red alder forest</td>
<td><em>Alnus rubra/Salix lasiolepis</em>/Rubus spp. Association</td>
<td>0.3</td>
<td>—</td>
<td>—</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>Riparian Subtotal</td>
<td></td>
<td>10.6</td>
<td>0.0&lt;sup&gt;a&lt;/sup&gt;</td>
<td>—</td>
<td>10.5</td>
<td>10.5</td>
</tr>
<tr>
<td>Grand Total</td>
<td></td>
<td>30.0</td>
<td>17.2</td>
<td>0.7</td>
<td>47.9</td>
<td></td>
</tr>
</tbody>
</table>

Note:

<sup>a</sup> 0.0 are values that are less than 0.05 acres.

Clifton Court Forebay Dam

Within the Clifton Court Forebay Dam biological resources study area, there are 30.0 acres of sensitive natural communities on site.

Dyer Dam

Within the Dyer Dam biological resources study area, there are 17.2 acres of sensitive natural communities on site.

Patterson Dam

Within the Patterson Dam biological resources study area, there are 0.7 acres of sensitive natural communities on site.

4.5.2 Special-Status Plant Species

Special-status plant surveys were conducted to determine the presence or absence of plant species considered endangered, rare, or threatened under CEQA Guidelines, Section 15380 (14 CCR 15000 et seq.). Endangered, rare, or threatened plant species, as defined in CEQA Guidelines, Section 15380(b) (14 CCR 15000 et seq.), are referred to as “special-status plant species” in this report and include endangered or threatened plant species recognized in the context of the CESA and the FESA and plant species with a CRPR of 1 or 2 (CDFW 2021c; CNPS 2020, 2021a). Special-status plant species directly observed during focused surveys or known to occur in the surrounding region are described in Appendix C. Appendix C includes descriptions of special-status plants’ known occurrences or potential to occur within each study area based on their general biology (e.g., primary habitat associations, life form, blooming period, and known elevation range). Focused surveys within the Project site were conducted in 2021 according to the methods presented in Section 3.2.5, Special-Status Plant Surveys.

4.5.2.1 Clifton Court Forebay Dam

Within the Clifton Court Forebay Dam biological resources study area, six special-status plant species were observed—long-styled sand-spurrey (CRPR 1B.2), woolly rose-mallow (CRPR 1B.2), brittlescale (CRPR 1B.2), heartscale (CRPR 1B.2); Mason's lilaeopsis (CRPR 1B.1), and Suisun Marsh aster (CRPR 1B.2). These species are discussed below. Crownscale (*Atriplex coronata* var. *coronata*) was observed within the Clifton Court Forebay Dam.
biological resources study area, but this species has a CRPR of 4.2, which is not considered special-status because this occurrence is not significant locally\(^1\) and impacts to this occurrence would not be considered significant.

Special-status plant species that are not expected to occur or have a low potential to occur due to lack of suitable habitat or because the site is outside of the known elevation range of the species are listed in Appendix C. These species are not discussed further because no significant direct, indirect, or cumulative impacts are expected to result from the proposed Project. Due, in part, to the extensive surveys conducted on site, there are no special-status plants with a moderate or high potential to occur in the Clifton Court Forebay Dam biological resources study area.

**Long-Styled Sand-Spurrey (CRPR 1B.2)**

Long-styled sand-spurrey has a CRPR 1B.2. Long-styled sand-spurrey is a perennial herb found in meadows, seeps, marshes, and swamps on alkaline soils. This species’ blooming period is between February and May. Long-styled sand-spurrey celery occurs between 0 feet and 835 feet in elevation (CNPS 2020).

A total of approximately 30,263 long-styled sand-spurrey plants were observed within the southern portion of the Clifton Court Forebay Dam biological resources study area by Dudek in 2021. Figure 9, Special-Status Plants–Clifton Court Forebay Dam, shows the location of the long-styled sand-spurrey within the study area.

**Woolly Rose-Mallow (CRPR 1B.2)**

Woolly rose-mallow has a CRPR 1B.2. Woolly rose-mallow is a perennial, rhizomatous herb and is found marshes and seeps and often in riprap on the side of levees. This species’ blooming period is between June and September. Woolly rose-mallow occurs between 0 feet and 395 feet in elevation (CNPS 2020).

A total of 11 individuals of woolly rose mallow were observed in the northern and southeastern portion of the Clifton Court Forebay Dam biological resources study area. Figure 9 shows the location of the woolly rose-mallow within the study area.

**Brittlescale (CRPR 1B.2)**

Brittlescale has a CRPR 1B.2. Brittlescale is an annual herb and is found in chenopod scrub, meadows and seeps, plays, valley and foothill grasslands, and vernal pools on alkaline or clay soils. This species’ blooming period is between April and October. Brittlescale occurs between 5 and 1,050 feet in elevation (CNPS 2021a).

A total of 10 individuals of brittlescale were observed on the south side of the Clifton Court Forebay biological resources study area. Figure 9 shows the location of the brittlescale within the study area.

**Heartscale (CRPR 1B.2)**

Heartscale has a CRPR 1B.2. Heartscale is an annual herb and is found in chenopod scrub, meadows and seeps, and valley and foothill grasslands with sandy soils. This species’ blooming period is between April and October. Heartscale occurs between 0 and 1,835 feet in elevation (CNPS 2021).

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\(^1\) Plants with a CRPR of 4 that may be considered significant locally are: (1) the type locality; (2) populations at the periphery of a species’ range; (3) areas where the taxon is especially uncommon; (4) areas where the taxon has sustained heavy losses; and (5) populations exhibiting unusual morphology or occurring on unusual substrates.
A total of 14 individuals were observed on the north and west side of the Clifton Court Forebay biological resources study area. Figure 9 shows the location of the heartscale within the study area.

**Mason's lilaeopsis (CRPR 1B.1)**

Mason’s lilaeopsis has a CRPR 1B.2. Mason’s lilaeopsis is a perennial, rhizomatous herb and is found in marshes in brackish and freshwater and riparian scrub. This species’ blooming period is between April and November. Mason’s lilaeopsis occurs between 0 and 35 feet in elevation (CNPS 2021).

A total of 512 individuals were observed on the west side of the Clifton Court Forebay biological resources study. Figure 9 shows the location of the Mason’s lilaeopsis within the study area.

**Suisun Marsh Aster (CRPR 1B.2)**

Suisun Marsh aster has a CRPR 1B.2. Suisun Marsh aster is a perennial, rhizomatous herb and is found in marshes and swamps in freshwater or brackish water. This species’ blooming period is between April and May. Suisun Marsh aster occurs between 0 and 10 feet in elevation (CNPS 2021).

One individual was observed within the southeast portion of the Clifton Court Forebay biological resources study. Figure 9 shows the location of the Suisun Marsh Aster within the study area.

4.5.2.2 Dyer Dam

No special-status plants were observed in the Dyer Dam biological resources study area. Special-status plant species that are not expected to occur or have a low potential to occur due to lack of suitable habitat or because the site is outside of the known elevation range of the species are listed in Appendix C. These species are not discussed further because no significant direct, indirect, or cumulative impacts are expected to result from the proposed Project. Due, in part, to the extensive surveys conducted on site, there are no special-status plants with a moderate or high potential to occur in the Dyer Dam biological resources study area.

4.5.2.3 Patterson Dam

No special-status plants were observed in the Patterson Dam biological resources study area. Special-status plant species that are not expected to occur or have a low potential to occur due to lack of suitable habitat or because the site is outside of the known elevation range of the species are listed in Appendix C. These species are not discussed further because no significant direct, indirect, or cumulative impacts are expected to result from the proposed Project. Due, in part, to the extensive surveys conducted on site, there are no special-status plants with a moderate or high potential to occur in the Patterson Dam biological resources study area.

4.5.3 Special-Status Wildlife Species

Special-status wildlife species include species that meet any of the following criteria (some species may meet several criteria):

- Listed, proposed for listing, or candidates (FC) for listing as threatened (FT) or endangered (FE) under the FESA
- Listed or candidates for listing as threatened (ST) or endangered (SE) under the CESA
Appendix D describes the special-status wildlife species that have been observed; have low, moderate, or high potential to occur; or are not expected to occur. The potential to occur is based on documented occurrences in the region, life history and general habitat requirements, and overall suitability of the habitat within the Project area to support such species.

Focused surveys for various wildlife species were conducted according to the methods presented in Section 3.2, Field Surveys. A total of five special-status species were observed during surveys conducted by Dudek in 2020 and 2021, and 2022. Special-status wildlife species observed or detected during surveys or with high potential to occur are discussed in this section. Species with low or moderate potential to occur, but for which focused assessments were conducted by Dudek in 2021 are also discussed below. The remaining species with low or moderate potential to occur are listed in Appendix D.

4.5.3.1 Invertebrates

**Vernal Pool Fairy Shrimp (Branchinecta lynchi), FT/None**

Vernal pool fairy shrimp (*Branchinecta lynchi*) was federally listed as threatened on September 19, 1994 (59 FR 48136–48153) and is endemic to California and the Agate Desert of southern Oregon. It only occurs in vernal pools or vernal pool-like habitats such as alkali pools, ephemeral drainages, stock ponds, roadside ditches, vernal swales, and rock outcrop pools (Helm 1998); it has never been found in riverine, marine, or other permanent bodies of water. Suitable pool types range from small, clear sandstone depressions to large, turbid, alkaline valley floor pools. Although they have been collected from large pools, vernal pool fairy shrimp typically occur in smaller pools less than 0.05 acres in size (Helm 1998; USFWS 2005). Vernal pool fairy shrimp have been observed in pools from early December to early May (Eriksen and Belk 1999). To withstand the harsh environmental conditions after pools dry up, vernal pool fairy shrimp eggs, or cysts, develop hard shells and remain dormant in the soil during the dry season.

**Occurrence within Study Area**

**Clifton Court Forebay Dam**

The CNDDB contains nine vernal pool fairy shrimp occurrences within 5 miles of the Clifton Court Forebay Dam study area, two of which fall within or are near the study area. Occurrence number 631 is associated with a vernal alkali plain with occasional shallow depressions at the southern end of the study area, approximately 0.3 miles north-northeast of the Byron Highway/Herdlyn Road junction. Hundreds of adult vernal pool fairy shrimp were observed in two pools at this location on February 24, 2009, and by DWR-contracted biologists on January 11, 2022. This area is outside the Project site but these pools are approximately 300 and 370 feet south of the footprint of a proposed temporary toe access road that runs along the northern edge of a 5.36-acre wetland with occasional shallow depressions that may support the species were created by minor grading and excavation associated with construction of the forebay and supporting roads and infrastructure; they are not natural claypan vernal pools. Occurrence number
630 is associated with a pool complex north of the Skinner Fish Facility. Thousands of adult vernal pool fairy shrimp were observed in multiple pools in this area on February 23, 2009.

Vernal pool fairy shrimp have high potential are known to occur in the southwestern portion of the study area but are not expected to occur in the Project site. Wetlands and earthen ditches within grassland and scrub (e.g., iodine bush scrub) communities with hydrologic connectivity to known CNDDB occurrences are the two occupied pools would be assumed suitable for this species but there are no such features in the Project site. The two pools are 120 and 190 feet south of the 5.36-acre wetland that overlaps the southern edge of the Project site and there are no swales connecting the wetland to the pools. Notes associated with CNDDB occurrence 631 also mention the presence of “thousands of” versatile fairy shrimp (Branchinecta lindahlii) in “most pools” and mosquitofish in “some pools” in the area, and these observations were corroborated during the January 2022 sampling event, which did not detect vernal pool fairy shrimp outside the two pools. This is consistent with vernal pool fairy shrimp most frequently occurring in pools less than 0.05 acre and rarely co-occurring with other fairy shrimp species (USFWS 2005). Much of the area, including the northern edge of the wetland within the Project site, is also dominated by non-native grass (i.e., Mediterranean barley) that further reduces habitat quality for vernal pool fairy shrimp.

**Dyer Dam**

This species does not have potential to occur within the Dyer Dam study area.

**Patterson Dam**

This species does not have potential to occur within the Patterson Dam study area.

4.5.3.2 Fish

**North American Green Sturgeon, Southern DPS (Acipenser medirostris), FT/SSC**

On April 7, 2006, NMFS listed the Southern Distinct Population Segment (DPS) of the North American green sturgeon as threatened under the FESA. The Southern DPS includes individual reproductive populations south of the Eel River. Green sturgeon are found in the lower reaches of large rivers, including the Sacramento–San Joaquin River basin, and in the Eel, Mad, Klamath, and Smith Rivers. Green sturgeon adults and juveniles are found throughout the upper Sacramento River; they spawn predominantly in the upper Sacramento River and are found primarily in the mainstem Sacramento River.

The green sturgeon is a primitive, bottom-dwelling fish found from Ensenada, Mexico, to the Bering Sea and Japan. It is characterized by its large size (up to 7 feet long and 350 pounds), a long, round body, and “scutes,” or plates along dorsal and lateral sides. It is known to migrate up to 600 miles between freshwater and saltwater environments and is commercially caught in the Columbia River and coastal Washington. Very little is known about the life history of the green sturgeon relative to other fish species. It is an anadromous fish that spends most of its life in salt water and returns to spawn in freshwater. It is slow growing and late maturing and may spawn as little as every 4 to 11 years. Individuals congregate in the bays of these systems in summer, while some may travel upstream to spawn in spring and summer.

Juvenile green sturgeon, between 6 months and 2 years of age, may rear in the Delta. Green sturgeon use these areas to forage and rear until they reach osmoregulatory capacity to tolerate higher salinity concentrations.
Occurrence within Study Area

Clifton Court Forebay Dam

Green sturgeon may be present and entrained into Clifton Court Forebay during any month of the year. Adult and juvenile green sturgeon are not likely to use shallow habitats near the embankment repair areas because they prefer to occupy deep, low-light habitats. This species does not spawn in the Delta.

Dyer Dam

This species does not have potential to occur within the Dyer Dam study area.

Patterson Dam

This species does not have potential to occur within the Patterson Dam study area.

Critical Habitat

While the Project site is not within designated critical habitat for the Southern DPS of the North American green sturgeon, critical habitat has been designated in Old River adjacent to Clifton Court Forebay. The critical habitat designation includes the stream channel to the lateral extent of the ordinary high-water line (50 CFR 226.219).

Steelhead, Central Valley DPS (Oncorhynchus mykiss irideus pop. 11), FT

Historically, steelhead spawned and reared in most of the accessible upstream reaches of Central Valley rivers, including the Sacramento and American Rivers and many of their tributaries. Compared with Chinook salmon, steelhead generally migrated farther into tributaries and headwater streams where cool, well-oxygenated water is available year-round. In the Central Valley, steelhead are now restricted to the upper Sacramento River downstream of Keswick Reservoir; the lower reaches of large tributaries downstream of impassable dams; small, perennial tributaries of the Sacramento River mainstem; and the San Francisco Bay/Sacramento–San Joaquin Delta (Bay–Delta) system.

Occurrence within Study Area

Clifton Court Forebay Dam

Migrating Central Valley steelhead DPS can occur within Clifton Court Forebay and adjacent waters, primarily between December and May.

Central Valley steelhead DPS do not spawn in the Delta.

Dyer Dam

This species does not have potential to occur within the Dyer Dam study area.

Patterson Dam

This species does not have potential to occur within the Patterson Dam study area.
Critical Habitat

Critical habitat for the Central Valley steelhead DPS was designated on August 12, 2005; a final designation was published on September 2, 2005, with an effective date of January 2, 2006 (70 FR 52487). Critical habitat is designated to include select waters in the Sacramento and San Joaquin River basins. While the Project site is not within designated critical habitat for the Central Valley steelhead DPS, critical habitat has been designated in Old River adjacent to Clifton Court Forebay.

Sacramento Winter-Run Chinook Salmon (Oncorhynchus tshawytscha), FE/SE

Adult Sacramento River winter-run Chinook salmon (Oncorhynchus tshawytscha) leave the ocean and migrate through the Delta into the Sacramento River system from November through July. Salmon migrate upstream past Red Bluff Diversion Dam on the Sacramento River from mid-December through July, and most of the spawning population has passed Red Bluff Diversion Dam by late June. Winter-run Chinook salmon spawn from mid-April through August, and incubation continues through October. The primary spawning grounds in the Sacramento River are above Red Bluff Diversion Dam. Adult winter-run Chinook salmon generally do not enter the American River.

Occurrence within Study Area

Clifton Court Forebay Dam

Migrating winter-run Chinook salmon could occur within Clifton Court Forebay and adjacent waters, primarily between December and May.

Winter-run Chinook salmon do not spawn in the Delta.

Dyer Dam

This species does not have potential to occur within the Dyer Dam study area.

Patterson Dam

This species does not have potential to occur within the Patterson Dam study area.

Critical Habitat

Essential Fish Habitat identified for Sacramento River winter-run Chinook salmon evolutionarily significant unit includes migration, holding, and rearing habitat for the Sacramento River. Critical habitat for the winter-run Chinook salmon evolutionarily significant unit was designated on June 16, 1993 by NMFS (58 FR 33212) with an effective date of July 16, 1993. Critical habitat is designated to include the Sacramento River from Keswick Dam (River Mile 302) to Chipps Island (River Mile 0) and all waters westward including the San Francisco Bay north of the Bay Bridge to the Golden Gate Bridge. The Project site is not within or in the vicinity of designated winter-run Chinook salmon evolutionarily significant unit critical habitat.

Central Valley Spring-Run Chinook Salmon (Oncorhynchus tshawytscha), FT/ST

Central Valley spring-run Chinook salmon were historically the second most abundant run of Central Valley Chinook salmon. They occupied the headwaters of all major river systems in the Central Valley where there were no natural
barriers. Adults returning to spawn ascended the tributaries to the upper Sacramento River, including the Pit, McCloud, and Little Sacramento Rivers. They also occupied Cottonwood, Battle, Antelope, Mill, Deer, Stony, Big Chico, and Butte Creeks and the Feather, Yuba, American, Mokelumne, Stanislaus, Tuolumne, Merced, San Joaquin, and Kings Rivers. Spring-run Chinook salmon migrated farther into headwater streams where cool, well-oxygenated water is available year-round. Historical records indicate that adult spring-run Chinook salmon enter the mainstem Sacramento River in February and March and continue to their spawning streams, where they then hold in deep, cold pools until they spawn. Spring-run Chinook salmon are sexually immature during their spawning migration (Cramer and Demko 1997). Some adult spring-run Chinook salmon start arriving in the Feather River below Fish Barrier Dam in June. They remain there until the fish ladder is opened in early September.

**Occurrence within Study Area**

**Clifton Court Forebay Dam**

Migrating spring-run Chinook salmon could occur within Clifton Court Forebay and adjacent waters, primarily between December and May.

Spring-run Chinook salmon do not spawn in the Delta.

**Dyer Dam**

This species does not have potential to occur within the Dyer Dam study area.

**Patterson Dam**

This species does not have potential to occur within the Patterson Dam study area.

**Critical Habitat**

Essential Fish Habitat identified for Central Valley spring-run Chinook salmon evolutionarily significant unit includes migration, holding, and rearing habitat for the Sacramento River. Critical habitat for the Central Valley spring-run Chinook salmon was designated on August 12, 2005; a final designation was published on September 2, 2005, with an effective date of January 2, 2006 (70 FR 52487). Critical habitat is designated to include selected waters in the Sacramento River basin from approximately Redding (River Mile 302) to approximately Chipps Island (River Mile 0) at the westward margin of the Delta and includes the Sacramento River. The Project site is not within or in the vicinity of designated Central Valley spring-run Chinook salmon critical habitat.

**Delta Smelt (Hypomesus transpacificus), FT/SE**

The delta smelt is endemic to the Bay–Delta in California and is restricted to the area from San Pablo Bay upstream through the Delta in Contra Costa, Sacramento, San Joaquin, Solano, and Yolo Counties (Moyle 2002). Their range extends from San Pablo Bay upstream to Verona on the Sacramento River and Mossdale on the San Joaquin River. The delta smelt has a fairly simple life history as a large majority of individuals live only 1 year (Bennett 2005; Moyle et al. 2016), and because it is an endemic species (Moyle 2002), comprising only one genetic population (Fisch et al. 2011) that completes its full life cycle in the northern reaches of the Bay–Delta (Merz et al. 2011).
The distribution of sub-adult delta smelt in fall (September to November) and adult delta smelt in winter (January to May) does not extend as far south as Clifton Court Forebay; however, the distribution of delta smelt sub-juveniles in spring (April to June) and juveniles in summer (July) may occasionally extend as far south as Clifton Court Forebay. Additionally, the distribution of delta smelt adults in spring (March to April) may also extend as far south as Clifton Court Forebay in some years. Data from the Summer Townet Survey shows that nearly 90% of the delta smelt sampled in the summer are found in Suisun Bay, Suisun Marsh (Montezuma Slough), the Sacramento and San Joaquin Rivers confluence, and in the lower Sacramento River. Delta smelt are essentially absent from the east and south Delta during this period (CDFW 2021d). By summer (June and July), juveniles appear to have retreated to and are concentrated in areas where they will remain for the following 6 months. These areas include north and south Suisun Bay, the Sacramento and San Joaquin Rivers confluence, and the lower Sacramento River, particularly around Decker Island, and notably, in the Cache Slough complex of channels. The average distribution of delta smelt observed in Interagency Ecological Program monitoring surveys by location indicates that delta smelt are generally absent from the south Delta (where Clifton Court Forebay is located) from June through November/December (CDFW 2021e).

Delta smelt are a pelagic species, inhabiting open waters away from the bottom and shore associated structural features. Captive delta smelt have been shown to avoid in-water structure like submerged aquatic vegetation (Ferrari et al. 2014). The proliferation of submerged aquatic vegetation in areas that might otherwise be attractive to delta smelt represents a significant habitat degradation, not only because it creates structure in the water column, but also because it is associated with higher water transparency (Hestir et al. 2016), and a fish fauna with which the delta smelt does not seem able to coexist (Nobriga et al. 2005; Conrad et al. 2016). Characterization of delta smelt as an open-water fish appears to be accurate and does not imply occupation of a particular water column depth (USFWS 2019).

**Occurrence within Study Area**

**Clifton Court Forebay Dam**

The presence of delta smelt within Clifton Court Forebay varies each year. The annual distribution of delta smelt seasonally expands as adults disperse in response to winter flow increases that also coincide with seasonal increases in turbidity and decreasing water temperature (Sommer et al. 2011). Every year some delta smelt seasonally and transiently occupy Old and Middle Rivers in the south Delta, although there is a high risk of entrainment when they do (Kimmerer 2008; Grimaldo et al. 2009). This species does not spawn in the south Delta.

**Dyer Dam**

This species does not have potential to occur within the Dyer Dam study area.

**Patterson Dam**

This species does not have potential to occur within the Patterson Dam study area.

**Critical Habitat**

On December 19, 1994, USFWS designated critical habitat for delta smelt in the following geographic areas (59 FR 65256): areas of all water and all submerged lands below ordinary high water and the entire water column bounded by and contained in Suisun Bay (including the contiguous Grizzly and Honker Bays); the length of Goodyear, Suisun,
Cutoff, First Mallard (Spring Branch), Montezuma Sloughs, and Clifton Court Forebay; and the existing contiguous waters contained within the Delta, as defined in Section 12220 of the California Water Code.

**Longfin smelt (Spirinchus thaleichthys), FC/ST**

Longfin smelt are found in open water channels and bays ranging from freshwater to seawater (Moyle 2002). The longfin smelt occurring in the Bay–Delta is considered a DPS based on its separation from other populations of longfin smelt (CDFG 2009). They are pelagic and facultative anadromous species, spawning in fresh water and migrating to the ocean, usually as juveniles. Because they are facultatively anadromous, they can choose to migrate to the ocean or not depending on the environmental conditions. Longfin smelt live for 2 years on average. The spawning period in the Bay–Delta being as early as November and go until as late as June (CDFG 2009; Moyle 2002). Based on their preference for sandy substrates in tributaries to Lake Washington, they likely prefer similar substrates in the Bay–Delta to spawn (USFWS 2017a).

**Occurrence within Study Area**

**Clifton Court Forebay Dam**

The presence of longfin smelt within Clifton Court Forebay varies each year. Longfin smelt seasonally and transiently occupy Old and Middle Rivers in the south Delta, although there is a high risk of entrainment when they do. This species does not spawn in the south Delta.

**Dyer Dam**

This species does not have potential to occur within the Dyer Dam study area.

**Patterson Dam**

This species does not have potential to occur within the Patterson Dam study area.

4.5.3.3 Amphibians and Reptiles

**California Tiger Salamander (Ambystoma californiense), Central California DPS, FT/ST**

All California tiger salamanders are federally listed; however, they are listed as three unique DPS: the Sonoma County DPS and Santa Barbara County DPS are listed as endangered, and the Central DPS, including those in the Project vicinity, are listed as threatened. All populations are listed as threatened under the CESA. California tiger salamander occurs within low-elevation grassland and oak woodland communities of the Central Valley, coastal valleys, and bordering foothills from at least Colusa County south to Santa Barbara and Tulare Counties (Shaffer et al. 1993). They require areas that support fossorial rodents, whose burrows provide underground retreats during the dry nonbreeding season, and with ponds, vernal pools, and intermittent streams that hold water during the winter and spring to provide aquatic breeding habitat (Shaffer et al. 1993). Although breeding by tiger salamanders has been documented in permanent ponds, if there are predatory fish or bullfrogs in the pond, breeding will most likely be unsuccessful. Various trapping studies in Monterey and Solano Counties have shown that most nonbreeding California tiger salamanders reside more than 100 yards, but within 0.6 and 1.2 miles, of breeding ponds (Ford et al. 2013).
Occurrence within Study Area

Clifton Court Forebay Dam

The CNDDB contains 29 California tiger salamander occurrences within 5 miles of the Clifton Court Forebay Dam study area, nearly all from the Diablo Range and foothills to the northwest, west, and southwest. Only two of these occurrences are within the 1.3-mile maximum known dispersal distance of the species (Orloff 2011), and only one of these is east of the Byron Highway, which presents a major barrier to terrestrial wildlife movement. The lone occurrence east of the highway is an observation of an “unknown number of larvae and juveniles” in a “farm pond surrounded by grassland” on July 4, 1982 (Occ. No. 169) (CDFW 2021a). All the remaining CNDDB occurrences are west of the Byron Highway.

California tiger salamander is highly unlikely to occur within the Clifton Court Forebay Dam study area. Open water within the drainages between the dam embankments and adjacent Delta levees in the northern part of the study area resemble suitable aquatic breeding habitat, but are highly disturbed, of artificial origin, and isolated from known or potential breeding sites (i.e., stock ponds) in the Diablo Range foothills west and southwest of the Byron Highway. These areas, as well as remaining dam embankments in the study area, are also isolated from the undeveloped lands surrounding the 1982 CNDDB occurrence by Italian Slough and the California Aqueduct. Both canals would be considered permanent barriers to California tiger salamander movement (USFWS 2017b) because of their width, depth, and non-native aquatic predator assemblage. Any tiger salamanders still occupying the area between the Byron Highway and Clifton Court Forebay would not be able to traverse these features to access the poor-quality habitat in the northern part of the study area, and it is highly unlikely they would attempt to do so.

Google Earth aerial imagery from March 2017 shows a seasonal pool surrounded by open grassland between the California Aqueduct and Bruns Road, approximately 0.9 miles southwest of a proposed staging area east of the Skinner Fish Facility. If this feature were occupied by tiger salamanders, there is some potential that individuals could cross Byron Highway and venture into the southern staging areas during rain events. However, the feature does not show on subsequent rainy season imagery (April 2018 and April 2019) and its habitat value therefore appears limited. In summary, there is low potential for California tiger salamanders to occasionally venture into or near the southern portion of the study area (including proposed staging areas) during the rainy season, but the species is presumed absent from the remainder of Clifton Court Forebay Dam study area.

Dyer Dam

The CNDDB contains 15 California tiger salamander occurrences within 2 miles of Dyer Dam. Five of these occurrences are within the 1.3-mile maximum known dispersal distance of the species (Orloff 2011). The remaining occurrences fall within the grasslands and rolling hills to the north and west of the site, with a few occurrences within the Altamont Landfill to the east. One CNDDB occurrence overlaps with the Dyer Dam study area boundary (Occ. No. 1196) in which several individuals were discovered within the DWR construction site in 2010 and 2011 and relocated (CDFW 2021a). Other occurrences within the 1.3-mile radius of the dam are from between 1989 and 1992, except for Occ. No. 199, approximately 0.9 miles north of Dyer Dam, in which larvae and adults were collected and/or observed between 1980 and 2007. All occurrences to the west of the site are separated from the study area by the South Bay Aqueduct and Dyer Road.

California tiger salamander is likely to occur at Dyer Dam. Suitable upland (dispersal and refuge) habitat is present, particularly in the grassy slopes north and east of the site where California ground squirrel burrows are abundant. Potential upland habitat is also present in vegetated portions of the Dyer Dam study area (e.g., slope east of
reservoir between the reservoir crest road and the settling pond to the east), although these areas do not contain as many burrows and are more disturbed than surrounding grassland. There is low potential for California tiger salamanders to breed in seasonal wetlands or drainages supporting aquatic vegetation, although the species rarely breeds in drainages with dense vegetation (Ford et al. 2013). In summary, California tiger salamander is assumed present within the Dyer Dam study area because of its previous occurrence there during reservoir construction and suitable dispersal and refuge habitat.

**Patterson Dam**

The CNDDB contains 10 California tiger salamander occurrences within 2 miles of Patterson Dam. Only 3 of these occurrences are within the 1.3-mile maximum known dispersal distance of the species (Orloff 2011). The remaining occurrences are generally located within the grasslands and rolling hills to the south and east of Patterson Dam, with several occurrences on the eastern side of the South Bay Aqueduct, a barrier to salamander movement. The three occurrences within 1.3 miles are from 1989 (Occ. No. 105), 1994 (Occ. No. 552), and 1998 (Occ. Num. 899). The closest is approximately 0.1 miles to the south, where four salamanders were observed along Patterson Pass and South Flynn Roads between 8:00 p.m. and 11:00 p.m. on November 25, 1989 (the specific locations are not provided in the CNDDB). The most recent occurrence in the vicinity is from April 2020, where a dead adult was found on Flynn Road N, approximately 2 miles northeast of the dam (Occ. No. 543).

California tiger salamander is likely to occur within the Patterson Dam study area. Suitable upland habitat is present within the Patterson Dam study area, particularly in the pasture west of DWR’s property and the grassy slopes northeast of the South Bay Aqueduct where California ground squirrel burrows are abundant. Potential upland habitat is also present in the downstream dam face, upper slope east of the dam, and staging areas east of the dam, although these areas do not contain as many burrows and are more disturbed than surrounding pasture or grassland. There is low potential for California tiger salamanders to breed in the low-outlet drainage channel in the western portion of the Patterson Dam study area, but the dense vegetation likely precludes breeding and work in the channel would be conducted during the nonbreeding season when individuals would not be present in aquatic habitat. There is also a pond partially filled with emergent wetland vegetation approximately 350 feet west of the low-outlet drainage channel that may be suitable for tiger salamander breeding. In summary, California tiger salamander is assumed present within the Patterson Dam study area because of suitable dispersal and refuge habitat, potential aquatic breeding habitat within known dispersal distance, and previous occurrences in the vicinity.

**Critical Habitat**

USFWS designated 382,666 acres of critical habitat for the Central DPS of California tiger salamander on August 10, 2004 (69 FR 48570); this designation was revised to 199,109 acres in 19 California counties on August 23, 2005 (70 FR 49380). The critical habitat designation included a description of primary constituent elements of California tiger salamander, which are “physical and biological features...that are essential to the conservation of the species, and that may require special management and protection.” These include such features as space for individual and population growth, nutritional and physical requirements (food, water, air, light, minerals), cover or shelter, breeding sites, and habitats representative of those where the species historically occurred. The primary constituent elements of critical habitat for the central population of California tiger salamander include the following:

- **Aquatic Breeding Habitat:** Standing bodies of freshwater ponds, vernal pools, and other ephemeral or permanent waterbodies that typically support inundation during winter rains and hold water for a minimum of 12 weeks in a year of average rainfall.
• **Upland Habitat**: Upland habitats adjacent and accessible to and from breeding ponds that contain small mammal burrows or other underground habitat for California tiger salamanders.

• **Dispersal Habitat**: Accessible upland dispersal habitat between occupied locations that allow for movement between such sites.

The Project site does not overlap with any designated critical habitat units for California tiger salamander. Unit 18 in the Central Valley Region is located approximately 6 miles west of the Project site.

**California Red-legged Frog (Rana draytonii), FT, SSC**

California red-legged frog occurs from sea level to elevations near 5,000 feet. It has been extirpated from 70% of its former range and now is found primarily in coastal drainages of Central California, from Marin County south to northern Baja California, and in isolated drainages in the Sierra Nevada, northern Coast, and northern Transverse Ranges. Breeding habitat includes freshwater pools and backwaters within streams and creeks, ponds, marshes, springs, and lagoons. They also frequently breed in artificial impoundments such as stock ponds (USFWS 2002). During the nonbreeding season, California red-legged frogs need moist areas in which to take refuge from the heat and predators, such as intermittent or ephemeral streams with dense riparian vegetation, overhanging banks, and rootwads; springs or spring boxes; rodent burrows; and damp leaf litter in riparian woodlands (Ford et al. 2013). USFWS (2002, 2019) considers freshwater habitat and associated upland habitat within 1 mile as red-legged frog breeding, foraging, and dispersal habitat.

**Occurrence within Study Area**

**Clifton Court Forebay Dam**

The CNDDB contains 40 California red-legged frog occurrences within 5 miles of Clifton Court Forebay Dam, nearly all from the Diablo Range and foothills to the northwest, west, and southwest. The only occurrence within 1 mile consists of three locations to the southwest: two in the southern reaches of Italian Slough and one northwest of the intersection of North Bruns Way and the Byron Highway. In Italian Slough, one juvenile was observed in a ditch approximately 2,100 feet west of the proposed staging areas west of the California Aqueduct and two adults were “observed in a canal” approximately 2,100 feet southwest of the proposed staging areas on February 24, 2009. At the third location northwest of the intersection of North Bruns Way and the Byron Highway, two frogs were observed on January 16, 2003 (Occ. No. 862) (CDFW 2021a). All the remaining CNDDB occurrences are west of the Byron Highway.

California red-legged frog is highly unlikely to occur in the Clifton Court Forebay Dam study area. Freshwater pond and wetland habitat occurs between the dam embankments and Italian Slough to the west/northwest and Old River to the northeast, but surveys of these areas (including a protocol-level survey in 2013 (DWR, unpubl. data) have not found any red-legged frogs. These areas, as well as remaining dam embankments in the Project site, are also isolated from occupied habitat to the southwest (i.e., CNDDB Occ. No. 862) by Italian Slough north of Clifton Court Road and the California Aqueduct. Both canals are approximately 250 to 300 feet wide, over 10 feet deep, and likely to support non-native aquatic predators. Any red-legged frogs occurring in the southern reaches of Italian Slough northwest of the Skinner Fish Facility would not be expected to swim across such features to access marginal aquatic habitat over 2.3 miles away. In summary, California red-legged frog is presumed absent from the Project site due to the poor quality of available aquatic habitat and lack of habitat connectivity to potentially occupied habitat north of the Skinner Fish Facility.
Dyer Dam

The CNDDB contains 15 California red-legged frog occurrences within 2 miles of Dyer Dam. However, many of these occurrences are sensitive records in which locational information is suppressed by the CNDDB. The remaining occurrences are located to the east of Dyer Dam outside of the 1-mile dispersal radius for California red-legged frog and separated from Dyer Dam by the South Bay Aqueduct. California red-legged frog are also known to occur within the Altamont Landfill, located approximately 1 mile east of the dam.

California red-legged frog is likely to occur within the Dyer Dam study area. Suitable nonbreeding aquatic habitat is present in the northern portion of the relocated drainage channel that supports riparian and freshwater emergent vegetation and the seasonal wetlands and swales in the western portion of Dyer Dam. These areas are within 1 mile and are hydrologically connected to the known occurrence along Dyer Road. Grasslands to the north, east, and south of Dyer Dam and vegetated areas within the site (e.g., western dam face, slope between reservoir and reservoir crest road) also provide upland and dispersal habitat, but such areas are more likely to be used during the rainy season when frogs move from aquatic nonbreeding sites to breeding sites (e.g., ponds). Therefore, the likelihood of California red-legged frogs occurring in upland areas during Project construction is low. In summary, California red-legged frog is assumed present within the Dyer Dam study area because of suitable aquatic, upland, and dispersal habitat within 1 mile of a known occurrence, but they are more likely to occur in riparian and wetland vegetation instead of uplands at the time of Project construction.

Patterson Dam

The CNDDB contains nine California red-legged frog occurrences within 2 miles of Patterson Dam. Of these occurrences, three are located within the 1-mile dispersal radius for this species. All three occurrences were documented prior to 2004. Occ. No. 95 is the closest documented occurrence to Patterson Dam, located immediately southwest of the reservoir facility in an artificial drainage channel (CDFW 2021a). Numerous California red-legged frog breeding observations (eggs, larvae, adults) were made at this location between 1991 and 2000. Occ. No. 603 is located approximately 0.3 miles northwest of Patterson Dam, in which adults were observed within an artificial pond from 2002 to 2004 (CDFW 2021a). Occ. No. 387 was approximately 0.14 miles northeast of Patterson Dam in which one juvenile was observed in an artificial pond in 2000, however this location is separated from the site by the South Bay Aqueduct. The remaining observations are located west of the Patterson Dam study area, west of Greenville Road.

California red-legged frog is known to occur in the low-outlet drainage within the Patterson Dam study area and may also occur in other areas. The downstream dam face, upper slope east of the dam, and staging areas east of the dam are suitable upland and dispersal habitat, but frogs are unlikely to occur in these areas outside the rainy season when Project construction is proposed. In summary, California red-legged frog is assumed present within the Patterson Dam study area because of its known occurrence and suitable aquatic habitat in the drainage to the west, and suitable upland and dispersal habitat within dispersal distance of aquatic habitat. It is more likely to occur in wetland vegetation instead of uplands at the time of Project construction, however.

Critical Habitat

USFWS designated 4,140,440 acres of critical habitat for California red-legged frog in 28 California counties on March 13, 2001 (66 FR 14625–14758). Critical habitat for this species has been revised several times since 2006, with the most recent revision (and the one currently in effect) dated March 17, 2010, and comprising approximately
1,636,609 acres in 27 counties (75 FR 12816–12959). The primary constituent elements of critical habitat for California red-legged frog, described in the 2010 designation, are summarized as follows:

- **Aquatic Breeding Habitat**: Standing bodies of fresh water (with salinities less than 4.5 ppt), including natural and constructed (e.g., stock) ponds, slow-moving streams or pools within streams, and other ephemeral or permanent water bodies that typically become inundated during winter rains and hold water for a minimum of 20 weeks in all but the driest of years

- **Aquatic Nonbreeding Habitat**: Freshwater pond and stream habitats that may not hold water long enough for the species to complete its aquatic life cycle but which provide for shelter, foraging, predator avoidance, and aquatic dispersal of juvenile and adult California red-legged frogs. Other wetland habitats considered to meet these criteria include, but are not limited to plunge pools within intermittent creeks, seeps, quiet backwaters within streams during high water flows, and springs of sufficient flow to provide mesic surface conditions during dry periods

- **Upland Habitat**: Upland areas adjacent to or surrounding breeding and nonbreeding aquatic and riparian habitat up to a distance of 1.6 kilometers (1 mile) in most cases (i.e., depending on surrounding landscape and dispersal barriers) including various vegetation types such as grassland, woodland, forest, wetland, or riparian areas that provide shelter, forage, and predator avoidance for the California red-legged frog

- **Dispersal Habitat**: Accessible upland or riparian habitat within and between occupied or previously occupied sites that are located within 1 mile of each other, and that support movement between such sites

The Clifton Court Forebay Dam study area is located outside of critical habitat for California red-legged frog. Dyer Dam is entirely located within the Mount Diablo critical habitat unit (CCS-2B). The northeastern/eastern edge of Patterson Dam is located within the Arroyo Valle critical habitat unit (ALA-2). The Dyer and Patterson Dam study areas do not support aquatic breeding habitat but do have nonbreeding aquatic habitat and upland and dispersal habitat.

**Western Pond Turtle (Actinemys marmorata), SSC**

The western pond turtle is uncommon to common in suitable aquatic habitat throughout California, west of the Sierra–Cascade crest and absent from desert regions, except in the Mojave Desert along the Mojave River and its tributaries. Western pond turtles typically forage on land and in quiet pools of water and, as omnivores with a broad feeding niche, they eat almost anything they can capture (Bury 1986). While moving between pools within the stream system, average distances were 354 meters (1,161 feet) for males, 169 meters (554 feet) for females, and 142 meters (466 feet) for juveniles. Holland (1994) reported that western pond turtles have been found up to one kilometer (3,280 feet) from watercourses and can move up to five kilometers (3.1 miles) between drainages. Although western pond turtles can move long distances, they are generally characterized as sedentary animals.

**Occurrence within Study Area**

**Clifton Court Forebay Dam**

Western pond turtle is known to occur in the Clifton Court Forebay Dam study area. There are multiple occurrences in the southern portion of the study area, including February and March 2021 observations by Dudek biologists on dam embankments and an April observation at Sump No. 4 in the northwest portion of the study area. DWR biologists have also observed pond turtles in the drainages in the western, northwestern, and northeastern portions of the study area and have documented nesting near the northeastern dam embankment (DWR, unpubl. data). Grasslands adjacent to aquatic habitat features also provide suitable upland nesting habitat.
**Dyer Dam**

Western pond turtle has moderate potential to occur within the Dyer Dam study area. The only nearby occurrence is a March 11, 1982, CNDD occurrence approximately 530 feet southwest of Dyer Dam, although the exact location and number of turtles observed is not reported (Occ. No. 120) (CDFW 2021a). DWR biologists have not observed pond turtles during preconstruction surveys for similar maintenance projects in the last 5 years (DWR, unpubl. data). Marginally suitable aquatic habitat is present in drainages within the study area and the nearby reservoir is also suitable for this species. If these aquatic habitat features are used by pond turtles, surrounding uplands could be used for nesting.

**Patterson Dam**

Western pond turtle has high potential to occur within the Patterson Dam study area. There is suitable habitat present on site and there are CNDB occurrences less than 2 miles southwest of the site (CDFW 2021a). Marginally suitable aquatic habitat is present in drainages within the study area and the nearby reservoir is also suitable for this species. If these aquatic habitat features are used by pond turtles, surrounding uplands could be used for nesting.

**San Joaquin Coachwhip (Masticophis flagellum ruddocki), SSC**

San Joaquin coachwhips occur in arid environments with open, sparsely vegetated land with little to no tree cover; vegetation communities include grassland and saltbush scrub (Jennings and Hayes 1994). It can occur in a variety of land types, including sandy or rocky, and flat or sloping topography (Stebbins 2003). It has been observed climbing bushes such as saltbushes (*Atriplex* spp.) to survey its surrounding and look for prey, such as nesting birds, and predators (Jennings and Hayes 1994). Coachwhips often burrow in rodent burrows for refuge and possibly for oviposition (Stebbins 2003; Jennings and Hayes 1994). Within the Plan Area, this species is recorded with herbaceous communities in topography with low relief. It occurs in elevation ranges from 65 to 2,950 feet above mean sea level (Nafis 2021).

**Occurrence within Study Area**

**Clifton Court Forebay Dam**

San Joaquin coachwhip has high potential to occur within the Clifton Court Forebay Dam study area. There is suitable habitat present in grassland and saltbush scrub in southern portion of study area.

**Dyer Dam**

This species has low potential to occur within the Dyer Dam study area. Suitable grassland habitat is present but the study area is on the periphery of known range of species (CDFW 2021f) and there are no occurrences in the vicinity of Dyer Dam.

**Patterson Dam**

This species has moderate potential to occur within the Patterson Dam study area. Suitable grassland habitat is present and a CNDB occurrence located 1.8 miles south–southwest of the site (CDFW 2021a).
4.5.3.4 Birds

Golden Eagle (*Aquila chrysaetos*), BCC/FP, WL

The golden eagle is a year-round, diurnally active species that is a permanent resident and migrant throughout California. Golden eagles are more common in northeast California and the Coast Ranges than in Southern California and the deserts. Foraging habitat for this species includes open habitats with scrub, grasslands, desert communities, and agricultural areas.

Golden eagles breed from January through August, with peak breeding activity occurring from February through July. Nest building can occur almost any time during the year. This species nests on cliffs, rock outcrops, large trees, and artificial structures such as electrical transmission towers, generally near open habitats used for foraging (Johnsgard 1990; Katzner et al. 2020; Scott 1985). Golden eagles commonly build, maintain, and variably use multiple alternative nest sites in their breeding territories, routinely refurbishing and reusing individual nests over many years. Generally, the nests are large platforms composed of sticks, twigs, and greenery that are often 10 feet across and 3 feet high (Zeiner et al. 1990a). Pairs may build more than one nest and attend to them prior to laying eggs (Katzner et al. 2020). Each pair can have up to 10 nests, but only 2 to 3 are generally used in rotation from one year to the next. Some pairs use the same nest each year, and others use alternate nests year after year, and still others apparently nest only every other year. Succeeding generations of eagles may even use the same nest (Terres 1980).

Occurrence within Study Area

**Clifton Court Forebay Dam**

There is no suitable nesting habitat for golden eagle within the Clifton Court Forebay Dam study area. There is moderate potential for this species to forage on site in the winter. One golden eagle was observed soaring just north of the study area in April 2021.

**Dyer Dam**

There is no suitable nesting habitat for golden eagle within the Dyer Dam study area. There is high potential for this species to forage on site in the winter. One individual was observed flying over the valley north of the reservoir during the January 2021 wildlife habitat assessment and biologists conducting wildlife surveys for the Delta Field Division HCP observed eagles soaring in the study area vicinity (approximately 0.5 miles north and 0.6 miles south) in March and April.

**Patterson Dam**

There is no suitable nesting habitat for golden eagle within the Patterson Dam study area but DWR biologists observed a pair nesting in a blue gum stand approximately 0.5 mile north of the study area from 2015 to 2019 (DWR, unpubl. data) and Dudek observed the nest is still active in 2021. Although not directly observed during 2021 field surveys, there is high potential for this pair to forage over the study area throughout the year.
Swainson’s Hawk (*Buteo swainsoni*), ST

Swainson’s hawk nests in California in the Central Valley, Klamath Basin, Northeastern Plateau, Lassen County, and the Mojave Desert. This species breeds in riparian areas, stands of trees, and isolated trees in agricultural environments, oak savannah, and juniper–sage flats. In the San Joaquin Valley, it typically nests in riparian areas and in isolated tree clusters, often near rural residences or other areas with some human disturbance. Alfalfa fields are the favored foraging areas of Swainson’s hawk in the Central Valley, but the species also forages in other low-density row crops, undisturbed grasslands, rangelands, and fallow agricultural fields.

**Occurrence within Study Area**

**Clifton Court Forebay Dam**

One Swainson’s hawk nest was observed within the Clifton Court Forebay Dam study area in 2021. On April 21, Dudek observed an adult flush from a nest in a willow (*Salix* sp.) adjacent to the West Canal approximately 0.6 miles north of the intake channel. The nest was abandoned on the subsequent June 23 visit, however. There is suitable nesting habitat present in study area and vicinity and additional nests were observed outside of the study area but within the Swainson’s hawk survey boundary. There are many nearby occurrences along Delta waterways (e.g., Widdows Island, Coney Island) (CDFW 2021a; DWR, unpubl. data); one occurrence overlaps with the study area and is a documented nest site (CDFW 2021a).

**Dyer Dam**

Swainson’s hawk is not expected to nest within the Dyer Dam study area due to lack of nesting habitat. Although suitable nesting habitat is present within 0.5 miles of the study area, Dudek biologists did not observe any Swainson's hawks within 0.5 miles during 2021 field surveys. The closest CNDDDB locations are around the Clifton Court Forebay Dam study area.

**Patterson Dam**

Swainson’s hawk is not expected to nest within the Patterson Dam study area due to lack of nesting habitat. Although suitable nesting habitat is present within 0.5 miles of the study area, Dudek biologists did not observe any Swainson's hawks within 0.5 miles during 2021 field surveys. The majority of the CNDDDB occurrences are within the Clifton Court Forebay Dam study area, but there is one record from 2017 approximately 2.5 miles southwest of Patterson Dam documenting a nesting pair (CDFW 2021a).

**Northern Harrier (*Circus hudsonius*), SCC**

The northern harrier breeds throughout most of Canada and Alaska; south through the northern and central Great Basin, Rocky Mountains, and Great Plains; in the northeastern United States; and in scattered locales from central, coastal, and southwestern California south to Baja California, Mexico (Smith et al. 2020). Northern harriers winter across most of the coterminous United States south through Mexico, Central America, the Bahamas, and Cuba. In California, northern harriers breed in the Central Valley, Great Basin, most of the Coast Ranges, and in some coastal areas from San Luis Obispo County southward (Davis and Niemela 2008). Northern harrier inhabits annual grassland, lodgepole pine, and pine meadow habitats in the Central Valley, the Sierra Nevada, and northeastern California (Zeiner et al. 1990a). This species is less common in the Central Valley, and permanently resides on the northeastern plateau and coastal areas. Northern harrier breeds from sea level to 5,700 feet and nests on the
ground in shrubby vegetation, within tall grasses and forbs in wetland (Brown and Amadon 1968). Extensive grazing general precludes nesting by northern harriers, which typically require relatively large tracts of undisturbed habitat (Smith et al. 2020).

**Occurrence within Study Area**

**Clifton Court Forebay Dam**

One northern harrier was observed foraging near the northeast portion of the Clifton Court Forebay Dam study area in December 2020 and in February 2021 a pair was observed in the same area displaying courtship. Another foraging individual was observed in the western portion of the study area in December 2020. Northern harrier has high potential to nest in portions of the Clifton Court Forebay Dam study area with dense ground cover. There is one CNDDB record from 1989 within 5 miles of Clifton Court Forebay Dam (CDFW 2021a).

**Dyer Dam**

Northern harrier has high potential to nest within the Dyer Dam study area where there is dense groundcover. There are no CNDDB occurrences within 5 miles of Dyer Dam (CDFW 2021a).

**Patterson Dam**

Northern harrier has high potential to nest within the Patterson Dam study area where the dense mustard west of the reservoir provides high-quality-habitat. Dudek biologists observed a pair in this area during 2021 field surveys. There are no CNDDB occurrences within 5 miles of Patterson Dam (CDFW 2021a).

**White-Tailed Kite (Elanus leucurus), FP**

White-tailed kite inhabits herbaceous and open cismontane habitats (Zeiner et al. 1990a). It is commonly associated with certain types of agricultural areas (Grinnell and Miller 1944). This species is a year-round resident in coastal and valley lowlands, and forages in open grasslands, meadows, farmlands, and emergent wetlands. It will also use marginal habitats such as freeway edges and medians when foraging for voles and mice. Nests are constructed in a variety of trees, with coast live oak perhaps the most common, and placed high in the crown on thin branches (Peeters and Peeters 2005). Riparian areas adjacent to open space areas are also typically used for nesting, and kites prefer dense, broad-leaved deciduous trees for nesting and night roosting (Brown and Amadon 1968). They also nest in young redwoods (Sequoia sempervirens) and mid-sized Douglas firs (Pseudotsuga menziesii) in Northern California.

**Occurrence within Study Area**

**Clifton Court Forebay Dam**

White-tailed kite has high potential to nest and forage on site. There are suitable nesting trees in and around the Clifton Court Forebay Dam study area. One CNDDDB record within 5 miles from 1993 documented a nesting pair of kites (CDFW 2021a).
**BIOLOGICAL RESOURCES EXISTING CONDITIONS REPORT FOR THE DELTA DAMS RODENT BURROW REMEDIATION PROJECT, ALAMEDA AND CONTRA COSTA COUNTIES, CALIFORNIA**

**Dyer Dam**

White-tailed kite is not expected to nest within the Dyer Dam study area due to lack of nesting habitat. There is one CNDDB record within 5 miles from 1996 documenting a nesting pair of kites (CDFW 2021a).

**Patterson Dam**

White-tailed kite is not expected to nest within the Patterson Dam study area due to lack of nesting habitat. One white-tailed kite was observed perched in a tree at the northeastern edge of the study area during the 2021 field surveys. There is one CNDDB record within 5 miles from 1996 documenting a nesting pair of kites (CDFW 2021a).

**Bald Eagle (Haliaeetus leucocephalus), SE, FP**

In California, most nesting bald eagles are found in the northern part of the state, but pairs nest locally south through the Sierra Nevada, coastal counties in Central and Southern California, and on the Channel Islands. Bald eagles typically nest in large conifers or on rock outcrops near aquatic features, but also occasionally in large hardwoods, such as sycamores and oaks (Anthony et al. 1982). They usually nest in one of the largest trees available near water and generally situated with a prominent overview of the surrounding area (Buehler 2020). Bald eagles prefer to forage on fish and waterfowl, but their diet varies regionally and seasonally in response to locally available resources, and often includes a variety of mammals as well as carrion, especially in winter (Todd et al. 1982; Stalmaster 1987; Ewins and Andress 1995; Buehler 2020).

**Occurrence within Study Area**

**Clifton Court Forebay Dam**

A pair of nesting bald eagles was observed at the northern edge of the Clifton Court Forebay Dam study area (Widdows Island) in a eucalyptus tree during the March 2021 field surveys. An adult was in the nest incubating eggs.

**Dyer Dam**

Bald eagle is not expected to occur within the Dyer Dam study area. Suitable open-water foraging habitat with nearby large trees for nesting is absent from the study area and vicinity.

**Patterson Dam**

Bald eagle is not expected to occur within the Patterson Dam study area. Suitable nesting habitat is absent from the study area and vicinity. A bald eagle was observed flying just west of the study area by Dudek biologists during 2021 field surveys.

**Burrowing Owl (Athene cunicularia), BCC/SSC**

Burrowing owl occurs throughout North and Central America west of the eastern edge of the Great Plains south to Panama. In California, it is a year-round resident of lowlands throughout much of the state; these resident populations may be augmented by migrants from other parts of western North America in the winter (Gervais et al. 2008). Burrowing owl has disappeared as a breeding species from many portions of its former statewide range, especially along the central and southern coasts (Gervais et al. 2008; Wilkerson and Siegel 2010).
Burrowing owls require habitat with three basic attributes: open, well-drained terrain; short, sparse vegetation; and underground burrows or burrow surrogates such as culverts, concrete debris piles, or riprap (Klute et al. 2003). They occupy grasslands, deserts, sagebrush scrub, agricultural areas (including pastures and untilled margins of cropland), earthen levees and berms, coastal uplands, and urban vacant lots, as well as the margins of airports, golf courses, and roads. This species also prefers sandy soils with higher bulk density and less silt, clay, and gravel (Lenihan 2007).

Occurrence within Study Area

**Clifton Court Forebay Dam**

Dudek observed two burrowing owls in the southern portion of the Clifton Court Forebay Dam study area during the 2021 field surveys. Numerous suitable burrowing owl burrows were mapped during the 2021 burrow surveys. In addition, DWR biologists have observed multiple burrowing owls in the study area since 2009, with most observations in the grassland north of the Skinner Fish Facility (DWR, unpubl. data).

**Dyer Dam**

Burrowing owl has high potential to occur within the Dyer Dam study area. There is a CNDDB occurrence (Occ. No. 670) that overlaps the study area and indicates the former presence of a sizeable population (up to 19 pairs and over 50 juveniles in 2006) in the mid-2000s. Dudek biologists observed burrowing owl sign (i.e., feathers and pellets) in the proposed staging area northeast of the reservoir during 2021 field surveys and high-quality habitat is present in the grasslands within the study area.

**Patterson Dam**

Burrowing owl has high potential to occur within the Patterson Dam study area. Burrowing owl sign (pellet and/or feathers) was observed at two locations along the northern/northeastern portions of the study area during the February 2021 burrow surveys.

**Loggerhead Shrike (Lanius ludovicianus), BCC/SSC**

Loggerhead shrike ranges throughout California in the lowlands and foothills. The largest breeding populations are in portions of the Central Valley, the Coast Ranges, and the southeastern deserts (Humble 2008). The loggerhead shrike is a resident in much of California, and migratory in the north. Winter visitors augment resident populations. Preferred habitats for loggerhead shrikes are open areas that include scattered shrubs, trees, posts, fences, utility lines, or other structures that provide hunting perches with views of open ground, as well as nearby spiny vegetation or built structures (such as the top of chain-link fences or barbed wire) that provide a location to impale prey items for storage or manipulation (Humble 2008). Loggerhead shrikes occur most frequently in riparian areas along the woodland edge, grasslands with available perch and butcher sites, scrublands, and open canopied woodlands; they can also occur in agricultural areas and rangelands, as well as developed areas such as mowed roadsides, cemeteries, and golf courses. They rarely occur in heavily urbanized areas. For nesting, the height of shrubs and presence of canopy cover are most important (Yosef 2020). Loggerhead shrikes nest in trees and shrubs, especially thorny or spiny ones. In some cases, tumbleweeds and brush or debris (e.g., discarded rolls of barbed wire) piles may be used for nesting (Ricketts, pers. obs. 2013).
Occurrence within Study Area

Clifton Court Forebay Dam

Loggerhead shrike was observed in the Clifton Court Forebay Dam study area during Dudek’s 2021 field surveys. Shrikes were observed perching in the northern and western portions of the study area in 2020 and 2021.

The study area provides high-quality nesting and foraging habitat for this species. Nesting habitat occurs in scattered trees and shrubs (e.g., willow stands) and grassland and open areas provide foraging habitat.

Dyer Dam

One loggerhead shrike was observed perched on a fence during the 2021 field surveys within the Dyer Dam study area. The Dyer Dam study area has limited shrubs and trees to provide nesting habitat; therefore, this species has moderate potential to nest on site.

Patterson Dam

The Patterson Dam study area has limited shrubs and trees to provide nesting habitat; therefore, this species has moderate potential to nest on site. This species likely forages on site.

Song Sparrow, Modesto population (Melospiza melodia), SSC

Song sparrows range from Mexico and Baja California through the United States and into southern Alaska. The “Modesto population” is endemic to California in the north-central portion of the Central Valley with the highest densities occurring in the Butte Sink area of the Sacramento Valley (Gardali 2008). Song sparrows occur in a wide variety of marsh, forest, shrub, and riparian habitats. Nests are established in substrate with secure support provided by the ground or vegetation that are concealed from predators.

Occurrence within Study Area

Clifton Court Forebay Dam

Song sparrows assumed to belong to the Modesto population were observed during 2021 field surveys and have potential to occur throughout the Clifton Court Forebay Dam study area. There are CNDDB records in study area and vicinity (CDFW 2021a).

Dyer Dam

The Dyer Dam study area is outside of the known range of this subspecies.

Patterson Dam

The Patterson Dam study area is outside of the known range of this subspecies.
Tricolored Blackbird (*Agelaius tricolor*), ST, SSC

Tricolored blackbirds are largely endemic to California, with more than 99% of the global population occurring in the state. Breeding tricolored blackbirds occur in four general areas of the state: the Central Valley, the central coast, the Sierra Nevada foothills, and Southern California. Madera, Merced, and Stanislaus Counties have the greatest numbers of consistently breeding birds (Meese 2014).

Tricolored blackbirds nest in colonies, primarily in freshwater marshes dominated by dense stands of emergent vegetation such as cattails and bulrushes, but they also nest in willows, blackberries, thistles, and nettles (*Urtica* spp.). They are known to forage up to 5.6 miles from active breeding colonies (UC Davis 2020).

**Occurrence within Study Area**

**Clifton Court Forebay Dam**

This species has high potential to occur within the Project site. The Clifton Court Forebay Dam study area supports nesting and foraging habitat for tricolored blackbird. There are small, scattered patches of marsh or blackberry around Clifton Court Forebay Dam. There are CNDDB occurrences of tricolored blackbird documented within the surrounding area (CDFW 2021a).

**Dyer Dam**

This species has high potential to occur within the Dyer Dam study area. Dyer Dam supports nesting and foraging habitat for tricolored blackbird. There is a narrow channel dominated by cattails in the northeastern portion of Dyer Dam. There are CNDDB occurrences of tricolored blackbird documented within the surrounding area (CDFW 2021a).

**Patterson Dam**

This species has high potential to occur within the Patterson Dam study area. Patterson Dam supports nesting and foraging habitat for tricolored blackbird. There is narrow channel dominated by cattails along the western portion of Patterson Dam. There are CNDDB occurrences of tricolored blackbird documented within the surrounding area (CDFW 2021a).

4.5.3.5 Mammals

**San Joaquin Kit Fox (*Vulpes macrotis mutica*), FT/SE**

San Joaquin kit fox is endemic to California, occurring only on the San Joaquin Valley floor, surrounding foothills and ranges, and smaller, adjacent valleys, from northern Ventura and Santa Barbara Counties north to Contra Costa and San Joaquin counties. The three core subpopulations for the kit fox are in the Ciervo–Panoche region (western Fresno and Merced counties and eastern San Benito County), western Kern County, and the Carrizo Plain (USFWS 2010).

San Joaquin kit fox occurs in arid lands with scattered shrubby vegetation underlain by loose-textured, sandy soils suitable for burrowing and supporting primary prey (e.g., kangaroo rats [*Dipodomys* sp.]). Occupied communities and land covers include valley sink scrub, valley saltbush scrub, upper Sonoran shrub scrub, annual grassland, grazed grasslands, petroleum fields, and urban areas in the southern portion of their range; valley sink scrub, interior coast range saltbush scrub, upper Sonoran shrub scrub, annual grassland, and the remaining native...
grasslands in the central portion of their range; and annual grassland and valley oak woodland in the northern part of their range (USFWS 1998). The Project site is in the northern portion of the range.

**Occurrence within Study Area**

**Clifton Court Forebay Dam**

The Clifton Court Forebay Dam study area is in the S1 (Alameda, Contra Costa, and San Joaquin Counties) San Joaquin kit fox satellite population recovery area (USFWS 2010), where there have been no confirmed observations since 2002 (USFWS 2020b). Extensive surveys using scent dogs between 2001 and 2003 did not detect any kit foxes in surveyed portions of Alameda and Contra Costa Counties, including DWR (California Aqueduct) and private (Bruns, Kelso/Bruns) parcels southwest of the study area (Smith et al. 2006).

The CNDDB contains 15 San Joaquin kit fox occurrences within 5 miles of the study area, all from the Diablo Range and foothills to the northwest, west, and southwest. The most recent occurrence is approximately 1.5 miles south of Clifton Court Forebay Dam and 0.45 miles northwest of the Kelso Road/Mountain House Road intersection, where several dens were observed adjacent to the Delta–Mendota Canal on May 24, 2000 (Occ. No. 34) (CDFW 2021a). The closest occurrence is a “sighting sometime from 1972 through July 1975” approximately 0.5 miles west of the northwest Clifton Court Forebay Dam embankment (Occ. No. 1033) (CDFW 2021a).

At the time of writing, Dudek is conducting a wildlife game camera study that is also intended to evaluate kit fox use of the study area. Although several burrows of suitable dimensions for use by San Joaquin kit fox were found during the initial February habitat assessment, no kit foxes or their sign have been detected during camera surveys or other wildlife surveys (e.g., burrowing owl and Swainson’s hawk surveys) and subsequent surveys are unlikely to detect any kit foxes due to the rarity of the species in this part of its range.

**Dyer Dam**

The Dyer Dam study area is in the S1 (Alameda, Contra Costa, and San Joaquin Counties) San Joaquin kit fox satellite population recovery area (USFWS 2010), where there have been no confirmed observations since 2002 (USFWS 2020b). Extensive surveys using scent dogs conducted between 2001 and 2003 did not detect any kit foxes in surveyed portions of Alameda and Contra Costa Counties, including DWR parcels (California Aqueduct, Bethany Reservoir) northeast of Dyer Dam, Brush Creek Regional Preserve (approximately 1 mile west of Dyer Dam), and the Lawrence Livermore National Laboratory Site 300 (approximately 7 miles east of Patterson Dam) (Smith et al. 2006).

The CNDDB contains 14 San Joaquin kit fox occurrences within 5 miles of Dyer Dam, all from the Diablo Range and foothills. The most recent and closest occurrence to Dyer Dam, from August 20, 2002, was an observation of one adult in the Brushy Creek Regional Preserve, approximately 1 mile to the northwest (Occ. No. 58).

At the time of writing, Dudek is conducting a wildlife game camera study that is also intended to evaluate kit fox use of the study area. Although several burrows of suitable dimensions for use by San Joaquin kit fox were found during the initial February habitat assessment, no kit foxes or their sign have been detected during camera surveys or other wildlife surveys (e.g., burrowing owl and Swainson’s hawk surveys) and subsequent surveys are unlikely to detect any kit foxes due to the rarity of the species in this part of its range.
**Patterson Dam**

The Patterson Dam study area is in the S1 (Alameda, Contra Costa, and San Joaquin Counties) San Joaquin kit fox satellite population recovery area (USFWS 2010), where there have been no confirmed observations since 2002 (USFWS 2020b). Extensive surveys using scent dogs conducted between 2001 and 2003 did not detect any kit foxes in surveyed portions of Alameda and Contra Costa Counties, including DWR parcels (California Aqueduct, Bethany Reservoir) northeast of Dyer Dam, Brush Creek Regional Preserve (approximately 1 mile west of Dyer Dam), and the Lawrence Livermore National Laboratory Site 300 (approximately 7 miles east of Patterson Dam) (Smith et al. 2006).

The CNDDB contains three occurrences within 5 miles of Patterson Dam study area, all from the Diablo Range and foothills. The most recent and closest occurrence to Patterson Dam is a June 1989 observation of a den with four individuals approximately 100 feet from South Flynn Road, approximately 0.9 miles to the northeast (Occ. No. 43).

At the time of writing, Dudek is conducting a wildlife game camera study that is also intended to evaluate kit fox use of the study area. Although several burrows of suitable dimensions for use by San Joaquin kit fox were found during the initial February habitat assessment, no kit foxes or their sign have been detected during camera surveys or other wildlife surveys (e.g., burrowing owl and Swainson’s hawk surveys) and subsequent surveys are unlikely to detect any kit foxes due to the rarity of the species in this part of its range.

**American Badger (Taxidea taxus), SSC**

American badger occurs throughout California except for the extreme northwestern coastal area (Zeiner et al. 1990b) and higher elevations of the Sierra Nevada. This species prefers dry, open, treeless areas, grasslands, coastal scrub, agriculture, and pastures, especially with friable soils (Zeiner et al. 1990b). This species is considered somewhat tolerant of human activities (Zeiner et al. 1990b).

**Occurrence within Study Area**

**Clifton Court Forebay Dam**

There is suitable habitat within the Clifton Court Forebay Dam study area and there are known occurrences from the vicinity. American badger sign was observed in various locations within the study area (e.g., potential burrows and burrows with bones) by Dudek biologists during the 2021 field surveys.

**Dyer Dam**

There is suitable habitat within the Dyer Dam study area and game cameras detected an individual badger near the South Bay Aqueduct over chute in the southern portion of the study area in April 2021 as well as crossings to the south (see Section 4.5.4.4, Game Camera Results).

**Patterson Dam**

There is suitable habitat within the Patterson Dam study area and several burrows of appropriate dimensions for badger were observed by Dudek biologists during 2021 field surveys. An American badger skull and carcass were found along the northern portion of the study area by Dudek biologists during the 2021 field surveys.
4.5.4 Wildlife Movement

Wildlife movement includes local and regional travels by species intended to satisfy one or more of their needs. Wildlife corridors and habitat linkages help mitigate some of the impacts of habitat fragmentation by facilitating wildlife movement and improving habitat connectivity.

Wildlife corridors are areas that connect suitable wildlife habitat in a region otherwise fragmented by rugged terrain, changes in vegetation, or human disturbance. Natural features—such as canyon drainages, ridgelines, or areas with vegetation cover—provide corridors for wildlife travel. Wildlife corridors are important because they provide access to mates, food, and water; allow the dispersal of wildlife from high-density areas; and facilitate the exchange of genetic traits between populations (Beier and Loe 1992).

Habitat linkages are patches of native habitat that function to join two larger patches of habitat. They serve as connections between habitat patches and help reduce the adverse effects of habitat fragmentation. The linkage represents a potential route for gene flow and long-term dispersal. Habitat linkages may serve as both habitat and avenues of gene flow for small animals such as passerine birds, small mammals, reptiles, and amphibians. Habitat linkages may be represented by continuous patches of habitat or by nearby habitat “islands” that function as “stepping stones” for dispersal.

The study area may function as a portion of the home ranges (e.g., foraging for food or water, defending territories, searching for mates, breeding areas, or cover) for large-ranging species. For example, mule deer ranges are approximately 121 to 2,812 acres (49 to 1,138 hectares) (Kie et al. 2002), depending on the habitats available. Smaller species, such as butterflies, amphibians, reptiles, birds, and small mammals, have smaller home ranges; therefore, individuals of these species present in the study area may spend most of their lives within the study area. The dispersal of these smaller species occurs over multiple generations (Penrod et al. 2006).

4.5.4.1 Wildlife Movement and the Project Site

Clifton Court Forebay Dam

The Clifton Court Forebay Dam study area is located at the western edge of the San Joaquin Valley near its transition to the rolling foothills of the Diablo Range west of the Byron Highway. Clifton Court Forebay and the surrounding waterways—the California Aqueduct, the Old River, Italian Slough, and the West Canal—effectively block most wildlife movement potential in the vicinity of the study area. Some movement potential exists within the study area between Clifton Court Forebay and Bethany Reservoir to the southwest, but it is constrained by DWR support facilities and roads, leaving canal termini, overchutes (e.g., bridges, siphons), and underchutes (e.g., culverts), available for wildlife to use. Land is available to the north, but is generally fragmented by multiple canals and other wide waterways.

Wildlife corridors are considered sensitive by resource and conservation agencies. The study area is not readily identifiable as a corridor or linkage, because wildlife is not anticipated to normally move through the area due to existing human-made features (e.g., water bodies, roads, facilities, and canals). The forebay and canal system likely serve as barriers to wildlife movement from the surrounding ranchlands and Diablo foothills to the west for small, ground-based wildlife including California tiger salamander. The forebay, canals, and other anthropogenic features likely hinder San Joaquin kit fox movement as well. The Project site is not likely to be part of a regional corridor or linkage for large mammals due to the physical constraints to movement. While Byron Highway, and other roads
represent a significant barrier to larger mammal (e.g., coyote, bobcat \(\text{Lynx rufus}\), mule deer) movement, it is possible that occasional crossings may occur as multiple overchutes, underchutes, and road crossings are present along the California Aqueduct within the study area. The reservoir and canals themselves prevent nearly all movement across them for larger wildlife and smaller wildlife, such as San Joaquin kit foxes, raccoons, and rabbits; this wildlife likely finds few areas like concrete bridges, culverts, and overchutes where they can cross. It should be noted that the canals have allowed some atypical species (e.g., sea lion, American beaver, river otter) to move in and out of the study area, but are not considered key movement species related to this Project.

**Dyer Dam**

The Dyer Dam study area is in the Altamont Hills of the Diablo Range in eastern Alameda County, approximately 7 miles northeast of Livermore and 2.3 miles north of Interstate 580. It is located in a large expanse of annual grassland with various land uses such as wind energy facilities, private ranchland, waste management (i.e., Altamont Landfill approximately 0.5 miles to the east) through which most wildlife can move freely, although local movements are constrained by the fence around the reservoir, the South Bay Aqueduct, and fencing associated with other human land uses. Some movement potential exists within the study area at canal terminuses, overchutes, and underchutes, available for wildlife to use to navigate over and around the South Bay Aqueduct.

The Dyer Dam study area is in the “Mt. Diablo-Diablo Range” critical linkage mapped by the Critical Linkages: Bay Area and Beyond project (Penrod et al. 2013). It is one of 14 landscape-level habitat linkages identified by Critical Linkages that, together with the Bay Area Open Space Council’s Conservation Lands Network, provide a comprehensive plan for the preservation and maintenance of wildlife habitat connectivity throughout the nine-county Bay Area. The preliminary mapping of this linkage was based on the estimated needs of mountain lion (\(\text{Puma concolor}\)), bobcat (\(\text{Lynx rufus}\), California quail (\(\text{Callipepla californica}\)), and American badger, but it is also intended to serve several other species, such as San Joaquin kit fox, northern harrier, white-tailed kite, loggerhead shrike, San Joaquin whipsnake, coast horned lizard, California red-legged frog, and western spadefoot.

**Patterson Dam**

The Patterson Dam study area is located on the eastern edge of the Livermore Valley approximately 1 mile east of Livermore. Local wildlife movement is constrained by the South Bay Aqueduct. Additionally, movement in the vicinity of Patterson Dam is constrained by development to the west, Patterson Pass Road to the south, and Interstate 580 to the north. These combined barriers can be a substantial barrier to California tiger salamander, large mammals, and smaller wildlife, though some movement is possible across the South Bay Aqueduct overchutes in the vicinity. The Patterson Dam study area is also in the “Mt. Diablo-Diablo Range” critical linkage mapped by the Critical Linkages: Bay Area and Beyond project (Penrod et al. 2013) as described above for Dyer Dam.

**4.5.4.2 Mountain Lions**

Mountain lions are unlikely to occur in the Project site due to generally unsuitable habitat. More suitable mountain lion habitat exists to the northeast in more mountainous and isolated habitat. Suitable prey species occur throughout the region in the form of mule deer, rabbits, and other species. Because of the existing constraints to movement, mountain lions are not expected to be affected by the Project.
4.5.4.3 Migrating Birds

The study area is located within the Pacific Flyway, which is a major north-south migration route for birds that travel between North and South America. This is a broad-front route that covers much landscape. In Central California, birds typically use the coast and Central Valley with east/west sub routes in the San Francisco Bay area (Kay 2015). The Pacific Coast route is used by gulls, ducks, and other water birds. The longest and most important route of the Pacific Flyway is that originating in northeastern Alaska. This route, which includes most waterfowl and shorebirds, passes through the interior of Alaska and then branches such that large flights continue southeast into the Central and Mississippi Flyways, or they turn in a southwesterly direction and pass through the interior valleys of California, ending or passing through the Salton Sea. The southward route of long-distance migratory land birds of the Pacific Flyway that typically overwinter south of the United States extends through the interior of California to the mouth of the Colorado River, and on to winter quarters that may be located in western Mexico (USGS 2013). The Project sites are located on the western edge of the Central Valley routes and the presence of the reservoirs and river-like aqueduct attract migrating waterbirds. Evidence of this is provided by the large rafts of migrating waterfowl within the reservoirs and aqueducts observed during field work.

Migration timing varies from species to species, and for some, there is little documentation of the timing. In general, bird migration occurs March through April, and August through November. Small bird (passerine) migration occurs mostly at night. Small birds avoid areas that are more turbulent over mountains; therefore, they mostly follow the coast or inland areas to reach their wintering grounds farther south (e.g., Mexico to South America). Smaller birds that do migrate through the mountains will generally seek out forested areas that provide cover during daylight hours. Conversely, migrating raptors and other soaring birds tend to follow mountain ridges and use updrafts created by the topography. Most raptorial species (other than turkey vultures and Swainson’s hawks migrating to and from Mexico) migrate across a broad and diffuse front and are not known to concentrate movements anywhere.

4.5.4.4 Game Camera Results

Twelve mammal species or species groups have been recorded by the wildlife game cameras within the Project study area to date, including striped skunk (*Mephitis mephitis*), Virginia opossum (*Didelphis virginiana*), bobcat, California ground squirrel, coyote, American badger, gray fox (*Urocyon cinereoargenteus*), rabbits, and rodents (Table 12). It should be noted that there is no way to determine how many unique individuals were photographed, but an attempt was made to not double count individuals when photos were taken chronologically close to one another. The observations summarized in Table 12 should be compared to discern relative use of an area by a particular species. Refer to Figures 10A-B, 11A-B, and 12A-B for the location, direction and viewscape, and wildlife recorded at each camera station.

A single American badger was detected at SBA-OC-001 within the Dyer Dam study area on April 9, 2021 (Table 12). Individual badgers were also detected at a culvert and overchute approximately 390 feet (Camera ID SBA-UC-002) and 0.2 miles (Camera ID SBA-OC-002) south of the Dyer Dam study area between April 10 and 18, 2021.
### Table 12. Wildlife Game Camera Study Preliminary Results

<table>
<thead>
<tr>
<th>Camera ID&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Location/ Surrounding Vegetation</th>
<th>Wildlife Species Observed and Total Number of Records</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dyer Dam</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SBA-OC-001-E</td>
<td>Large open channel over chute over South Bay Aqueduct, 0.4 miles south of Dyer Reservoir. Surrounding vegetation primarily consists of open grassland.</td>
<td>American Badger 1  Coyote 5</td>
</tr>
<tr>
<td>SBA-OC-001-W</td>
<td>Large open channel over chute over South Bay Aqueduct, 0.4 miles south of Dyer Reservoir. Surrounding vegetation primarily consists of open grassland.</td>
<td>American Badger 1  Coyote 3  Rabbit sp. 1  Racoon 1</td>
</tr>
<tr>
<td>SBA-OC-002-E</td>
<td>Over chute pipe over South Bay Aqueduct, south of Dyer Reservoir. Surrounding vegetation primarily consists of open grassland.</td>
<td>Bobcat 2  California Ground Squirrel 139  Coyote 1  Rabbit sp. 19  Racoon 5  Rodent sp. 1</td>
</tr>
<tr>
<td>SBA-OC-002-W</td>
<td>Over chute pipe over South Bay Aqueduct, south of Dyer Reservoir. Surrounding vegetation primarily consists of California annual grassland.</td>
<td>American Badger 1  California Ground Squirrel 49  Rabbit sp. 3  Racoon 1  Rodent sp. 4</td>
</tr>
<tr>
<td>SBA-UC-002-E</td>
<td>Culvert under South Bay Aqueduct, south of Dyer Reservoir. Camera facing east. Surrounding vegetation primarily consists of California annual grassland.</td>
<td>Bobcat 1  California Ground Squirrel 4  Rabbit sp. 69  Racoon 2  Rodent sp. 11</td>
</tr>
<tr>
<td>SBA-UC-002W</td>
<td>Culvert under South Bay Aqueduct, south of Dyer Reservoir. Camera facing west. Surrounding vegetation primarily consists of California annual grassland.</td>
<td>American Badger 2  California Ground Squirrel 51  Rabbit sp. 155  Racoon 1  Rodent sp. 14</td>
</tr>
<tr>
<td><strong>Patterson Dam</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SBA-UC-009-E</td>
<td>Culvert under South Bay Aqueduct, north of Patterson Reservoir. Surrounding vegetation primarily consists of California annual grassland.</td>
<td>California Ground Squirrel 1  Coyote 1</td>
</tr>
</tbody>
</table>
## Table 12. Wildlife Game Camera Study Preliminary Results

<table>
<thead>
<tr>
<th>Camera ID*</th>
<th>Location/ Surrounding Vegetation</th>
<th>Wildlife Species Observed and Total Number of Records</th>
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<td>Species</td>
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<td></td>
<td>Total Number of Records</td>
</tr>
<tr>
<td>SBA-UC-009-W</td>
<td>Culvert under South Bay Aqueduct, north of Patterson Reservoir. Surrounding vegetation primarily consists of California annual grassland.</td>
<td>Coyote</td>
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<td></td>
<td></td>
<td>Rabbit Sp.</td>
</tr>
<tr>
<td>SBA-OC-011-E</td>
<td>Overchute pipe over South Bay Aqueduct, approx. 500 feet north-northwest of Patterson Reservoir. Surrounding vegetation primarily consists of California annual grassland.</td>
<td>Coyote</td>
</tr>
<tr>
<td>SBA-OC-011-W</td>
<td>Overchute pipe over South Bay Aqueduct, approx. 500 feet north-northwest of Patterson Reservoir. Surrounding vegetation primarily consists of California annual grassland.</td>
<td>Bobcat</td>
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<td></td>
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<td>California Ground Squirrel</td>
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<td>Rabbit sp.</td>
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<td></td>
<td>Striped skunk</td>
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<td></td>
<td></td>
<td>Virginia opossum</td>
</tr>
<tr>
<td>SBA-BR-005-NE</td>
<td>Patterson Pass Road bridge over the South Bay Aqueduct, south of Patterson Reservoir. Surrounding vegetation primarily consists of California annual grassland.</td>
<td>Domestic cat</td>
</tr>
<tr>
<td>SBA-BR-005-NW</td>
<td>Patterson Pass Road bridge over the South Bay Aqueduct, south of Patterson Reservoir. Surrounding vegetation primarily consists of California annual grassland.</td>
<td>Coyote</td>
</tr>
<tr>
<td></td>
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<td>Raccoon</td>
</tr>
<tr>
<td>SBA-BR-005-SE</td>
<td>Patterson Pass Road bridge over the South Bay Aqueduct, south of Patterson Reservoir. Surrounding vegetation primarily consists of California annual grassland.</td>
<td>Rabbit sp.</td>
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<td></td>
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<td>Grey fox.</td>
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<tr>
<td></td>
<td></td>
<td>Striped skunk</td>
</tr>
<tr>
<td>SBA-BR-005-SW</td>
<td>Patterson Pass Road bridge over the South Bay Aqueduct, south of Patterson Reservoir. Surrounding vegetation primarily consists of California annual grassland.</td>
<td>Domestic cow</td>
</tr>
</tbody>
</table>

**Notes:** SBA = South Bay Aqueduct; OC = overcrossing; BR = bridge; UC = underchute.
Camera ID codes: [DWR facility]-[crossing type]-[location ID]-[camera orientation].
5 References and Preparers

5.1 References Cited


BIOLOGICAL RESOURCES EXISTING CONDITIONS REPORT FOR THE DELTA DAMS RODENT BURROW REMEDIATION PROJECT, ALAMEDA AND CONTRA COSTA COUNTIES, CALIFORNIA


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BIOLOGICAL RESOURCES EXISTING CONDITIONS REPORT FOR THE DELTA DAMS RODENT BURROW REMEDIATION PROJECT, ALAMEDA AND CONTRA COSTA COUNTIES, CALIFORNIA


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Old River
West Canal
Italian Slough
Old River
Delta-Mendota Canal
Old River
Clifton Court Forebay
Dyer Reservoir
Patterson Reservoir
South Bay Reservoir

BASEMAP SOURCE: DWR 2020; USGS 2020; ESRI World Imagery

FIGURE 1
Project Location
Delta Dams Rodent Burrow Remediation Project
FIGURE 2A
Soils - Clifton Court Forebay Dam
Delta Dams Rodent Burrow Remediation Project

SOURCE: USDA NRCS Soils; ESRI World Imagery

Study Area
Soils

- Fc - Fluvaquents
- FcF - Fluvaquents, 0-2 percent slopes, frequently flooded
- Md - Merritt loam
- Rh - Rydes silt loam
- Sa - Sacramento clay
- Sb - Sacramento clay, alkali
- Sh - Solano loam
- Sk - Solano loam, strongly alkali
- Water
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Soils

- **AaC** - Altamont clay, 3-15 percent slopes
- **AaD** - Altamont clay, 15-30 percent slopes
- **AmE2** - Altamont clay, moderately deep, 30-45 percent slopes, eroded
- **CoC2** - Cotati fine sandy loam, eroded
- **Pd** - Pescadero clay

**FIGURE 2B**
Soils - Dyer Dam
Delta Dams Rodent Burrow Remediation Project

SOURCE: USDA NRCS Soils; ESRI Imagery
FIGURE 2C
Soils - Patterson Dam

SOURCE: USDA NRCS Soils; ESRI Imagery

Study Area
Soils
- LaE2 - Linne clay loam, 30-45 percent slopes, eroded
- RdB - Rincon clay loam, 3-7 percent slopes
- Sa - San Ysidro loam
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FIGURE 3
Hydrologic Setting
Delta Dams Rodent Burrow Remediation Project

SOURCE: USGS 2020; ESRI Shaded Relief
BIOLOGICAL RESOURCES EXISTING CONDITIONS REPORT FOR THE DELTA DAMS RODENT BURROW REMEDIATION PROJECT, ALAMEDA AND CONTRA COSTA COUNTIES, CALIFORNIA

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FIGURE 4C

Biological Study Area - Patterson Dam

Delta Dams Rodent Burrow Remediation Project
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**Generalized Vegetation Communities**

**Bog and Marsh**
- Alkali heath marsh; *Frankenia salina*
- American bulrush marsh; *Schoenoplectus americanus*
- Baltic and Mexican rush marshes; *Juncus arcticus var. balticus-var. mexicanus*
- Common and giant reed marshes; *Arundo donax*
- Hardstem and California bulrush marshes; *Schoenoplectus acutus*
- Iodine bush scrub; *Allenrolfea occidentalis*
- Iodine bush scrub; *Allenrolfea occidentalis-Distichlis spicata*
- Perennial pepper weed patches; *Lepidium latifolium*
- Quailbush scrub; *Atriplex lentiformis*
- Salt grass flats; *Distichlis spicata*
- Smartweed-cocklebur patches; *Polygonum-amphibus-lapathifolium*

**Dune**
- Ice plant mats; *Carpobrotus edulis*

**Grass and Herb Dominated**
- California brome-blue wildrye prairie; *Elymus glaucus*
- Perennial rye grass fields; *Lolium perenne-Hordeum marinum-Ranunculus californicus*
- Poison hemlock or fennel patches; *Conium maculatum*
- Upland mustards or star-thistle fields; *Brassica nigra*
- Wild oats and annual brome grasslands

**Riparian**
- Button willow thickets; *Cephalanthus occidentalis*
- Goodding's willow-red willow riparian woodland and forest; *Salix gooddingii*
- Himalayan blackberry-rattlebox-edible fig riparian scrub; *Rubus armeniacus*
- Hinds walnut and related stands; *Juglans hindsii*
- Red alder forest; *Alnus rubra-Salix lasiolepis-Rubus spp.*

**Scrub**
- Coyote brush scrub; *Baccharis pilularis*

**Other**
- Disturbed and Developed
INTENTIONALLY LEFT BLANK
Generalized Vegetation Communities

Bog and Marsh
- Cattail marshes; *Typha latifolia*
- Quailbush scrub; *Atriplex lentiformis*
- Salt grass flats; *Distichlis spicata*

Grass and Herb Dominated
- Needle grass-Melic grass grassland
  - Perennial rye grass fields; *Lolium perenne*  
  - *Hordeum marinum*-*Ranunculus californicus*  
- Upland mustards or star-thistle fields; *Carduus pycnocephalus*-*Silybum marianum*
- Upland mustards or star-thistle fields; *Brassica nigra*
- Wild oats and annual brome grasslands

Riparian
- Arroyo willow thickets; *Salix lasiolepis*

Other
- Disturbed and Developed

SOURCE: ESRI Imagery

FIGURE 5B
Vegetation Communities - Dyer Dam
Delta Dams Rodent Burrow Remediation Project
Generalized Vegetation Communities

Bog and Marsh
- Cattail marshes; *Typha latifolia*
- Hardstem and California bulrush marshes; *Schoenoplectus acutus*
- Salt grass flats; *Distichlis spicata*

Grass and Herb Dominated
- Needle grass-Melic grass grassland
- Upland mustards or star-thistle fields; *Brassica nigra*
- Upland mustards or star-thistle fields; *Raphanus sativus*
- Wild oats and annual brome grasslands

Other
- Disturbed and Developed

FIGURE 5C
Vegetation Communities - Patterson Dam
Delta Dams Rodent Burrow Remediation Project
BIOLOGICAL RESOURCES EXISTING CONDITIONS REPORT FOR THE DELTA DAMS RODENT BURROW REMEDIATION PROJECT, ALAMEDA AND CONTRA COSTA COUNTIES, CALIFORNIA

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FIGURE 9

Special-Status Plants - Clifton Court Forebay Dam

SOURCE: DWR 2020; ESRI World Imagery

Study Area
Special-Status Plants (CRPR 1B.2)

DWR Observation
- woolly rose-mallow (*Hibiscus lasiocarpos*)

Dudek Observation
- woolly rose-mallow (*Hibiscus lasiocarpos*)
- long-styled sand-spurrey (*Spergularia macrotheca*)

SOURCE: DWR 2020; ESRI World Imagery
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FIGURE 10A

Wildlife Camera Stations - Dyer Dam

Dyer Reservoir

SOURCE: DWR; ESRI World Imagery

Study Area
Wildlife Camera Station
Wildlife Camera Stations - Patterson Dam

Source: DWR; ESRI World Imagery

Study Area
Wildlife Camera Station

FIGURE 10B
Wildlife Camera Stations Results - Dyer Dam

Study Area
Wildlife Camera Station
Wildlife Camera Station Results
- American badger
- bobcat
- California ground squirrel
- coyote
- rabbit spp.
- raccoon
- rodent spp.

FIGURE 11A

Source: DWR, ESRI World Imagery

Source: DUDEK

Delta Dams Rodent Burrow Remediation Project
Wildlife Camera Stations Results - Patterson Dam

- bobcat
- California ground squirrel
- coyote
- domestic cat
- domestic cow
- grey fox
- rabbit spp.
- raccoon
-Striped skunk
-Virginia opossum

Study Area
Wildlife Camera Station
Wildlife Camera Station Results

SOURCE: DWR; ESRI World Imagery
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FIGURE 12A

Wildlife Camera Stations Direction and Viewscape - Dyer Dam

SOURCE: DWR; ESRI World Imagery

- Study Area
- Wildlife Camera Station
- Wildlife Camera Photo Direction
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Appendix A

Plant Species Observed within the Project Site
APPENDIX A
PLANT SPECIES OBSERVED WITHIN THE PROJECT SITE

Vascular Species

*Eudicots*

ADOXACEAE—MUSKROOT FAMILY

*Sambucus nigra* ssp. *caerulea*—blue elderberry

AIZOACEAE—FIG-MARIGOLD FAMILY

* Carpodetus edulis—hottentot fig
  * Sesuvium verrucosum—western sea-purslane

AMARANTHACEAE—AMARANTH FAMILY

* Amaranthus albus—prostrate pigweed

ANACARDIACEAE—SUMAC OR CASHEW FAMILY

* Schinus molle—Peruvian peppertree

APIACEAE—CARROT FAMILY

* Anthriscus caucalis—bur chervil
  * Conium maculatum—poison hemlock
  * Foeniculum vulgare—fennel
    * Lilaeopsis masonii—Mason’s lilaeopsis
  * Torilis arvensis—spreading hedgeparsley

APOCYNACEAE—DOGBANE FAMILY

* Apocynum cannabinum—Indianhemp
  * Asclepias fascicularis—Mexican whorled milkweed
  * Nerium oleander—oleander

ARALIACEAE—GINSENG FAMILY

* Hydrocotyle ranunculoides—floating marshpennywort
  * Hydrocotyle verticillata—whorled marshpennywort

ASTERACEAE—SUNFLOWER FAMILY

* Achillea millefolium—common yarrow
  * Artemisia douglasiana—Douglas’ sagewort
  * Baccharis pilularis ssp. *consanguinea*—coyotebrush
  * Baccharis salicifolia—mulefat
  * Carduus pycnocephalus ssp. *pycnocephalus*—Italian plumeless thistle
  * Centaurea solstitialis—yellow star-thistle
  * Centaurea sulphurea—sulphur knapweed
Appendix A
Plant Species Observed within the Project Site

Centromadia fitchii—Fitch’s tarweed
Centromadia pungens ssp. pungens—common tarweed
* Cirsium vulgare—bull thistle
* Cynara cardunculus—cardoon
Deinandra lobbii—three ray tarweed
* Dittrichia graveolens—stinkwort
Encelia californica—California brittle bush
Encelia farinosa—brittle bush
* Erigeron bonariensis—asthmaweed
Erigeron canadensis—Canadian horseweed
Euthamia occidentalis—western goldentop
Gnaphalium palustre—western marsh cudweed
Grindelia camporum—Great Valley gumweed
Helenium puberulum—rosilla
Helianthus annuus—common sunflower
* Helminthotheca echioides—bristly oxtongue
Heterotheca grandiflora—telegraphweed
* Hypochaeris glabra—smooth cat’s ear
* Lactuca serriola—prickly lettuce
Lagophylla ramosissima—branched lagophylla
Lasthenia fremontii—Fremont’s goldfields
Pluchea odorata—sweetscent
* Pseudognaphalium luteoalbum—Jersey cudweed
Psilocarphus brevissimus—short woollyheads
* Senecio vulgaris—old-man-in-the-Spring
* Silybum marianum—blessed milkthistle
* Sonchus asper—spiny sowthistle
Symphyotrichum lentum—Suisun Marsh aster
Symphyotrichum subulatum—eastern annual saltmarsh aster
* Tragopogon dubius—yellow salsify
Xanthium strumarium—cocklebur

BETULACEAE—BIRCH FAMILY
Alnus rhombifolia—white alder

BORAGINACEAE—BORAGE FAMILY
Amsinckia intermedia—common fiddleneck
Amsinckia lycopsoides—tarweed fiddleneck
Amsinckia menziesii—Menzies’ fiddleneck
Heliotroplum curassavicum—salt heliotrope
APPENDIX A
PLANT SPECIES OBSERVED WITHIN THE PROJECT SITE

BRASSICACEAE—MUSTARD FAMILY
* Brassica nigra—black mustard
* Hirschfeldia incana—shortpod mustard
* Lepidium chalepense—lenspod whitetop
* Lepidium latifolium—perennial pepper weed
* Lepidium nitidum—shining pepperweed
* Raphanus sativus—cultivated radish
* Rorippa palustris ssp. palustris—hispid yellowcress

CARYOPHYLLACEAE—PINK FAMILY
Spergularia macrotheca var. longistyla—long-styled sand-spurrey
Spergularia marina—saltmarsh sand-spurrey

CHENOPODIACEAE—GOOSEFOOT FAMILY
Allenrolfea occidentalis—iodine bush
Atriplex argentea var. expansa—silverscale saltbush
Atriplex argentea—silverscale saltbush
Atriplex cordulata var. cordulata—heartscale
Atriplex coronata var. coronata—crownscale
Atriplex depressa—brittlescale
Atriplex lentiformis—quailbush
* Atriplex prostrata—fat hen
* Atriplex semibaccata—Australian saltbush
* Bassia hyssopifolia—fivehorn smootherweed
* Chenopodium album—lambsquarters
* Chenopodium californicum—California goosefoot
* Chenopodium murale—nettleleaf goosefoot
* Dysphania ambrosioides—Mexican tea
* Salicornia pacifica—Pacific swampfire
* Salsola tragus—prickly Russian thistle
* Suaeda nigra—bush seepweed

CONVOLVULACEAE—MORNING-GLORY FAMILY
* Convolvulus arvensis—field bindweed
* Cressa truxillensis—alkali weed

CUCURBITACEAE—GOURD FAMILY
Marah fabacea—California man-root

EUPHORBIACEAE—SPURGE FAMILY
Croton setiger—dove weed
APPENDIX A

PLANT SPECIES OBSERVED WITHIN THE PROJECT SITE

- *Euphorbia albomarginata*—whitemargin sandmat
- *Ricinus communis*—castorbean
- *Triadica sebifera*—Chinese tallow

**FABACEAE—LEGUME FAMILY**
- *Astragalus gambelianus*—Gambel’s dwarf milkvetch
- *Caesalpinia gilliesii*—bird-of-paradise shrub
- *Lotus corniculatus*—bird’s-foot trefoil
- *Lupinus microcarpus*—valley lupine
- *Lupinus succulentus*—hollowleaf annual lupine
- *Medicago polymorpha*—burclover
- *Melilotus albus*—yellow sweetclover
- *Melilotus indicus*—annual yellow sweetclover
- *Trifolium hirtum*—rose clover
- *Vicia benghalensis*—purple vetch
- *Vicia villosa*—winter vetch

**FAGACEAE—OAK FAMILY**
- *Quercus sp.*—oak

**FRANKENIACEAE—FRANKENIA FAMILY**
- *Frankenia salina*—alkali heath

**GENTIANACEAE—GENTIAN FAMILY**
- *Zeltnera muehlenbergii*—Muhlenberg’s centaury

**GERANIACEAE—GERANIUM FAMILY**
- *Erodium botrys*—longbeak stork’s bill
- *Erodium cicutarium*—redstem stork’s bill
- *Erodium moschatum*—musky stork’s bill
- *Geranium dissectum*—cutleaf geranium
- *Geranium sp.*—geranium

**HALORAGACEAE—WATER-MILFOIL FAMILY**
- *Myriophyllum sp.*—watermilfoil

**JUGLANDACEAE—WALNUT FAMILY**
- *Juglans hindsii*—Northern California black walnut

**LAMIACEAE—MINT FAMILY**
- *Lamium amplexicaule*—henbit deadnettle
- *Lycopus americanus*—American water horehound
APPENDIX A
PLANT SPECIES OBSERVED WITHIN THE PROJECT SITE

* Marrubium vulgare—horehound
* Mentha arvensis—wild mint
  Pogogyne zyzphoroides—Sacramento mesamint

LYTHRACEAE—LOOSESTRIFE FAMILY
* Lythrum hyssopifolia—hyssop loosestrife

MALVACEAE—MALLOW FAMILY
  Hibiscus lasiocarpos var. occidentalis—woolly rose-mallow
* Malva arborea—tree mallow
* Malva parviflora—cheeseweed mallow
  Malvella leprosa—alkali mallow

MORACEAE—MULBERRY FAMILY
* Ficus carica—edible fig
* Morus alba—white mulberry

MYRSINACEAE—MYRISNE FAMILY
* Lysimachia arvensis—scarlet pimpernel

MYRTACEAE—MYRTLE FAMILY
* Eucalyptus sp.—eucalyptus

OLEACEAE—OLIVE FAMILY
  Fraxinus dipetala—California ash
* Ligustrum lucidum—glossy privet
* Olea europaea—olive

ONAGRACEAE—EVENING PRIMROSE FAMILY
  Epilobium brachycarpum—tall annual willowherb
  Epilobium ciliatum—fringed willowherb
* Ludwigia peplus ssp. peplus—floating primrose-willow
* Ludwigia peplus—floating primrose-willow
  Oenothera elata—Hooker’s evening primrose
  Oenothera sp.—evening-primrose

OROBRANCHACEAE—BROOM-RAPE FAMILY
* Bellardia trixago—Mediterranean lineseed
  Castilleja exserta ssp. exserta—exserted Indian paintbrush

PAPAVERACEAE—POPPY FAMILY
  Eschscholzia californica—California poppy
APPENDIX A
PLANT SPECIES OBSERVED WITHIN THE PROJECT SITE

PLANTAGINACEAE—PLANTAIN FAMILY
* Plantago lanceolata—narrowleaf plantain

PLATANACEAE—PLANE TREE, SYCAMORE FAMILY
Platanus racemosa—California sycamore

POLYGONACEAE—BUCKWHEAT FAMILY
Persicaria amphibia—longroot smartweed
* Persicaria hydropiper—marshpepper knotweed
* Polygonum aviculare—prostrate knotweed
  Rumex californicus—toothed willow dock
* Rumex crispus—curly dock
  Rumex salicifolius—willow dock

ROSACEAE—ROSE FAMILY
* Prunus dulcis—sweet almond
  Rosa californica—California rose
* Rosa multiflora—multiflora rose
* Rubus armeniacus—Himalayan blackberry
  Rubus ursinus—California blackberry

RUBIACEAE—MADDER FAMILY
Cephalanthus occidentalis—button willow

SALICACEAE—WILLOW FAMILY
Populus fremontii—Fremont cottonwood
  Salix exigua—sandbar willow
  Salix gooddingii—Goodding’s willow
  Salix laevigata—red willow
  Salix lasiolepis—arroyo willow

SAPINDACEAE—SOAPBERRY FAMILY
Acer negundo—box-elder

SOLANACEAE—NIGHTSHADE FAMILY
* Nicotiana glauca—tree tobacco
  Nicotiana quadrivalvis—Indian tobacco
  Solanum americanum—American black nightshade
* Solanum carolinense—Carolina horsenettle

TAMARICACEAE—TAMARISK FAMILY
* Tamarix ramosissima—tamarisk
APPENDIX A
PLANT SPECIES OBSERVED WITHIN THE PROJECT SITE

URTICACEAE—NETTLE FAMILY
   * Urtica dioica ssp. gracilis—California nettle
   * Urtica dioica—stinging nettle

VERBENACEAE—VERVAIN FAMILY
   Phyla nodiflora—turkey tangle fogfruit
   * Verbena bonariensis—purpletop vervain
   * Verbena lasiostachys—western vervain

   Ferns and Fern Allies

AZOLLACEAE—MOSQUITO FERN FAMILY
   * Azolla filiculoides—Pacific mosquitofern

   Gymnosperms and Gnetophytes

PINACEAE—PINE FAMILY
   * Pinus sp.—pine

   Monocots

AGAVACEAE—AGAVE FAMILY
   Chlorogalum pomeridianum—wavyleaf soap plant

ARACEAE—ARUM FAMILY
   Lemna minuta—least duckweed

ARECACEAE—PALM FAMILY
   * Chamaerops humilis—Mediterranean fan palm
   * Phoenix dactylifera—date palm
   * Washingtonia robusta—Washington fan palm

ASPARAGACEAE—ASPARAGUS FAMILY
   * Asparagus officinalis—garden asparagus

CYPERACEAE—SEDGE FAMILY
   Bolboschoenus maritimus ssp. paludosus—cosmopolitan bulrush
   * Carex nebrascensis—Nebraska sedge
   * Carex obturata—slough sedge
   Cyperus eragrostis—tall flat sedge
   Eleocharis sp.—beautiful spikerush
   Schoenoplectus acutus—hardstem bulrush
   * Schoenoplectus americanus—American bulrush
   * Schoenoplectus triqueter—three-sided bulrush
HYDROCHARITACEAE—WATERWEED FAMILY
* Egeria densa—Brazilian waterweed
  Elodea canadensis—Canadian waterweed

IRIDACEAE—IRIS FAMILY
* Iris pseudacorus—paleyellow iris

JUNCACEAE—RUSH FAMILY
  Juncus balticus—no common name
* Juncus effusus ssp. effusus—lamp rush
  Juncus occidentalis—western rush
  Juncus xiphioides—irisleaf rush

POACEAE—GRASS FAMILY
* Arundo donax—giant reed
* Avena barbata—slender oat
* Avena fatua—wild oat
* Bromus diandrus—ripgut brome
* Bromus hordeaceus—soft brome
* Bromus madritensis—compact brome
* Bromus rubens—red brome
* Festuca turgida—tall fescue
* Festuca myuros—rat-tail fescue
* Festuca pratensis—perennial rye grass
  Hordeum brachyantherum—meadow barley
* Hordeum marinum ssp. glussoneanum—Mediterranean barley
* Hordeum murinum—mouse barley
* Paspalum dilatatum—theallisgrass
* Phalaris aquatica—Harding grass
* Polypogon monspeliensis—annual rabbitsfoot grass
  Setaria parviflora—marsh bristlegrass
* Setaria sp.—bristlegrass
* Sorghum halepense—Johnsongrass
  Stipa pulchra—purple needlegrass
APPENDIX A
PLANT SPECIES OBSERVED WITHIN THE PROJECT SITE

PONTEDERIACEAE—PICKEREL-WEED FAMILY
*Eichhornia crassipes—common water hyacinth

THEMIDACEAE—BRODIAEA FAMILY
Triteleia laxa—Ithuriel’s spear

TYPHACEAE—CATTAIL FAMILY
Typha angustifolia—narrowleaf cattail
Typha latifolia—broadleaf cattail
Typha sp.—cattail

*Signifies introduced (non-native) species
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APPENDIX B

WILDLIFE SPECIES OBSERVED WITHIN THE PROJECT SITE

Amphibians

Frogs

Ranidae—True Frogs

Rana draytonii—California red-legged frog

Birds

Blackbirds, Orioles and Allies

Icteridae—Blackbirds

Agelaius phoeniceus—red-winged blackbird
Euphagus cyanocephalus—Brewer's blackbird
Sturnella neglecta—western meadowlark

Cormorants

Phalacrocoracidae—Cormorants

Phalacrocorax auritus—double-crested cormorant

Falcons

Falconidae—Caracaras and Falcons

Falco sparverius—American kestrel

Finches

Fringillidae—Fringilline and Cardueline Finches and Allies

Haemorhous mexicanus—house finch

Flycatchers

Tyrannidae—Tyrant Flycatchers

Sayornis nigricans—black phoebe

Grebes

Podicipedidae—Grebes

Aechmophorus clarkii—Clark's grebe
APPENDIX B
WILDLIFE SPECIES OBSERVED WITHIN THE PROJECT SITE

Hawks

**ACIPITRIDAE—hawks, Kites, Eagles, and Allies**
- *Aquila chrysaetos*—golden eagle
- *Buteo jamaicensis*—red-tailed hawk
- *Buteo swainsoni*—Swainson’s hawk
- *Elanus leucurus*—white-tailed kite
- *Haliaeetus leucocephalus*—bald eagle
- *Circus hudsonius*—northern harrier

Herons and Bitterns

**ARDEIDAE—Herons, Bitterns, and Allies**
- *Ardea alba*—great egret
- *Ardea herodias*—great blue heron

Jays, Magpies and Crows

**CORVIDAE—Crows and Jays**
- *Corvus brachyrhynchos*—American crow
- *Corvus corax*—common raven

Kingfishers

**ALCEDINIDAE—Kingfishers**
- *Megaceryle alcyon*—banded kingfisher

Kinglets

**REGULIDAE—Kinglets**
- *Regulus calendula*—ruby-crowned kinglet

Mockingbirds and Thrashers

**MIMIDAE—Mockingbirds and Thrashers**
- *Mimus polyglottos*—northern mockingbird

New World Quail

**ODONTOPHORIDAE—New World Quail**
- *Callipepla californica*—California quail
APPENDIX B
WILDLIFE SPECIES OBSERVED WITHIN THE PROJECT SITE

New World Vultures

**CATHARTIDAE—NEW WORLD VULTURES**
Cathartes aura—turkey vulture

Owls

**STRIGIDAE—TYPICAL OWLS**
Athene cunicularia—burrowing owl
Bubo virginianus—great horned owl

**PELECANIDAE—PELICANS**
Pelecanus erythrorhynchos—American white pelican

Pelicans

Pigeons and Doves

**COLUMBIDAE—PIGEONS AND DOVES**
Zenaida macroura—mourning dove

**RALLIDAE—RAILS, GALLINULES, AND COOTS**
Fulica americana—American coot

Shorebirds

**CHARADRIIDAE—LAPWINGS AND PLOVERS**
Charadrius vociferus—killdeer

Shrikes

**LANIIDAE—SHRIKES**
Lanius ludovicianus—loggerhead shrike

**STURNIDAE—STARLINGS**
* Sturnus vulgaris—European starling
Swallows

HIRUNDINIDAE—SWALLows
  Petrochelidon pyrrhonota—cliff swallow

Wagtails and Pipits

MOTACILLIDAE—WAGTAILS AND PIPITS
  Anthus rubescens—American pipit

Waterfowl

ANATIDAE—Ducks, Geese, and Swans
  Anas platyrhynchos—mallard
  Branta canadensis—Canada goose
  Bucephala albeola—bufflehead
  Mergus serrator—red-breasted merganser

Wood Warblers and Allies

PARULIDAE—WOOD-WARBLERS
  Geothlypis trichas—common yellowthroat
  Setophaga coronata—yellow-rumped warbler

Wrens

TROGLODYTIDAE—WRENS
  Thryomanes bewickii—Bewick’s wren

New World Sparrows

PASSERELIDAE—NEW WORLD SPARRows
  Melospiza lincolnii—Lincoln’s sparrow
  Melospiza melodia—song sparrow
  Passerculus sandwichensis—savannah sparrow
  Passerella iliaca—fox sparrow
  Pipilo maculatus—spotted towhee
  Zonotrichia leucophrys—white-crowned sparrow
Mammals

*Canids*

**CANIDAE—WOLVES AND FOXES**
*Canis latrans*—coyote

**Mustelids**

**MUSTELIDAE—WEASELS, SKUNKS, AND OTTERS**
*Lontra canadensis*—North American river otter
*Taxidea taxus*—American badger

**Squirrels**

**SCIURIDAE—SQUIRRELS**
*Spermophilus (Otospermophilus) beecheyi*—California ground squirrel

**Reptiles**

**Lizards**

**PHRYNOSOMATICIDAE—IGUANID LIZARDS**
*Sceloporus occidentalis*—western fence lizard

**Snakes**

**COLUBRIDAE—COLUBRID SNAKES**
*Lampropeltis californiae*—California kingsnake

**Turtles**

**EMYDIDAE—BOX AND WATER TURTLES**
*Actinemys marmorata*—northwestern pond turtle
APPENDIX B
WILDLIFE SPECIES OBSERVED WITHIN THE PROJECT SITE

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Appendix C

Special-Status Plant Species’ Potential to Occur within the Project Site
<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Status (Federal/State/ CRPR)</th>
<th>Primary Habitat Associations/ Life Form/ Blooming Period/ Elevation Range (feet)</th>
<th>Potential to Occur: Clifton Court Forebay Dam</th>
<th>Potential to Occur: Dyer Dam</th>
<th>Potential to Occur: Patterson Dam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sharpsmith’s onion</td>
<td>Allium sharpsmithiae</td>
<td>None/None/1B.3</td>
<td>Chaparral, Cismontane woodland; serpentine, rocky/perennial bulbiferous herb/Mar-May/3,110–3,935</td>
<td>Not expected to occur. The site is outside of the species’ known elevation range, there is no suitable vegetation present, and this species is not known to occur within the region of the site. There are no serpentine soils mapped on site (Calflora 2021). This species was not observed during April 2021 rare plant surveys.</td>
<td>Not expected to occur. The site is outside of the species’ known elevation range, there is no suitable vegetation present, and this species is not known to occur within the region of the site. There are no serpentine soils mapped on site (Calflora 2021). This species was not observed during March 2021 or May rare plant surveys.</td>
<td>Not expected to occur. The site is outside of the species’ known elevation range and there is no suitable vegetation present. This species was not observed during March or May 2021 rare plant surveys.</td>
</tr>
<tr>
<td>large-flowered fiddleneck</td>
<td>Amsinckia grandiflora</td>
<td>FE/SE/1B.1</td>
<td>Cismontane woodland, Valley and foothill grassland/annual herb/(Mar)Apr–May/886–1,800</td>
<td>Not expected to occur. The site is outside of the species’ known elevation range. This species was not observed during April 2021 rare plant surveys.</td>
<td>Not expected to occur. This species was not observed during March or May 2021 rare plant surveys and the site is outside of the known elevation range of the species.</td>
<td>Not expected to occur. This species was not observed during May or July 2021 rare plant surveys.</td>
</tr>
<tr>
<td>bent-flowered fiddleneck</td>
<td>Amsinckia lunaris</td>
<td>None/None/1B.2</td>
<td>Coastal bluff scrub, Cismontane woodland, Valley and foothill grassland/annual herb/Mar–June/10–1,640</td>
<td>Not expected to occur. The species was not observed during April 2021 rare plant surveys.</td>
<td>Not expected to occur. The closest known occurrence of this species is over 2 miles northwest (CDFW 2021). Additionally, this species was not observed during March or May 2021 rare plant surveys.</td>
<td>Not expected to occur. The closest known occurrence of this species is over 2 miles northwest (CDFW 2021). Additionally, this species was not observed during March or May 2021 rare plant surveys.</td>
</tr>
<tr>
<td>Mt. Diablo manzanita</td>
<td>Arctostaphylos auriculata</td>
<td>None/None/1B.3</td>
<td>Chaparral (sandstone), Cismontane woodland/perennial evergreen shrub/Jan–Mar/443–2,130</td>
<td>Not expected to occur. The site is outside of the species’ known elevation range, there is no suitable vegetation present, and this species is not known to occur within the region of the site. Additionally, it is a large perennial shrub that would have been observed if present; no Arctostaphylos (manzanita) species were observed during March 2021 rare plant surveys.</td>
<td>Not expected to occur. No suitable vegetation present. Additionally, it is a large perennial shrub that would have been observed if present; no Arctostaphylos (manzanita) species were observed during March 2021 rare plant surveys.</td>
<td>Not expected to occur. No suitable vegetation present. Additionally, it is a large perennial shrub that would have been observed if present; no Arctostaphylos (manzanita) species were observed during March 2021 rare plant surveys.</td>
</tr>
<tr>
<td>Contra Costa manzanita</td>
<td>Arctostaphylos manzanita ssp. laevigata</td>
<td>None/None/1B.2</td>
<td>Chaparral (rocky)/perennial evergreen shrub/Jan–Mar/443–2,130</td>
<td>Not expected to occur. The site is outside of the species’ known elevation range and there is no suitable vegetation present. This species was not observed during March 2021 rare plant surveys.</td>
<td>Not expected to occur. The site is outside of the species’ known elevation range and there is no suitable vegetation present. This species was not observed during March 2021 rare plant surveys.</td>
<td>Not expected to occur. The site is outside of the species’ known elevation range and there is no suitable vegetation present. This species was not observed during March 2021 rare plant surveys.</td>
</tr>
<tr>
<td>alkali milk-vetch</td>
<td>Astragalus tenerr var. tenerr</td>
<td>None/None/1B.2</td>
<td>Playas, Valley and foothill grassland (adobe clay), Vernal pools, alkaline/annual herb/Mar–June/3–1,595</td>
<td>Not expected to occur. There are no playas, vernal pools, or grasslands with adobe clay on site. Additionally, this species was not observed during April 2021 rare plant surveys.</td>
<td>Not expected to occur. The site is outside of the species’ known elevation range. This species was not observed during March or May 2021 rare plant surveys.</td>
<td>Not expected to occur. The site is outside of the species’ known elevation range. This species was not observed during March or May 2021 rare plant surveys.</td>
</tr>
<tr>
<td>heartscale</td>
<td>Atriplex cordulata var. cordulata</td>
<td>None/None/1B.2</td>
<td>Chenopod scrub, Meadows and seeps, Valley and foothill grassland (sand); saline or alkaline/annual herb/Apr–Oct/0–1,835</td>
<td>Observed. 14 individuals were observed on the north and west side of the Clifton Court Forebay biological resources study area by Dudek in 2021.</td>
<td>Low potential to occur. Suitable habitat present and species known to occur in the vicinity. However, this species was not observed during the July 2021 surveys.</td>
<td>Low potential to occur. Suitable habitat present and species known to occur in the vicinity. However, this species was not observed during the July 2021 surveys.</td>
</tr>
<tr>
<td>Lost Hills crownscale</td>
<td>Atriplex coronata var. vaicolla</td>
<td>None/None/1B.2</td>
<td>Chenopod scrub, Valley and foothill grassland, Vernal pools; alkaline/annual herb/Apr–Sep/164–2,080</td>
<td>Not expected to occur. The site is outside of the species’ known elevation range.</td>
<td>Not expected to occur. This closest known occurrence is over 65 miles south of the site (CDFW 2021) and there are no alkaline soils on site. Additionally, this species was not observed during the May or July 2021 surveys.</td>
<td>Not expected to occur. This closest known occurrence is over 65 miles south of the site (CDFW 2021) and there are no alkaline soils on site. Additionally, this species was not observed during May or July 2021 rare plant surveys.</td>
</tr>
<tr>
<td>brittlescale</td>
<td>Atriplex depressa</td>
<td>None/None/1B.2</td>
<td>Chenopod scrub, Meadows and seeps, Playas, Valley and foothill grassland, Vernal pools; alkaline/clay/annual herb/Apr–Oct/3–1,045</td>
<td>Observed. 10 individuals were observed on the south side of the Clifton Court Forebay biological resources study area by Dudek in 2021.</td>
<td>Low potential to occur. Suitable grasslands present and species known to occur in the vicinity. However, this species as not observed during the May or July 2021 surveys.</td>
<td>Low potential to occur. Suitable grasslands present and species known to occur in the vicinity. However, this species as not observed during the May or July 2021 surveys.</td>
</tr>
<tr>
<td>Common Name</td>
<td>Scientific Name</td>
<td>Status (Federal/State/CRPR)</td>
<td>Primary Habitat Associations/ Life Form/ Blooming Period/ Elevation Range (feet)</td>
<td>Potential to Occur: Clifton Court Forebay Dam</td>
<td>Potential to Occur: Dyer Dam</td>
<td>Potential to Occur: Patterson Dam</td>
</tr>
<tr>
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</tr>
<tr>
<td>lesser saltscale</td>
<td>Atriplex minuscula</td>
<td>None/None/1B.1</td>
<td>Choropod scrub, Playas, Valley and foothill grassland; alkaline, sandy/ annual herb/May–Oct/45–655</td>
<td>Low potential to occur. Suitable grasslands present and species known to occur less than 2 miles from the site (CDFW 2021). However, this species was not observed during July 2021 rare plant surveys.</td>
<td>Low potential to occur. Suitable grasslands present and species known to occur in the vicinity. However, this species was not observed during the May or July 2021 surveys.</td>
<td>Low potential to occur. Suitable grasslands present and species known to occur in the vicinity. However, this species was not observed during the May or July 2021 surveys.</td>
</tr>
<tr>
<td>big-scale balsamroot</td>
<td>Balsamorhiza macrolepis</td>
<td>None/None/1B.2</td>
<td>Chaparral, Cismontane woodland, Valley and foothill grassland; sometimes serpentine/perennial herb/ Mar–June/148–5,100</td>
<td>Not expected to occur. The site is outside of the species’ known elevation range. This species was not observed during April 2021 rare plant surveys.</td>
<td>Not expected to occur. Although there is suitable grassland on site, the closest known location is over 7 miles from the site (CDFW 2021). Additionally, this species was not observed during March or May 2021 rare plant surveys.</td>
<td>Low potential to occur. There is suitable grasslands on site and the species is known to occur in the vicinity. However, this species was not observed during July 2021 rare plant surveys.</td>
</tr>
<tr>
<td>big tarplant</td>
<td>Blepharizonia plumosa</td>
<td>None/None/1B.1</td>
<td>Valley and foothill grassland; Usually clay/annual herb/July–Oct/98–1,655</td>
<td>Not expected to occur. Suitable grassland present and species known to occur in the region of the site; however, the site is outside of the species’ known elevation range. Additionally, this species was not observed during July 2021 rare plant surveys.</td>
<td>Low to potential too occur. Suitable grasslands present and species known to occur in the vicinity. However, this species was not observed during July 2021 rare plant surveys.</td>
<td>Low potential to occur. Suitable grasslands present and species known to occur in the vicinity. However, this species was not observed during July 2021 rare plant surveys.</td>
</tr>
<tr>
<td>Mt. Diablo fairy-lantern</td>
<td>Calochortus pulchellus</td>
<td>None/None/1B.2</td>
<td>Chaparral, Cismontane woodland, Riparian woodland, Valley and foothill grassland/perennial bulbiferous herb/ Apr–June/98–2,755</td>
<td>Not expected to occur. There is suitable riparian habitat and grasslands on site and the species is known to occur less than 8 miles from the site (CDFW 2021). However, this species was not observed during April 2021 rare plant surveys.</td>
<td>Not expected to occur. Suitable riparian habitat and grasslands on site. Species known to occur approximately 4 miles away (CDFW 2021). However, this species was not observed during they May 2021 surveys.</td>
<td>Low potential to occur. There is suitable grasslands on the site and the species is known to occur approximately 7 miles from the site (CDFW 2021). However, this species was not observed during the May 2021 surveys.</td>
</tr>
<tr>
<td>chaparral harebell</td>
<td>Campanula exigua</td>
<td>None/None/1B.2</td>
<td>Chaparral (rocky, usually serpentine)/ annual herb/May–June/902–4,100</td>
<td>Not expected to occur. The site is outside of the species’ known elevation range and there is no suitable vegetation present.</td>
<td>Not expected to occur. No suitable vegetation present.</td>
<td>Not expected to occur. The site is outside of the species’ known elevation range and there is no suitable vegetation present.</td>
</tr>
<tr>
<td>bristly sedge</td>
<td>Carex comosa</td>
<td>None/None/2B.1</td>
<td>Coastal prairie, Marshes and swamps (lake margins), Valley and foothill grassland/perennial rhizomatous herb/ May–Sep/0–2,050</td>
<td>Not expected to occur. There is suitable habitat on site and the species is known to occur within the region of the site. However, this species was not observed during July 2021 rare plant surveys.</td>
<td>Not expected to occur. Although suitable habitat is present on site, this species is known to occur within the region of the site.</td>
<td>Not expected to occur. Although suitable habitat is present on site, this species is known to occur within the region of the site.</td>
</tr>
<tr>
<td>Lemmon’s jewelflower</td>
<td>Caulanthus lemmonii</td>
<td>None/None/1B.2</td>
<td>Pinyon and juniper woodland, Valley and foothill grassland/annual herb/ Feb–May/262–5,180</td>
<td>Not expected to occur. The site is outside of the species’ known elevation range. This species was not observed during April 2021 rare plant surveys.</td>
<td>Not expected to occur. While there is suitable grassland on site, the species is not known to occur in the vicinity. Additionally, this species was not observed during March or May 2021 rare plant surveys.</td>
<td>Not expected to occur. While there is suitable grassland on site, the species is not known to occur in the vicinity. Additionally, this species was not observed during March or May 2021 rare plant surveys.</td>
</tr>
<tr>
<td>Hoover’s crypantha</td>
<td>Cryptantha hooveri</td>
<td>None/None/1A</td>
<td>Inland dunes, Valley and foothill grassland (sandy)/annual herb/ Apr–May/30–490</td>
<td>Not expected to occur. Although suitable habitat is present on site, this species is not known to occur within the region of the site.</td>
<td>Not expected to occur. The site is outside of the species’ known elevation range.</td>
<td>Not expected to occur. Although suitable habitat is present on site, this species is not known to occur within the region of the site.</td>
</tr>
<tr>
<td>Congdon’s tarplant</td>
<td>Centromadia grandis</td>
<td>None/None/1B.1</td>
<td>Valley and foothill grassland (alkaline)/ annual herb/May–Oct (Nov)/0–755</td>
<td>Not expected to occur. There are suitable grasslands present and alkaline soils present and species is known to occur in the region of the site. However, this species was not observed during July 2021 rare plant surveys.</td>
<td>Low potential to occur. There are suitable grasslands present and alkaline soils present and species is known to occur in the vicinity of the site. However, this species was not observed during the May or July 2021 rare plant surveys.</td>
<td>Low potential to occur. There are suitable grasslands present and alkaline soils present and species is known to occur in the vicinity of the site. However, this species was not observed during the May or July 2021 rare plant surveys.</td>
</tr>
<tr>
<td>dwarf soaproot</td>
<td>Chlorogalum pomeridianum var. minus</td>
<td>None/None/1B.2</td>
<td>Chaparral (serpentine)/perennial bulbiferous herb/May–Aug/ 1,000–3,280</td>
<td>Not expected to occur. The site is outside of the species’ known elevation range, there is no suitable vegetation present, and this species is not known to occur within the region of the site.</td>
<td>Not expected to occur. The site is outside of the species’ known elevation range, there is no suitable vegetation present. The site lacks serpentine soils. Additionally, this species was not expected to occur. Not expected to occur. The site is outside of the species’ known elevation range and there is no suitable vegetation present. The site lacks serpentine soils. Additionally, this species was not expected to occur.</td>
<td>Not expected to occur. The site is outside of the species’ known elevation range and there is no suitable vegetation present. The site lacks serpentine soils. Additionally, this species was not expected to occur.</td>
</tr>
<tr>
<td>Common Name</td>
<td>Scientific Name</td>
<td>Status (Federal/State/ CRPR)</td>
<td>Primary Habitat Associations/ Life Form/ Blooming Period/ Elevation Range (feet)</td>
<td>Potential to Occur: Clifton Court Forebay Dam</td>
<td>Potential to Occur: Dyer Dam</td>
<td>Potential to Occur: Patterson Dam</td>
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</tr>
<tr>
<td>hispid bird's-beak</td>
<td>Chloropyron melle ssp. hispidum</td>
<td>None/None/1B.1</td>
<td>Meadows and seeps, Plays, Valley and foothill grassland; alkaline/annual herb (hemiparastic)/June–Sept/3–510</td>
<td>Not expected to occur. Suitable grasslands and alkaline soils present on site. Species known to occur in the region. However, this species was not observed during July 2021 rare plant surveys.</td>
<td>Not expected to occur. The site is outside of the species' known elevation range. Additionally, this species was not observed during the July 2021 rare plant surveys.</td>
<td>Not expected to occur. The site is outside of the species' known elevation range. Additionally, this species was not observed during the July 2021 rare plant surveys.</td>
</tr>
<tr>
<td>palmate-bracted bird's-beak</td>
<td>Chloropyron palmatum</td>
<td>FE/SE/1B.1</td>
<td>Chenoedop scrub, Valley and foothill grassland; alkaline/annual herb (hemiparastic)/May–Oct/16–510</td>
<td>Not expected to occur. Suitable grasslands and alkaline soils present on site. Species known to occur in the region. Site elevation slightly below known elevation of species, but within 10 feet above mean sea level. However, this species was not observed during July 2021 rare plant surveys.</td>
<td>Not expected to occur. The site is outside of the species' known elevation range. Additionally, this species was not observed during the July 2021 rare plant surveys.</td>
<td>Not expected to occur. The site is outside of the species' known elevation range. Additionally, this species was not observed during the July 2021 rare plant surveys.</td>
</tr>
<tr>
<td>Bolander’s water-hemlock</td>
<td>Cicuta maculata var. bolanderi</td>
<td>None/None/2B.1</td>
<td>Marshes and swamps; Coastal, fresh or brackish water perennial/herb/July–Sep/0–655</td>
<td>Low potential to occur. Suitable marsh habitat present and species known to occur in the region. However, this species was not observed during July 2021 rare plant surveys.</td>
<td>Not expected to occur. The site is outside of the species' known elevation range. Additionally, this species was not observed during the July 2021 rare plant surveys.</td>
<td>Not expected to occur. This species is not known to occur within the region. Additionally, this species was not observed during the July 2021 rare plant surveys.</td>
</tr>
<tr>
<td>Mt. Hamilton thistle</td>
<td>Cirsium fontinalis var. campyon</td>
<td>None/None/1B.2</td>
<td>Chaparrel, Clismontane woodland, Valley and foothill grassland; serpentinite seeps/ perennial herb/(Feb)/Apr–Oct/328–2,915</td>
<td>Not expected to occur. The site is outside of the species' known elevation range and this species is not known to occur within the region of the site. This species was not observed during April 2021 rare plant surveys.</td>
<td>Not expected to occur. Although suitable habitat is present on site, this species is not known to occur within the region of the site. This species was not observed during March, May, or July 2021 rare plant surveys.</td>
<td>Not expected to occur. While there is suitable grasslands present, the site lacks serpentinite soils. Additionally, this species was not observed during March, May, or July 2021 rare plant surveys.</td>
</tr>
<tr>
<td>Livermore tarplant</td>
<td>Delianandra baciguapui</td>
<td>None/SE/1B.1</td>
<td>Meadows and seeps (alkaline)/annual herb/June–Oct/492–605</td>
<td>Not expected to occur. The site is outside of the species' known elevation range.</td>
<td>Not expected to occur. While there is mesic habitat on site, the site is outside of the known elevation ranges of the species. Additionally, this species was not observed during July 2021 rare plant surveys.</td>
<td>Not expected to occur. While there is mesic habitat on site, the site is outside of the known elevation ranges of the species. Additionally, this species was not observed during July 2021 rare plant surveys.</td>
</tr>
<tr>
<td>Hospital Canyon larkspur</td>
<td>Delphinium californicum ssp. interclus</td>
<td>None/None/1B.2</td>
<td>Chaparrel (openings), Clismontane woodland (mesic), Coastal scrub/ perennial herb/Apr–June/640–3,590</td>
<td>Not expected to occur. The site is outside of the species' known elevation range and there is no suitable vegetation present.</td>
<td>Not expected to occur. No suitable vegetation present.</td>
<td>Not expected to occur. No suitable vegetation present.</td>
</tr>
<tr>
<td>recurved larkspur</td>
<td>Delphinium recurvatum</td>
<td>None/None/1B.2</td>
<td>Chenoedop scrub, Clismontane woodland, Valley and foothill grassland; alkaline/ perennial herb/Mar–June/10–2,590</td>
<td>Low potential to occur. There is suitable grasslands and alkaline soils present. However, this species was not observed during April 2021 rare plant surveys.</td>
<td>Low potential to occur. There are suitable grasslands on site but the species primarily occurs further west. Additionally, this species was not observed during May or July 2021 rare plant surveys.</td>
<td>Low potential to occur. There are suitable grasslands on site but the species primarily occurs further west. Additionally, this species was not observed during May or July 2021 rare plant surveys.</td>
</tr>
<tr>
<td>Mt. Diablo buckwheat</td>
<td>Eriogonum truncatum</td>
<td>None/None/1B.1</td>
<td>Chaparrel, Coastal scrub, Valley and foothill grassland; sandy/annual herb/ Apr–Sept/Nov–Dec/10–1,145</td>
<td>Not expected to occur. Although suitable habitat is present on site, this species is not known to occur within the region of the site. Additionally, this species was not observed during April and July 2021 rare plant surveys.</td>
<td>Not expected to occur. Although suitable habitat is present on site, this species is not known to occur within the region of the site. Additionally, this species was not observed during May or July 2021 rare plant surveys.</td>
<td>Not expected to occur. Although suitable habitat is present on site, this species is not known to occur within the region of the site. Additionally, this species was not observed during May or July 2021 rare plant surveys.</td>
</tr>
<tr>
<td>Jesup's coyote thistle</td>
<td>Eryngium jepsonii</td>
<td>None/None/1B.2</td>
<td>Valley and foothill grassland, Vernal pools; clay/perennial herb/Apr–Aug/10–595</td>
<td>Not expected to occur. Although suitable habitat is present on site, this species is not known to occur within the region of the site. Additionally, this species was not observed during April and July 2021 rare plant surveys.</td>
<td>Not expected to occur. While there are suitable grasslands and clay soils on site, there are no vernal pools present. Additionally, this species was not observed during May or July 2021 rare plant surveys.</td>
<td>Not expected to occur. Although suitable habitat is present on site, this species is not known to occur within the region of the site. Additionally, this species was not observed during May or July 2021 rare plant surveys.</td>
</tr>
</tbody>
</table>
| Delta buttonceley          | Eryngium racemosum | None/SE/1B.1 | Riparian scrub (vernally mesic clay depressions)/annual / perennial herb/ (May) June–Oct/10–100 | Not expected to occur. No vernally mesic clay depressions present. Additionally, this species was not observed during July 2021 rare plant surveys. | Not expected to occur. No suitable riparian scrub or vernally mesic clay depressions present. Additionally, this species was not observed during July 2021 rare plant surveys. | Not expected to occur. This species is not known to occur within the region of the site, and the site is outside of the species' known elevation range. There are no vernally mesic
<table>
<thead>
<tr>
<th>Common Name</th>
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<th>Potential to Occur: Patterson Dam</th>
</tr>
</thead>
<tbody>
<tr>
<td>spiny-seeded button-celery</td>
<td>Eryngium spinosepalum</td>
<td>None/None/1B.2</td>
<td>Valley and foothill grassland, Vernal pools/ annual / perennial herb/Apr–June/ 262–3,195</td>
<td>Not expected to occur. The site is outside of the species’ known elevation range. Additionally, this species was not observed during April 2021 rare plant surveys.</td>
<td>Low potential to occur. The site has suitable grassland habitat; however, this species was not observed during March or May 2021 rare plant surveys.</td>
<td>Low potential to occur. The site has suitable grassland habitat; however, this species was not observed during March or May 2021 rare plant surveys.</td>
</tr>
<tr>
<td>diamond-petaled California poppy</td>
<td>Lasthenia rhombipetala</td>
<td>None/None/1B.1</td>
<td>Valley and foothill grassland (alkaline, clay)/annual herb/Mar–Apr/0–3,195</td>
<td>Low potential to occur, While there is suitable grasslands and soils present, this species was not observed during April 2021 rare plant surveys.</td>
<td>Low potential to occur, While there is suitable grassland present, this species was not observed during March 2021 rare plant surveys.</td>
<td>Low potential to occur, While there is suitable grassland present, this species was not observed during March 2021 rare plant surveys.</td>
</tr>
<tr>
<td>San Joaquin spearscale</td>
<td>Lasthenia joaquiforma</td>
<td>None/None/1B.2</td>
<td>Choropod scrub, Meadows and seeps, Playas, Valley and foothill grassland; alkaline/annual herb/Apr–Oct/3–2,735</td>
<td>Low potential to occur, Suitable vegetation communities and alkaline soils present. However, this species was not observed during April and July 2021 rare plant surveys.</td>
<td>Low potential to occur, Suitable vegetation communities and alkaline soils present. While the site contains suitable vegetation present. The site lacks serpentinite soils (Caflora 2021). This species was not observed during May or July 2021 rare plant surveys.</td>
<td>Low potential to occur, Suitable vegetation communities and alkaline soils present. While the site contains suitable vegetation present. The site lacks serpentinite soils (Caflora 2021). This species was not observed during May or July 2021 rare plant surveys.</td>
</tr>
<tr>
<td>talus fritillary</td>
<td>Fritillaria falcata</td>
<td>None/None/1B.2</td>
<td>Chaparral, Cismontane woodland, Lower montane coniferous forest; serpentine, often talus/perennial bulbiferous herb/ Mar–May/984–5,000</td>
<td>Not expected to occur. The site is outside of the species’ known elevation range, there is no suitable vegetation present, and this species is not known to occur within the region of the site. The site lacks serpentinite soils (Caflora 2021). This species was not observed during April 2021 rare plant surveys.</td>
<td>Not expected to occur. The site is outside of the species’ known elevation range, there is no suitable vegetation present, and this species is not known to occur within the region of the site. The site lacks serpentinite soils (Caflora 2021). This species was not observed during May or July 2021 rare plant surveys.</td>
<td>Not expected to occur. The site is outside of the species’ known elevation range and there is no suitable vegetation present. The site lacks serpentinite soils (Caflora 2021). This species was not observed during May or July 2021 rare plant surveys.</td>
</tr>
<tr>
<td>Diablo helianthella</td>
<td>Helianthella castanea</td>
<td>None/None/1B.2</td>
<td>Broadcasted upland forest, Chaparral, Cismontane woodland, Coastal scrub, Riparian woodland, Valley and foothill grassland; Usually rocky, azonal soils. Often in partial shade/perennial herb/ Mar–June/197–4,265</td>
<td>Not expected to occur. The site is outside of the species’ known elevation range. This species was not observed during April 2021 rare plant surveys.</td>
<td>Low potential to occur, While the site contains suitable grassland habitat, this species was not observed during March or May 2021 rare plant surveys.</td>
<td>Low potential to occur, While the site contains suitable grassland habitat, this species was not observed during March or May 2021 rare plant surveys.</td>
</tr>
<tr>
<td>Brewer’s western flax</td>
<td>Eschscholzia occidentalis</td>
<td>None/None/1B.2</td>
<td>Chaparral, Cismontane woodland, Valley and foothill grassland; usually serpentinite/ annual herb/May–July/98–3,100</td>
<td>Not expected to occur. The site is outside of the species’ known elevation range and no serpentinite soils are present on site.</td>
<td>Low potential to occur. The site contains suitable grasslands, but lacks serpentinite soils. Because this species is not restricted to serpentinite soils, there is a still a low potential for it to occur on site. However, this species was not observed during the May or July 2021 rare plant survey.</td>
<td>Low potential to occur. The site contains suitable grasslands, but lacks serpentinite soils. The species is known to occur in the vicinity. Because this species is not restricted to serpentinite soils, there is a still a low potential for it to occur on site. However, this species was not observed during the May or July 2021 rare plant surveys.</td>
</tr>
<tr>
<td>woolly rose-mallow</td>
<td>Hibiscus latisocarpus var. occidentalis</td>
<td>None/None/1B.2</td>
<td>Marshes and swamps (freshwater); Often in riprap on sides of levees/ perennial rhizomatous herb (emergent)/ June–Sept/0–395</td>
<td>Observed. Eleven individuals were observed in the Clifton Court Forebay biological resources study area by Dudek in 2021; one individual on the north side of the study area and nine individuals on the southeast side of the study area.</td>
<td>Not expected to occur. The site is outside of the species’ known elevation range. Additionally, this species was not observed during July 2021 rare plant survey.</td>
<td>Not expected to occur. The site is outside of the species’ known elevation range. Additionally, this species was not observed during July 2021 rare plant survey.</td>
</tr>
<tr>
<td>Loma Prieta hoita</td>
<td>Hottla strobilina</td>
<td>None/None/1B.1</td>
<td>Chaparral, Cismontane woodland, Riparian woodland; usually serpentinite, mesic/ perennial herb/May–July/Aug–Oct/ 98–2,820</td>
<td>Not expected to occur. The site is outside of the species’ known elevation range and this species is not known to occur within the region of the site.</td>
<td>Not expected to occur. Although suitable habitat is present on site, this species is not known to occur within the region of the site. Additionally, this species was not observed during May or July 2021 rare plant survey.</td>
<td>Not expected to occur. No suitable vegetation present. Additionally, this species was not observed during May or July 2021 rare plant surveys.</td>
</tr>
<tr>
<td>Contra Costa goldfields</td>
<td>Lasthenia conjugens</td>
<td>FE/None/1B.1</td>
<td>Cismontane woodland, Playas (alkaline), Valley and foothill grassland, Vernal</td>
<td>Not expected to occur. While there are suitable grasslands and alkaline soils present, there are no clay depressions present. Additionally, this species was not observed during May or July 2021 rare plant surveys.</td>
<td>Not expected to occur. While there are suitable grasslands, there are no vernal pools present.</td>
<td>Not expected to occur. While there are suitable grasslands, there are no vernal pools present.</td>
</tr>
<tr>
<td>Common Name</td>
<td>Scientific Name</td>
<td>Status (Federal/State/CPRPR)</td>
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<td>Potential to Occur: Patterson Dam</td>
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</tr>
<tr>
<td>Delta tule pea</td>
<td>Lathyrus jeponsii var. jeponsii</td>
<td>None/None/1B.2</td>
<td>Marshes and swamps (freshwater and brackish)/perennial herb/May–July (Aug–Sep)/O–15</td>
<td>Not expected to occur. There is suitable marsh habitat present on site. However, this species was not observed during July 2021 rare plant surveys.</td>
<td>Not expected to occur. The site is outside of the species’ known elevation range. Additionally, this species was not observed during May or July 2021 rare plant surveys.</td>
<td>Not expected to occur. Although suitable habitat is present on site, this species is not known to occur within the region of the site, and the site is outside of the species’ known elevation. Additionally, this species was not observed during May or July 2021 rare plant surveys.</td>
</tr>
<tr>
<td>legenere</td>
<td>Legenere iliosa</td>
<td>None/None/1B.1</td>
<td>Vernal pools/annual herb/Apr–June/3–2,885</td>
<td>Not expected to occur. There are no vernal pools present and this species is not known to occur within the region. Additionally, this species was not observed during April 2021 rare plant surveys.</td>
<td>Not expected to occur. There are no vernal pools present and this species is not known to occur within the region. This species was not observed during May 2021 rare plant surveys.</td>
<td>Not expected to occur. There are no vernal pools present.</td>
</tr>
<tr>
<td>Mt. Hamilton coreopsis</td>
<td>Leptosyne hamiltonii</td>
<td>None/None/1B.2</td>
<td>Cismontane woodland (rocky)/annual herb/Mar–May/1,800–4,265</td>
<td>Not expected to occur. The site is outside of the species’ known elevation range, there is no suitable vegetation present, and this species is not known to occur within the region of the site. This species was not observed during April 2021 rare plant surveys.</td>
<td>Not expected to occur. The site is outside of the species’ known elevation range, there is no suitable vegetation present, and this species is not known to occur within the region of the site. Additionally, this species was not observed during May 2021 rare plant surveys.</td>
<td>Not expected to occur. The site is outside of the species’ known elevation range and there is no suitable vegetation present. This species was not observed during March or May 2021 rare plant surveys.</td>
</tr>
<tr>
<td>Mason’s lilacopsis</td>
<td>Lilaeopsis masonii</td>
<td>None/4R/1B.1</td>
<td>Marshes and swamps (brackish or freshwater), Riparian scrub/perennial rhizomatous herb/Apr–Nov/0–35</td>
<td>Observed. A total of 512 individuals were observed on the west side of the Clifton Court Forebay biological resources study area were observed by Dudek in 2021.</td>
<td>Not expected to occur. The site is outside of the species’ known elevation range. Additionally, this species was not observed during May or July 2021 rare plant surveys.</td>
<td>Not expected to occur. The site is outside of the species’ known elevation range. Additionally, this species was not observed during May or July 2021 rare plant surveys.</td>
</tr>
<tr>
<td>Delta mudwort</td>
<td>Limosella australis</td>
<td>None/None/2B.1</td>
<td>Marshes and swamps (freshwater or brackish), Riparian scrub; Usually mud banks/perennial stoloniferous herb/ May–Aug/0–10</td>
<td>Low potential to occur. There is suitable marsh habitat present and the species is known to occur in the vicinity. However, this species was not observed during May 2021 rare plant surveys.</td>
<td>Not expected to occur. The site is outside of the species’ known elevation range. Additionally, this species was not observed during May or July 2021 rare plant surveys.</td>
<td>Not expected to occur. The site is outside of the species’ known elevation range. Additionally, this species was not observed during May or July 2021 rare plant surveys.</td>
</tr>
<tr>
<td>showy golden madia</td>
<td>Madia radiata</td>
<td>None/None/1B.1</td>
<td>Cismontane woodland, Valley and foothill grassland/annual herb/ Mar–May/82–3,985</td>
<td>Not expected to occur. The site is outside of the species’ known elevation range and this species was not observed during April 2021 rare plant surveys.</td>
<td>Not expected to occur. While there is suitable grassland present, the closest known location is over 11 miles away (CDFW 2021). Additionally, this species was not observed during March or May 2021 rare plant surveys.</td>
<td>Not expected to occur. While there is suitable grassland present, the closest known location is over 11 miles away (CDFW 2021). Additionally, this species was not observed during March or May 2021 rare plant surveys.</td>
</tr>
<tr>
<td>Hall’s bushmallow</td>
<td>Malacothamnus hallii</td>
<td>None/None/1B.2</td>
<td>Chaparral, Coastal scrub/perennial evergreen shrubs/(Apr/ May–Sep/ Oct)/ 33–2,490</td>
<td>Not expected to occur. The site is outside of the species’ known elevation range, there is no suitable vegetation present, and this species is not known to occur within the region of the site. Additionally, this species was not observed during April 2021 or July 2021 rare plant surveys.</td>
<td>Not expected to occur. There is no suitable vegetation present and this species is not known to occur within the region of the site. Additionally, this species was not observed during May or July 2021 rare plant surveys.</td>
<td>Not expected to occur. No suitable vegetation present. Additionally, this species was not observed during May or July 2021 rare plant surveys.</td>
</tr>
<tr>
<td>shining navarretia</td>
<td>Navarretia nigelliformis ssp. radians</td>
<td>None/None/1B.2</td>
<td>Cismontane woodland, Valley and foothill grassland, Vernal pools; Sometimes clay/annual herb/ (Mar) Apr–July/213–2,380</td>
<td>Not expected to occur. The site is outside of the species’ known elevation range. This species was not observed during April or July 2021 rare plant surveys.</td>
<td>Not expected to occur. While there is suitable grassland on site, there are no vernal pools. Additionally, this species was not observed during March, May, or July 2021 rare plant surveys.</td>
<td>Not expected to occur. While there is suitable grasslands on site, there are no vernal pools. Additionally, this species was not observed during March, May, or July 2021 rare plant surveys.</td>
</tr>
<tr>
<td>prostrate vernal pool navarretia</td>
<td>Navarretia prostrata</td>
<td>None/None/1B.2</td>
<td>Coastal scrub, Meadows and seeps, Valley and foothill grassland (alkaline), Vernal pools; mesic/annual herb/ Apr–July/10–3,965</td>
<td>Not expected to occur. This species is not known to occur within the region of the site and there are no suitable vernal pools on site. Additionally, this species was not observed during April 2021 or July 2021 rare plant surveys.</td>
<td>Not expected to occur. There are no suitable vernal pools on site. This site is not known to occur within the site. However, this potential site is not known to occur in the vicinity and was not observed during April 2021 rare plant surveys.</td>
<td>Not expected to occur. There are no suitable vernal pools on site but there is suitable alkaline grasslands on site. However, this potential site is not known to occur in the vicinity and was not observed during April 2021 rare plant surveys.</td>
</tr>
<tr>
<td>Common Name</td>
<td>Scientific Name</td>
<td>Status (Federal/State/CRPR)</td>
<td>Primary Habitat Associations/ Life Form/ Blooming Period/ Elevation Range (feet)</td>
<td>Potential to Occur: Clifton Court Forebay Dam</td>
<td>Potential to Occur: Dyer Dam</td>
<td>Potential to Occur: Patterson Dam</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>----------------------------------</td>
<td>----------------------------</td>
<td>--------------------------------------------------------------------------------</td>
<td>-----------------------------------------------</td>
<td>-----------------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>Antioch Dunes evening-primrose</td>
<td>Oenothera deltoides ssp. howelli</td>
<td>FE/SE/1B.1</td>
<td>Inland dunes/perennial herb/Mar-Sep 0–100</td>
<td>species was not observed during April or July 2021 rare plant surveys.</td>
<td>species was not observed during May or July 2021 rare plant surveys.</td>
<td>not observed during May or July 2021 rare plant surveys.</td>
</tr>
<tr>
<td>hairless popcornflower</td>
<td>Plagiobothrys glaber</td>
<td>None/None/1A</td>
<td>Meadows and seeps (alkaline), Marshes and swamps (coastal salt)/annual herb/ Mar–May 2021</td>
<td>Low potential to occur. While there are alkaline soils on site and mesic habitat, this species was not observed April 2021 rare plant surveys.</td>
<td>Not expected to occur. The site is outside of the species’ known elevation range. This species was not observed during March, May, or July 2021 rare plant surveys.</td>
<td>Not expected to occur. The site is outside of the species’ known elevation range. This species was not observed during March, May, or July 2021 rare plant surveys.</td>
</tr>
<tr>
<td>California alkali grass</td>
<td>Puccinellia simplex</td>
<td>None/None/1B.2</td>
<td>Chenopod scrub, Meadows and seeps, Valley and foothill grassland, Vernal pools; Alkaline, vernal mesic; sinks, flats, and lake margins/annual herb/ Mar–May 2021</td>
<td>Low potential to occur. While there is suitable vegetation communities and soils on site, this species was not observed during April 2021 rare plant surveys.</td>
<td>Low potential to occur. While there is suitable vegetation present. This species was not observed during March or May 2021 rare plant surveys.</td>
<td>Low potential to occur. While there is suitable vegetation present. This species was not observed during March or May 2021 rare plant surveys.</td>
</tr>
<tr>
<td>marsh skullcap</td>
<td>Scutellaria galericulata</td>
<td>None/None/2B.2</td>
<td>Lower montane coniferous forest, Meadows and seeps (mesic), Marshes and swamps/perennial rhizomatous herb/ June–Sep 0–6,885</td>
<td>Not expected to occur. This species occurs on wet sites, meadows, streambanks, conifer forest (Jepson Flora Project 2021) and all records of this species are east of the site. Suitable habitat is marginal. Additionally, this species was not observed during July 2021 rare plant surveys.</td>
<td>Low potential to occur. This species occurs on wet sites, meadows, streambanks, conifer forest (Jepson Flora Project 2021) and all records of this species are east of the site. Suitable habitat is marginal. Additionally, this species was not observed during the July 2021 survey.</td>
<td>Low potential to occur. This species occurs on wet sites, meadows, streambanks, conifer forest (Jepson Flora Project 2021) and all records of this species are east of the site. Suitable habitat is marginal. Additionally, this species was not observed during the July 2021 survey.</td>
</tr>
<tr>
<td>chaparral ragwort</td>
<td>Senecio aphanactis</td>
<td>None/None/2B.2</td>
<td>Chaparral, Cismontane woodland, Coastal scrub; sometimes alkaline/ annual herb/Jan–Apr 2021</td>
<td>Not expected to occur. No suitable vegetation present and the site is outside of the species’ known elevation. Additionally, this species was not observed during April 2021 rare plant surveys.</td>
<td>Not expected to occur. No suitable vegetation present. Additionally, this species was not observed during the March or May 2021 survey.</td>
<td>Not expected to occur. No suitable vegetation present. Additionally, this species was not observed during the March or May 2021 survey.</td>
</tr>
<tr>
<td>long-styled sand-spurrey</td>
<td>Spergularia macrotheca var. longistyloides</td>
<td>None/None/1B.2</td>
<td>Meadows and seeps, Marshes and swamps; alkaline/perennial herb/ Feb–May 0–835</td>
<td>Observed. A total of approximately 30,236 long-styled sand-spurrey individuals were observed within the southern portion of the Clifton Court Forebay biological resources study area by Dudek in 2021.</td>
<td>Low potential to occur. There is suitable habitat and soils present and the species is known to occur within 2 miles of the Dyer Dam study area. However, this species was not observed during March or May 2021 surveys.</td>
<td>Low potential to occur. There is suitable habitat and soils present and the species is known to occur within 2 miles of the Patterson Dam study area. However, this species was not observed during March or May 2021 surveys.</td>
</tr>
<tr>
<td>most beautiful jewelflower</td>
<td>Streptanthus albidus ssp. peramoenus</td>
<td>None/None/1B.2</td>
<td>Chaparral, Cismontane woodland, Valley and foothill grassland; serpentine/ annual herb/ Mar–Apr–Sep 2021</td>
<td>Not expected to occur. The site is outside of the species’ known elevation range and this species is not known to occur within the region of the site. The site lacks serpentine soils (Calflora 2021). This species was not observed during April or July 2021 rare plant surveys.</td>
<td>Not expected to occur. The site is outside of the species’ known elevation range and this species was not observed during March or May 2021 rare plant surveys. The site lacks serpentine soils (Calflora 2021).</td>
<td>Not expected to occur. While there are suitable grasslands site, the site lacks serpentine soils (Calflora 2021). Additionally, this species was not observed during March or May 2021 rare plant surveys.</td>
</tr>
<tr>
<td>Suisun Marsh aster</td>
<td>Symphyotrichum leucanthum</td>
<td>None/None/1B.2</td>
<td>Marshes and swamps (brackish and freshwater)/perennial rhizomatous herb/ (Apr–May–Nov 0–10</td>
<td>Observed. One individual was observed within the southeast portion of the Clifton Court Forebay biological resources study area by Dudek in 2021.</td>
<td>Not expected to occur. The site is outside of the species’ known elevation range. Additionally, this species would have been observed during May or July 2021 surveys.</td>
<td>Not expected to occur. Although suitable habitat is present on site, this species is not known to occur within the region of the site, and the site is outside of the species’ known elevation. Additionally, this species would have been observed during May or July 2021 surveys.</td>
</tr>
</tbody>
</table>
### Appendix C

**Special-Status Plant Species’ Potential to Occur within the Project Site**

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Status (Federal/State/ CRPR)</th>
<th>Primary Habitat Associations/ Life Form/ Blooming Period/ Elevation Range (feet)</th>
<th>Potential to Occur: Clifton Court Forebay Dam</th>
<th>Potential to Occur: Dyer Dam</th>
<th>Potential to Occur: Patterson Dam</th>
</tr>
</thead>
<tbody>
<tr>
<td>saline clover</td>
<td>Trifolium hydrophilum</td>
<td>None/None/1B.2</td>
<td>Marshes and swamps, Valley and foothill grassland (mesic, alkaline), Vernal pools/annual herbs/ Apr–June/0–985</td>
<td>Low potential to occur. There are suitable marshes and grasslands on site and alkaline soils but the site lacks vernal pools. This species was not observed during April 2021 rare plant surveys.</td>
<td>Not expected to occur. This species is not known to occur within the region of the site.</td>
<td>Low potential to occur. There are suitable marshes and grasslands on site and alkaline soils but the site lacks vernal pools. This species was not observed during March or May 2021 rare plant surveys.</td>
</tr>
<tr>
<td>caper-fruit Tritocarpon tropidocarpum caparidium</td>
<td>None/None/1B.1</td>
<td>Valley and foothill grassland (alkaline hills)/annual herbs/Mar–Apr/3–1,490</td>
<td>Not expected to occur. There are no alkaline hills on site and this species was not observed during April 2021 rare plant surveys.</td>
<td>Not expected to occur. There are no alkaline hills on site and this species was not observed during March 2021 rare plant surveys.</td>
<td>Not expected to occur. There are no alkaline hills on site and this species was not observed during March 2021 rare plant surveys.</td>
<td></td>
</tr>
<tr>
<td>oval-leaved Viburnum ellipticum</td>
<td>Oval/None/28.3</td>
<td>Chaparral, Cismontane woodland, Lower montane coniferous forest/perennial deciduous shrub/May–July/705–1,490</td>
<td>Not expected to occur. The site is outside of the species’ known elevation range, there is no suitable vegetation present, and this species is not known to occur within the region of the site.</td>
<td>Not expected to occur. No suitable vegetation present.</td>
<td>Not expected to occur. There is no suitable vegetation present and this species is not known to occur within the region of the site.</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:** DWR = California Department of Water Resources; USGS = U.S. Geological Survey.

The Clifton Court Forebay Dam study area is located 10 miles northwest of the City of Tracy in Contra Costa County, and includes the area between Clifton Court Forebay and the surrounding waterways, California Aqueduct, Old River, Italian Slough, and West Canal. This area includes access roads, DWR facilities, developed and disturbed habitat, and a variety of native and non-native vegetation communities. The Dyer Dam study area is located just east of the City of Livermore in Alameda County, and includes the areas surrounding Dyer Reservoir and the South Bay Aqueduct, including access roads, DWR facilities, disturbed habitat, and a variety of native and non-native vegetation communities. The Patterson Dam study area is located just east of the City of Livermore in Alameda County, and includes the areas surrounding the Patterson Reservoir and South Bay Aqueduct, including access roads, DWR facilities, disturbed habitat, and a variety of native and non-native vegetation communities. Region is defined as the USGS 7.5-minute in which the specified dam site is located, and the eight surrounding USGS 7.5-minute quadrangles. Vicinity is defined as the USGS 7.5-minute in which the specified dam site is located.

**Status Legend**

- **Federal**
  - FC: Candidate for federal listing as threatened or endangered
  - FE: Federally listed as endangered
  - FT: Federally listed as threatened
- **State**
  - SC: Candidate for state listing as endangered
  - SE: State listed as endangered
  - ST: State listed as threatened
  - SR: State listed as rare
- **CRPR**
  - California Rare Plant Rank
  - 1A: Plants presumed extirpated in California and either rare or extinct elsewhere
  - 1B: Plants rare, threatened, or endangered in California and elsewhere
  - 2A: Plants presumed extirpated in California, but common elsewhere
  - 2B: Plants rare, threatened, or endangered in California, but more common elsewhere
  - 3: Plants about which more information is needed – A Review List
  - 4: Plants of Limited Distribution – A Watch List
- **Threat Rank**
  - 0.1 – Seriously threatened in California (over 80% of occurrences threatened/high degree and immediacy of threat)
  - 0.2 – Moderately threatened in California (20%–80% occurrences threatened/moderate degree and immediacy of threat)
  - 0.3 – Not very threatened in California (less than 20% of occurrences threatened/low degree and immediacy of threat or no current threats known)

### References


DWR (California Department of Water Resources). n.d. “Special-status species occurrence data from the Delta Field Division” [GIS digital data]. Unpublished geodatabase files, provided by DWR Division of Environmental Services (DES) to Dudek, on November 25, 2020.

Appendix D

Special-Status Wildlife Species’ Potential to Occur within the Project Site
<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Status (Federal/State)</th>
<th>Habitat</th>
<th>Potential to Occur: Clifton Court Forebay Dam</th>
<th>Potential to Occur: Dyer Dam</th>
<th>Potential to Occur: Patterson Dam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invertebrates</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crotch bumble bee</td>
<td>Bombus crotchii</td>
<td>None/PSE</td>
<td>Open grassland and scrub communities supporting suitable nesting resources within primarily rodent burrows, crevices, and less commonly holes in trees. Less important are floral resources as they rely on many different genera and fly miles to nectar resources. Important nectar resources vary as plants come into and out of bloom. Known to occur from Oregon border to Mexico border generally east of the eastern deserts and highest elevation areas.</td>
<td>Low potential to occur. Key concentrations are from southern Central Valley area. Closest known locations are from early to mid-1900s.</td>
<td>Low potential to occur. Key concentrations are from southern Central Valley area. Closest known locations are from early to mid-1900s.</td>
<td>Low potential to occur. Key concentrations are from southern Central Valley area. Closest known locations are from early to mid-1900s.</td>
</tr>
<tr>
<td>western bumble bee</td>
<td>Bombus occidentalis</td>
<td>None/PSE</td>
<td>Open grassland and scrub communities supporting suitable nesting resources within primarily rodent burrows, crevices, and less commonly holes in trees. Less important are floral resources as they rely on many different genera and fly miles to nectar resources. Important nectar resources vary as plants come into and out of bloom. Known to occur throughout the west, but primarily along the Sierra Nevada’s and general San Francisco metropolitan area and north coast area.</td>
<td>Low potential to occur. No recent detections, with proximate ones from the mid-1900s.</td>
<td>Low potential to occur. No recent detections, with proximate ones from the mid-1900s.</td>
<td>Low potential to occur. No recent detections, with proximate ones from the mid-1900s.</td>
</tr>
<tr>
<td>Conservancy fairy shrimp</td>
<td>Branchinecta conservatio</td>
<td>FE/None</td>
<td>Larger, more turbid vernal pools, playa pools</td>
<td>Not expected to occur. The study area is outside the known range of the species.</td>
<td>Not expected to occur. The study area is outside the known range of the species.</td>
<td>Not expected to occur. The study area does not contain suitable habitat.</td>
</tr>
<tr>
<td>longhorn fairy shrimp</td>
<td>Branchinecta longiantenna</td>
<td>FE/None</td>
<td>Sandstone outcrop pools, alkaline grassland vernal pools, and pools within alkali sink and alkali scrub communities</td>
<td>Low potential to occur. Suitable habitat present in alkali flats with shallow depressions in southern portion of study area, but the species is extremely rare and has not been observed in the study area vicinity.</td>
<td>Not expected to occur. The study area does not contain suitable habitat.</td>
<td>Not expected to occur. The study area does not contain suitable habitat.</td>
</tr>
<tr>
<td>vernal pool fairy shrimp</td>
<td>Branchinecta lynchi</td>
<td>FT/None</td>
<td>Vernal pools, seasonally ponded areas within vernal swales, and ephemeral freshwater habitats</td>
<td>High potential Known to occur. CNDDIS Occurrence No. 631 overlaps the southern portion of the study area where two shallow depressions within alkali flat occur and biologists observed the species in these depressions in January 2022 and assumed to support the species. However, they are 300 and 370 feet south of the Project site and are not hydrologically connected to the 5.36-acre seasonal wetland that abuts the site. Biologists also did not observe any vernal pool fairy shrimp in the 5.36-acre wetland in January 2022, which instead supports thousands of versatile fairy shrimp (B. lindahli).</td>
<td>Moderate potential to occur in study area but not project site. Known to be present nearby.</td>
<td>Not expected to occur. The study area does not contain suitable habitat.</td>
</tr>
</tbody>
</table>
### Appendix D
Special-Status Wildlife Species’ Potential to Occur within the Project Site

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Status (Federal/State)</th>
<th>Habitat</th>
<th>Potential to Occur: Clifton Court Forebay Dam</th>
<th>Potential to Occur: Dyer Dam</th>
<th>Potential to Occur: Patterson Dam</th>
</tr>
</thead>
<tbody>
<tr>
<td>San Bruno elfin butterfly</td>
<td>Callophrys mossil bayensis</td>
<td>FE/None</td>
<td>Coastal chaparral, on steep north-facing slopes, and in fog-belt of the mountains near San Francisco Bay</td>
<td>Not expected to occur. The study area is outside the known range of the species.</td>
<td>Not expected to occur. The study area is outside the known range of the species.</td>
<td>Not expected to occur. The study area is outside the known range of the species.</td>
</tr>
<tr>
<td>valley elderberry longhorn beetle</td>
<td>Desmocerus californicus dimorphus</td>
<td>FT/None</td>
<td>Occurs only in the Central Valley of California, in association with blue elderberry (Sambucus nigra ssp. caerulea)</td>
<td>Not expected to occur. No suitable vegetation present.</td>
<td>Not expected to occur. No suitable vegetation present.</td>
<td>Not expected to occur. No suitable vegetation present.</td>
</tr>
<tr>
<td>Bay checkerspot butterfly</td>
<td>Euphydryas editha bayensis</td>
<td>FT/None</td>
<td>Serpentine grassland in Santa Clara and San Mateo Counties. Primary host plant is native plantain (Plantago erecta) with two secondary host plants: purple owl's-clover (Castilleja exserta) and exerted paintbrush (Castilleja exserta).</td>
<td>Not expected to occur. The study area is outside the known range of the species.</td>
<td>Not expected to occur. The study area is outside the known range of the species.</td>
<td>Not expected to occur. The study area is outside the known range of the species.</td>
</tr>
<tr>
<td>vernal pool tadpole shrimp</td>
<td>Lepidurus packardi</td>
<td>FE/None</td>
<td>Ephemeral freshwater habitats including alkaline pools, clay flats, vernal lakes, vernal pools, and vernal swales.</td>
<td>Not expected to occur. The study area is outside the known range of the species.</td>
<td>Not expected to occur. No suitable habitat present.</td>
<td>Not expected to occur. No suitable habitat present.</td>
</tr>
</tbody>
</table>

**Flies**

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Status (Federal/State)</th>
<th>Habitat</th>
<th>Potential to Occur: Clifton Court Forebay Dam</th>
<th>Potential to Occur: Dyer Dam</th>
<th>Potential to Occur: Patterson Dam</th>
</tr>
</thead>
<tbody>
<tr>
<td>green sturgeon (southern DPS)</td>
<td>Acioperis medirostris</td>
<td>FT/SSC</td>
<td>Spawns in deep pools in large, turbulent, freshwater rivers; adults live in oceanic waters, bays, and estuaries</td>
<td>Moderate potential to occur. Migrating individuals could occur in the Old River, West Canal and Intake Channel in late winter and early spring but unlikely to use shallow waters near the embankments. This species does not spawn in the Delta.</td>
<td>Not expected to occur. The study area does not contain suitable habitat.</td>
<td>Not expected to occur. The study area does not contain suitable habitat.</td>
</tr>
<tr>
<td>steelhead - Central Valley DPS</td>
<td>Oncorhynchus mykiss irideus pop. 11</td>
<td>FT/None</td>
<td>Spawning in tributaries to the Sacramento River below Keswick Dam. Spawning occurs from December-April in upper watershed streams with cool, well-oxygenated water. Juveniles likely utilize the edges of rivers and sloughs for foraging and rearing as they emigrate, during late winter and early spring (March through June).</td>
<td>Moderate potential to occur. Migrating individuals could occur in the Old River, West Canal and Intake Channel in late winter and early spring but unlikely to use shallow waters near the embankments. This species does not spawn in the Delta.</td>
<td>Not expected to occur. The study area does not contain suitable habitat.</td>
<td>Not expected to occur. The study area does not contain suitable habitat.</td>
</tr>
<tr>
<td>steelhead - Central California coast DPS</td>
<td>Oncorhynchus mykiss irideus pop. B</td>
<td>FT/None</td>
<td>Coastal basins from Redwood Creek south to the Guadalupe River, inclusive: does not include summer-run steelhead.</td>
<td>Not expected to occur. The study area is outside the known range of this DPS.</td>
<td>Not expected to occur. The study area does not contain suitable habitat.</td>
<td>Not expected to occur. The study area does not contain suitable habitat.</td>
</tr>
<tr>
<td>Chinook salmon [Sacramento winter-run ESU]</td>
<td>Oncorhynchus tshawytscha</td>
<td>FE/SE</td>
<td>Within the Delta, winter-run adults begin to move through the system in early winter (November–December). Juveniles likely utilize the edges of rivers and sloughs for foraging and rearing as they emigrate, during winter and early spring. Spawning occurs primarily from mid-April to mid-August, with peak activity occurring in May and June in the Sacramento River reach between Keswick Dam and the Red Bluff Diversion Dam.</td>
<td>Moderate potential to occur. Migrating individuals could occur in the Old River, West Canal and Intake Channel in late winter and early spring but unlikely to use shallow waters near the embankments.</td>
<td>Not expected to occur. The study area does not contain suitable habitat.</td>
<td>Not expected to occur. The study area does not contain suitable habitat.</td>
</tr>
<tr>
<td>Chinook salmon [Central Valley River spring-run ESU]</td>
<td>Oncorhynchus tshawytscha</td>
<td>FT/ST</td>
<td>Remnant, non-sustaining runs in Cottonwood, Battle, Antelope, and Big Chico creeks; sizable, consistent runs of naturally produced fish are found only in Mill and Deer creeks (tributaries to the Sacramento River). The Feather River Fish Hatchery sustains the spring-run population on the Feather River. Juveniles likely utilize the Feather River.</td>
<td>Moderate potential to occur. Migrating individuals could occur in the Old River, West Canal and Intake Channel in late winter and early spring but unlikely to use shallow waters near the embankments.</td>
<td>Not expected to occur. The study area does not contain suitable habitat.</td>
<td>Not expected to occur. The study area does not contain suitable habitat.</td>
</tr>
</tbody>
</table>
### Delta Smelt

**Scientific Name:** Hypomesus transpacificus  
**Status (Federal/State):** FT/SE  
**Habitat:** Sacramento–San Joaquin Delta; seasonally in Suisun Bay, Carquinez Strait, and San Pablo Bay  
**Potential to Occur:** Moderate potential to occur. Every year some delta smelt seasonally and transiently occupy the Old River in the south Delta. Delta smelt sub-juveniles, juveniles, and adults may also extend as far south as Clifton Court Forebay Dam in some years during different parts of the year. Migrating individuals could occur in the Old River, West Canal and Intake Channel from December to June but unlikely to use shallow waters near the embankments. This species does not spawn in the south Delta. Not expected to occur. The study area does not contain suitable habitat.

### Longfin Smelt

**Scientific Name:** Spirinchus thaleichthys  
**Status (Federal/State):** FC/ST  
**Habitat:** San Francisco Estuary and Sacramento/San Joaquin Delta, Humboldt Bay, and estuaries of Eel River and Klamath River. Spawns from November to May (peaking from February to April) in estuarine waters and lower portions of freshwater streams.  
**Potential to Occur:** Moderate potential to occur. Longfin smelt seasonally and transiently occupy the Old River in the south Delta. Migrating individuals could occur in the Old River, West Canal and Intake Channel from November to May but unlikely to use shallow waters near the embankments. This species does not spawn in the south Delta. Not expected to occur. The study area does not contain suitable habitat.

### Eulachon

**Scientific Name:** Thaleichthys pacificus  
**Status (Federal/State):** FT/None  
**Habitat:** Found in Klamath River, Mad River, and Redwood Creek and in small numbers in Smith River and Humboldt Bay tributaries  
**Potential to Occur:** Low potential to occur. One collected at Skinner Fish Facility on April 27, 1984 (CDFW 2021a) but no recent occurrences in the region. The study area is outside the species’ primary distribution from Alaska to northern California. Not expected to occur. The study area does not contain suitable habitat.

### Amphibians

#### California Tiger Salamander

**Scientific Name:** Ambystoma californiense  
**Status (Federal/State, WL):** FT/ST, WL  
**Habitat:** Annual grassland, valley–foothill hardwood, and valley–foothill riparian habitats; vernal pools, other ephemeral pools, and (uncommonly) along stream courses and constructed pools if predatory fishes are absent  
**Potential to Occur:** Low potential to occur. 1982 CNDDB occurrence 0.3 miles west of site (CDFW 2021a) isolated from dam embankments where most work would occur. Seasonal pool appearing on 2017 aerial imagery between Bruns Road and California Aqueduct is approx. 0.9 mile southwest of proposed staging area east of Skinner Fish Facility. Any California tiger salamanders occurring in or near this feature would have to cross the Byron Highway to access the staging area and more recent aerial imagery does not show ponding; therefore, the likelihood of California tiger Not expected to occur. The study area does not contain suitable habitat. High potential to occur, CNDDB occurrence directly south of study area (CDFW 2021a) and suitable habitat present.
### APPENDIX D

**SPECIAL-STATUS WILDLIFE SPECIES’ POTENTIAL TO OCCUR WITHIN THE PROJECT SITE**

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Status (Federal/State)</th>
<th>Habitat</th>
<th>Potential to Occur: Clifton Court Forebay Dam</th>
<th>Potential to Occur: Dyer Dam</th>
<th>Potential to Occur: Patterson Dam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foothill yellow-legged frog</td>
<td><em>Rana boylii</em></td>
<td>None/SSC, SE</td>
<td>Rocky streams and rivers with open banks in forest, chaparral, and woodland</td>
<td>Not expected to occur. The study area does not contain suitable habitat.</td>
<td>Not expected to occur. The study area does not contain suitable habitat.</td>
<td>Not expected to occur. The study area does not contain suitable habitat.</td>
</tr>
<tr>
<td>California red-legged frog</td>
<td><em>Rana draytonii</em></td>
<td>FT/SSC</td>
<td>Lowland streams, wetlands, riparian woodlands, livestock ponds; dense, shrubby or emergent vegetation associated with deep, still or slow-moving water; uses adjacent uplands</td>
<td>Low potential to occur. Observed in 2009 approximately 2,100 feet southwest of isolated study area (CDFW 2021a) north of Skinner Fish Facility, but this area is isolated from the dam embankments where most work would occur. Individuals may occasionally venture into this part of the study area during rain events but no Project activities are proposed at this location. Not expected to occur in remaining parts of the study area. Protocol-level surveys of the drainages and wetlands between the dam and adjacent Sacramento–San Joaquin River Delta levees in the northern portion of the study area in 2013 did not detect any red-legged frogs (DWR, unpubl. data). The study area is located outside designated critical habitat for this species.</td>
<td>High potential to occur. Suitable habitat present and species known to occur in the study area vicinity.</td>
<td>Not expected to occur. The study area does not contain suitable habitat.</td>
</tr>
<tr>
<td>Western spadefoot</td>
<td><em>Spea hammondi</em></td>
<td>None/SSC</td>
<td>Primarily grassland and vernal pools, but also in ephemeral wetlands that persist at least 3 weeks in chaparral, coastal scrub, valley–foothill woodlands, pastures, and other agriculture</td>
<td>Moderate potential to occur. Potential season wetland habitat present and the study area is within the known range of the species (CDFW 2021b).</td>
<td>Moderate potential to occur. No vernal pools present, but potential season wetland habitat present and the study area is within the known range of the species (CDFW 2021b).</td>
<td>Moderate potential to occur. No vernal pools present, but potential season wetland habitat present and two CNDDB occurrences within 2 miles to the southwest (CDFW 2021a).</td>
</tr>
</tbody>
</table>

**Reptiles**

- **Western pond turtle**
  - *Actinemys marmorata*
  - None/SSC
  - Slow-moving permanent or intermittent streams, ponds, small lakes, and reservoirs with emergent basking sites; adjacent uplands used for nesting and during winter | Not expected to occur. The study area does not contain suitable habitat. | Not expected to occur. The study area does not contain suitable habitat. | Not expected to occur. The study area does not contain suitable habitat. |
- **Northern California legless lizard**
  - *Anniella pulchra*
  - None/SSC
  - Coastal dunes, stabilized dunes, beaches, dry washes, valley–foothill, chaparral, and scrubs; pine, oak, and riparian woodlands; associated with sparse vegetation and sandy or loose, loamy soils | Not expected to occur. The study area does not contain suitable habitat. | Not expected to occur. The study area does not contain suitable habitat. | Not expected to occur. The study area does not contain suitable habitat. |
- **California glossy snake**
  - *Arizona elegans occidentalis*
  - None/SSC
  - Grasslands, fields, coastal sage scrub, and chaparral. Prefers open sandy areas with scattered brush. Also found in rocky areas. | Not expected to occur. The study area does not contain suitable habitat. | Not expected to occur. The study area does not contain suitable habitat. | Not expected to occur. The study area does not contain suitable habitat. |
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<tbody>
<tr>
<td>San Joaquin coachwhip</td>
<td>Masticophis flagellum ruddocki</td>
<td>None/SSC</td>
<td>Open, dry, treeless areas including grassland and saltbush scrub</td>
<td>High potential to occur, Suitable habitat present in grassland and saltbush scrub in southern portion of study area.</td>
<td>Low potential to occur, Suitable grassland habitat present but study area on periphery of the known range of the species (CDFW 2021a) and there are no occurrences in the vicinity.</td>
<td>Moderate potential to occur, Suitable grassland habitat present and CNDDB occurrence located 1.8 miles south-southwest of the site (CDFW 2021a).</td>
</tr>
<tr>
<td>Alameda whipsnake</td>
<td>Masticophis lateralis euryxanthus</td>
<td>FT/ST</td>
<td>Open areas in chaparral and scrub habitat; also adjacent grassland, oak savanna, and woodland</td>
<td>Not expected to occur, The study area does not contain suitable habitat.</td>
<td>Not expected to occur, The study area does not contain suitable habitat.</td>
<td>Not expected to occur, The study area does not contain suitable habitat.</td>
</tr>
<tr>
<td>Blainville’s horned lizard</td>
<td>Phrynosoma blainvillii</td>
<td>None/SSC</td>
<td>Open areas of sandy soil in valleys, foothills, and semi-arid mountains including coastal scrub, chaparral, valley-foothill hardwood, conifer, riparian, pine–cypress, juniper, and annual grassland habitats</td>
<td>Not expected to occur, The study area does not contain suitable habitat.</td>
<td>Not expected to occur, The study area does not contain suitable habitat.</td>
<td>Not expected to occur, The study area does not contain suitable habitat.</td>
</tr>
<tr>
<td>giant gartersnake</td>
<td>Thamnophis gigas</td>
<td>FT/ST</td>
<td>Freshwater marsh habitat and low-gradient streams; also uses canals and irrigation ditches</td>
<td>Not expected to occur, The study area does not contain suitable habitat.</td>
<td>Not expected to occur, The study area does not contain suitable habitat.</td>
<td>Not expected to occur, The study area does not contain suitable habitat.</td>
</tr>
<tr>
<td>golden eagle (nesting and wintering)</td>
<td>Aquila chrysaetos</td>
<td>BCC/FP</td>
<td>Nests and winters in hilly, open/semi-open areas, including shrublands, grasslands, pastures, riparian areas, mountainous canyon land, open desert rimrock terrain; nests in large trees and on cliffs in open areas and forages in open habitats</td>
<td>Not expected to occur (nesting). The study area does not contain suitable nesting habitat.</td>
<td>Not expected to occur (nesting). The study area does not contain suitable nesting habitat.</td>
<td>Not expected to occur (nesting). The study area does not contain suitable nesting habitat.</td>
</tr>
<tr>
<td>Swainson’s hawk (nesting)</td>
<td>Buteo swainsoni</td>
<td>None/ST</td>
<td>Nests in open woodland and savanna, riparian, and in isolated large trees; forages in nearby grasslands and agricultural areas such as wheat and alfalfa fields and pasture</td>
<td>Not expected to occur (nesting). The study area does not contain suitable nesting habitat.</td>
<td>Not expected to occur (nesting). The study area does not contain suitable nesting habitat.</td>
<td>Not expected to occur (nesting). The study area does not contain suitable nesting habitat.</td>
</tr>
<tr>
<td>northern harrier (nesting)</td>
<td>Circus hudsonius</td>
<td>None/SSC</td>
<td>Nests in open wetlands (marshy meadows, wet lightly-grazed pastures, old fields, freshwater and brackish marshes); also in drier habitats (grassland and grain fields); forages in grassland, scrub, rangelands, emergent wetlands, and other open habitats</td>
<td>High potential to occur, Suitable nesting habitat present in portions of the study area by Dudek biologists during 2021 field surveys.</td>
<td>High potential to occur (wintering), Suitable foraging habitat present in portions of the study area covered by dense ground cover.</td>
<td>High potential to occur, Pair observed in suitable nesting habitat in western portion of study area by Dudek biologists during 2021 field surveys. Dense ground cover in proposed staging areas in eastern portion of study area also suitable for nesting.</td>
</tr>
<tr>
<td>white-tailed kite (nesting)</td>
<td>Elanus leucurus</td>
<td>None/FP</td>
<td>Nests in woodland, riparian, and individual trees near open lands; forages opportunistically in grassland, meadows, shrubs, agriculture, emergent wetland, savanna, and disturbed lands</td>
<td>High potential to occur, Suitable nesting habitat present in study area and vicinity.</td>
<td>Not expected to occur, The study area does not contain suitable nesting habitat.</td>
<td>Not expected to occur, The study area does not contain suitable nesting habitat.</td>
</tr>
<tr>
<td>bald eagle (nesting and wintering)</td>
<td>Haloaeetus leucocephalus</td>
<td>TDL, BCC/FP, SE</td>
<td>Nests in forested areas adjacent to large bodies of water, including seacoasts, rivers, swamps, large lakes; winters near large bodies of water in lowlands and mountains</td>
<td>Observed, Observed nesting at northern edge of study area (Widdows Island) during 2021 field surveys.</td>
<td>Not expected to occur, The study area does not contain suitable nesting or wintering habitat.</td>
<td>Not expected to occur, The study area does not contain suitable nesting or wintering habitat.</td>
</tr>
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<td>Common Name</td>
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</tr>
<tr>
<td>American peregrine falcon (nesting)</td>
<td>Falco peregrinus anatum</td>
<td>SDL, BCC/FP, SDL</td>
<td>Nests on cliffs, buildings, and bridges; forages in wetlands, riparian, meadows, croplands, especially where waterfowl are present</td>
<td>Not expected to occur. The study area does not contain suitable nesting habitat.</td>
<td>Not expected to occur. The study area does not contain suitable nesting habitat.</td>
<td>Not expected to occur. The study area does not contain suitable nesting habitat.</td>
</tr>
<tr>
<td>California black rail</td>
<td>Laterallus jarainaicetiis columnicus</td>
<td>BCC/FP, ST</td>
<td>Tidal marshes, shallow freshwater margins, wet meadows, and flooded grassy vegetation; suitable habitats are often supplied by canal leakage in Sierra Nevada foothill populations</td>
<td>Low potential to occur. The study area contains a small amount of potentially suitable habitat (Tsao et al. 2015) but it is at the southern periphery of the species’ range in the Delta and there are no nearby occurrences.</td>
<td>Not expected to occur. The study area does not contain suitable habitat and is outside of the species’ known geographic range.</td>
<td>Not expected to occur. The study area does not contain suitable habitat and is outside of the species’ known geographic range.</td>
</tr>
<tr>
<td>short-eared owl (nesting)</td>
<td>Asio flammeus</td>
<td>None/SSC</td>
<td>Grassland, prairies, dunes, meadows, irrigated lands, and saline and freshwater emergent wetlands</td>
<td>Low potential to occur. The study area contains suitable nesting habitat but existing disturbance likely precludes nesting.</td>
<td>Low potential to occur. The study area contains suitable nesting habitat but there are no known occurrences in the vicinity and this species is rare in the Bay Area.</td>
<td>Low potential to occur. The study area contains suitable nesting habitat but there are no known occurrences in the vicinity and this species is rare in the Bay Area.</td>
</tr>
<tr>
<td>burrowing owl (burrow sites and some wintering sites)</td>
<td>Athene curiculuraria</td>
<td>None/SSC</td>
<td>Nests and forages in grassland, open scrub, and agriculture, particularly with ground squirrel burrows</td>
<td>Not expected to occur. The study area is outside the known range of the species.</td>
<td>Not expected to occur. The study area is outside the known range of the species.</td>
<td>Not expected to occur. The study area is outside the known range of the species.</td>
</tr>
<tr>
<td>least Bell’s vireo (nesting)</td>
<td>Vireo bellii pusillus</td>
<td>FE/SE</td>
<td>Nests and forages in low, dense riparian thickets along water or along dry parts of intermittent streams; forages in riparian and adjacent shrubland late in nesting season</td>
<td>High potential to occur. The study area contains suitable nesting habitat. Individuals observed by Dudek biologists during 2021 field surveys.</td>
<td>Moderate potential to occur. The study area contains suitable but limited nesting habitat.</td>
<td>Moderate potential to occur. The study area contains suitable but limited nesting habitat.</td>
</tr>
<tr>
<td>loggerhead shrike (nesting)</td>
<td>Lanius ludovicianus</td>
<td>BCC/SSC</td>
<td>Nests and forages in open habitats with scattered shrubs, trees, or other perches.</td>
<td>High potential to occur. The study area does not contain suitable nesting habitat.</td>
<td>Moderate potential to occur. The study area contains low-quality nesting habitat.</td>
<td>Moderate potential to occur. The study area contains low-quality nesting habitat.</td>
</tr>
<tr>
<td>grasshopper sparrow (nesting)</td>
<td>Ammodramus savannaharum</td>
<td>None/SSC</td>
<td>Nests and forages in moderately open grassland with tall forbs or scattered shrubs used for perches.</td>
<td>Not expected to occur. The study area does not contain suitable nesting habitat.</td>
<td>Low potential to occur. The study area contains low-quality nesting habitat.</td>
<td>Low potential to occur. The study area contains low-quality nesting habitat.</td>
</tr>
<tr>
<td>song sparrow (&quot;Modesto&quot; population)</td>
<td>Melospiza melodia (&quot;Modesto&quot; population)</td>
<td>None/SSC</td>
<td>Nests and forages in emergent freshwater marsh, riparian forest, vegetated irrigation canals and levees, and newly planted valley oak (Quercus lobata) restoration sites</td>
<td>Observed. Observed during 2021 field surveys; multiple occurrences in study area and vicinity (CDFW 2021a).</td>
<td>Not expected to occur. The study area is outside of the known range of this subspecies.</td>
<td>Not expected to occur. The study area is outside of the known range of this subspecies.</td>
</tr>
<tr>
<td>tricolor blackbird (nesting colony)</td>
<td>Agelaius tricolor</td>
<td>None, SSC, ST</td>
<td>Nests near freshwater, emergent wetland with cattails or tufts, but also in Himalayan blackberry; forages in grasslands, woodland, and agriculture</td>
<td>High potential to occur. Suitable nesting habitat present in study area.</td>
<td>High potential to occur. Suitable nesting habitat present in study area.</td>
<td>High potential to occur. Observed in study area vicinity during 2021 field surveys. Suitable nesting habitat present in study area.</td>
</tr>
<tr>
<td>saltmarsh common yellowthroat (nesting)</td>
<td>Geothlypis trichas sinuosa</td>
<td>BCC/SSC</td>
<td>Nests and forages in emergent wetlands including woody swamp, brackish marsh, and freshwater marsh</td>
<td>Not expected to occur. The study area is outside the known range of this subspecies.</td>
<td>Not expected to occur. The study area is outside the known range of this subspecies.</td>
<td>Not expected to occur. The study area is outside the known range of this subspecies.</td>
</tr>
</tbody>
</table>
## APPENDIX D
### SPECIAL-STATUS WILDLIFE SPECIES’ POTENTIAL TO OCCUR WITHIN THE PROJECT SITE

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<tr>
<th>Common Name</th>
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<tbody>
<tr>
<td><strong>Mammals</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>San Joaquin kit fox</td>
<td><em>Vulpes macrotis mutica</em></td>
<td>FE/ST</td>
<td>Grasslands and scrublands, including those that have been modified; oak woodland, alkali sink scrubland, vernal pool, and alkali meadow</td>
<td>Moderate potential to occur. Smattering of CNDDB occurrences in the study area vicinity and the study area is at the northern edge of the range.</td>
<td>Moderate potential to occur. Smattering of CNDDB occurrences in the study area vicinity and the study area is at the northern edge of the range.</td>
<td>Moderate potential to occur. Smattering of CNDDB occurrences in the study area vicinity and the study area is at the northern edge of the range.</td>
</tr>
<tr>
<td>riparian brush rabbit</td>
<td><em>Sylviulus bachmani riparius</em></td>
<td>FE/SE</td>
<td>Dense thickets of wild rose, willows, and blackberries growing along the banks of San Joaquin and Stanislaus Rivers</td>
<td>Not expected to occur. The study area is outside the known range of this species.</td>
<td>Not expected to occur. The study area is outside the known range of this species.</td>
<td>Not expected to occur. The study area is outside the known range of this species.</td>
</tr>
<tr>
<td>Townsend’s big-eared bat</td>
<td><em>Corynorhinus townsendii</em></td>
<td>None/SSC</td>
<td>Mesic habitats characterized by coniferous and deciduous forests and riparian habitat, but also xeric areas; roosts in limestone caves and lava tubes, and occasionally built structures, and tunnels. Since they are extremely sensitive to disturbance, actively used structures are not expected to provide good roosting habitat. While they may roost in the 1,000’s they are not typically a clustering species.</td>
<td>Moderate potential to occur (roosting). The study area provides suitable foraging habitat.</td>
<td>Moderate potential to occur (roosting). The study area provides suitable foraging habitat.</td>
<td>Moderate potential to occur (roosting). The study area provides suitable foraging habitat.</td>
</tr>
<tr>
<td>western mastiff bat</td>
<td><em>Euops perotis californicus</em></td>
<td>None/SSC</td>
<td>Chaparral, coastal and desert scrub, coniferous and deciduous forest and woodland; roosts in crevices in rocky canyons and cliffs where the canyon or cliff is vertical or nearly vertical, trees, and tunnel.</td>
<td>Not expected to occur. The study area is outside the known range of the species and suitable habitat is not present.</td>
<td>Not expected to occur. The study area is outside the known range of the species and suitable habitat is not present.</td>
<td>Not expected to occur. The study area is outside the known range of the species and suitable habitat is not present.</td>
</tr>
<tr>
<td>San Francisco dusky-footed woodrat</td>
<td><em>Neotoma fuscipes arrectecens</em></td>
<td>None/SSC</td>
<td>Forest habitats with a moderate canopy and moderate to dense understory</td>
<td>Not expected to occur. The study area is outside of the known range of this subspecies.</td>
<td>Not expected to occur. The study area is outside of the known range of this subspecies.</td>
<td>Not expected to occur. The study area is outside of the known range of this subspecies.</td>
</tr>
<tr>
<td>American badger</td>
<td><em>Taxidea taxus</em></td>
<td>None/SSC</td>
<td>Dry, open, treeless areas; grasslands, coastal scrub, agriculture, and pastures, especially with friable soils</td>
<td>Observed. Suitable habitat present and known occurrences from the vicinity. Sign of American badger were observed in various locations within the study area (e.g., potential burrows and burrows with bones) by Dudek biologists during the 2021 field surveys.</td>
<td>High potential to occur. Suitable habitat present and known occurrences from the vicinity.</td>
<td>High potential to occur. Several burrows of appropriate dimensions for badger observed by Dudek biologists during 2021 field surveys. An American badger skull and carcass was found along the northern portion of the study area by Dudek biologists during the 2021 field surveys.</td>
</tr>
<tr>
<td>western red bat</td>
<td><em>Lasiusus biobeservillii</em></td>
<td>None/SSC</td>
<td>Forest, woodland, riparian, mesquite bosque, and orchards, including fig, apricot, peach, pear, almond, walnut, and orange; roosts in tree canopy. A solitary rooster.</td>
<td>Moderate potential to occur. The study area contains suitable but limited tree foliage roosting habitat.</td>
<td>Not expected to occur. The study area does not contain suitable roosting habitat.</td>
<td>Not expected to occur. The study area does not contain suitable roosting habitat.</td>
</tr>
<tr>
<td>aquatic bat</td>
<td><em>Antrozous pallidus</em></td>
<td>None/SSC</td>
<td>Gravelly, gravelly-sandy, and sandy areas; grasslands, coastal scrub, agriculture, and pastures, especially with friable soils</td>
<td>Not expected to occur. The study area is outside the known range of this species.</td>
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### Notes:
- CNDDB = California Natural Diversity Database; USFWS = U.S. Fish and Wildlife Service; CDFW = California Department of Fish and Wildlife.
The Clifton Court Forebay Dam study area is located 10 miles northwest of the City of Tracy in Contra Costa County, and includes the area between Clifton Court Forebay and the surrounding waterways, California Aqueduct, Old River, Italian Slough, and West Canal. This area includes access roads, DWR facilities, developed and disturbed habitat, and a variety of native and non-native vegetation communities.

The Dyer Dam study area is located just east of the City of Livermore in Alameda County, and includes the areas surrounding Dyer Reservoir and the South Bay Aqueduct, including access roads, DWR facilities, disturbed habitat, and a variety of native and non-native vegetation communities. The Patterson Dam study area is located just east of the City of Livermore in Alameda County, and includes the areas surrounding the Patterson Reservoir and South Bay Aqueduct, including access roads, DWR facilities, disturbed habitat, and a variety of native and non-native vegetation communities.

**Status Legend**

**Federal**  
BCC: USFWS—Birds of Conservation Concern  
FC: Candidate for federal listing as threatened or endangered  
FD: Federally delisted; monitored for 5 years  
FE: Federally listed as endangered  
FT: Federally listed as threatened  
FPE: Federally proposed for listing as endangered  
FPT: Federally proposed for listing as threatened  
FPD: Federally proposed for delisting  

**State**  
FP: CDFW Fully Protected species  
SE: State listed as endangered  
ST: State listed as threatened  
SCE: State candidate for listing as endangered  
SCT: State candidate for listing as threatened  
SCD: State candidate for delisting  
SSC: California Species of Special Concern  
WL: CDFW Watch List species

**References**


DWR. n.d. “Special-status species occurrence data from the Delta Field Division” [GIS digital data]. Unpublished geodatabase files, provided by DWR Division of Environmental Services (DES) to Dudek, on November 25, 2020.

Appendix C1

Archaeological Resources Inventory Report
Clifton Court Forebay
(Confidential)

Please contact Sara Paiva-Lowry (Sara.Paiva-Lowry@water.ca.gov) at DWR for additional information.
Appendix C2

Archaeological Resources Inventory Report
Dyer Reservoir and Dam and Patterson Reservoir and Dam
(Confidential)

Please contact Sara Paiva-Lowry (Sara.Paiva-Lowry@water.ca.gov) at DWR for additional information.
DRAFT

Built Environment Inventory and Evaluation Report for the Delta Dams Rodent Burrow Remediation Project at Clifton Court Forebay Contra Costa County, California

Prepared for:
California Department of Water Resources
1416 Ninth Street, Room 604
Sacramento, California 95814
Contact: Sara Paiva-Lowry

Prepared by:
DUDEK
Contact: Kathryn Haley and Kate G. Kaiser
Email: khaley@dudek.com, kkaiser@dudek.com

OCTOBER 2021
# Table of Contents

<table>
<thead>
<tr>
<th>SECTION</th>
<th>PAGE NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACRONYMS AND ABBREVIATIONS</td>
<td>................................................................. III</td>
</tr>
<tr>
<td>1 EXECUTIVE SUMMARY</td>
<td>.............................................................. 1</td>
</tr>
<tr>
<td>2 INTRODUCTION</td>
<td>.............................................................. 3</td>
</tr>
<tr>
<td>2.1 Project Description and Location</td>
<td>................................................................. 3</td>
</tr>
<tr>
<td>2.1.1 Project Description</td>
<td>................................................................. 3</td>
</tr>
<tr>
<td>2.1.2 Project Location, Access, and Staging</td>
<td>................................................................. 4</td>
</tr>
<tr>
<td>2.1.3 Construction Equipment</td>
<td>................................................................. 5</td>
</tr>
<tr>
<td>2.2 Regulatory Setting</td>
<td>................................................................. 5</td>
</tr>
<tr>
<td>2.2.1 Federal</td>
<td>................................................................. 5</td>
</tr>
<tr>
<td>2.2.2 State</td>
<td>................................................................. 7</td>
</tr>
<tr>
<td>2.3 Area of Potential Effect</td>
<td>................................................................. 9</td>
</tr>
<tr>
<td>3 RESEARCH AND FIELD METHODS</td>
<td>.............................................................. 11</td>
</tr>
<tr>
<td>3.1 Literature Review</td>
<td>................................................................. 11</td>
</tr>
<tr>
<td>3.1.1 California Historical Resources Information System Record Search</td>
<td>................................................................. 11</td>
</tr>
<tr>
<td>3.1.2 Other Relevant Studies</td>
<td>................................................................. 21</td>
</tr>
<tr>
<td>3.2 Archival Research</td>
<td>................................................................. 23</td>
</tr>
<tr>
<td>3.3 Field Survey</td>
<td>................................................................. 24</td>
</tr>
<tr>
<td>3.3.1 Methods</td>
<td>................................................................. 24</td>
</tr>
<tr>
<td>3.3.2 Results</td>
<td>................................................................. 25</td>
</tr>
<tr>
<td>3.4 Interested Party Correspondence</td>
<td>................................................................. 25</td>
</tr>
<tr>
<td>4 HISTORICAL OVERVIEW</td>
<td>.............................................................. 27</td>
</tr>
<tr>
<td>4.1 General Historic Context</td>
<td>................................................................. 27</td>
</tr>
<tr>
<td>4.2 Water Management in California—Development of the State Water Project</td>
<td>................................................................. 27</td>
</tr>
<tr>
<td>4.2.1 Early Water Development</td>
<td>................................................................. 28</td>
</tr>
<tr>
<td>4.2.2 Twentieth Century Water Management Planning</td>
<td>................................................................. 29</td>
</tr>
<tr>
<td>4.2.3 Construction and Implementation of the State Water Project</td>
<td>................................................................. 31</td>
</tr>
<tr>
<td>4.2.4 The State Water Project After 1974: Realization and Expansion</td>
<td>................................................................. 34</td>
</tr>
<tr>
<td>4.3 Historic Development of Clifton Court Forebay</td>
<td>................................................................. 35</td>
</tr>
<tr>
<td>5 RESULTS OF IDENTIFICATION AND EVALUATION EFFORTS</td>
<td>.............................................................. 39</td>
</tr>
<tr>
<td>5.1 Site Description</td>
<td>................................................................. 39</td>
</tr>
<tr>
<td>5.2 National Register of Historic Places/California Register of Historic Resources Statement of Significance</td>
<td>................................................................. 40</td>
</tr>
<tr>
<td>5.3 Integrity Discussion</td>
<td>................................................................. 41</td>
</tr>
<tr>
<td>5.4 Character-Defining Features</td>
<td>................................................................. 42</td>
</tr>
</tbody>
</table>
6 APPLICATION OF CRITERIA OF ADVERSE EFFECT .................................................................................. 43
6.1 Physical Effects of the Proposed Project ................................................................................................. 43
6.2 Clifton Court Forebay ............................................................................................................................ 43
   6.2.1 Summary of Resource Significance .................................................................................................. 43
   6.2.2 Analysis of Potential Adverse Effect ................................................................................................. 43
6.3 Finding of No Adverse Effect ................................................................................................................. 45
7 SUMMARY OF FINDINGS ......................................................................................................................... 47
8 REFERENCES AND PREPARERS ............................................................................................................ 49
   8.1 References Cited .................................................................................................................................. 49
   8.2 List of Preparers .................................................................................................................................. 52

TABLES
1 Clifton Court Forebay – Previously Conducted Technical Studies ............................................................ 11
2 Clifton Court Forebay – Previously Recorded Resources ......................................................................... 16
3 California Department of Water Resources–Held Previously Conducted Technical Studies .................. 21
4 Application of Criteria of Adverse Effects for Clifton Court Forebay ...................................................... 43
5 Summary of Findings .................................................................................................................................. 47

EXHIBITS
A SWP Project Components and their Dates of Completion (DWR 1974g, p. 13). ........................................ 33
B Illustration of Clifton Court Forebay Showing the Related Pump and Drainage Systems
C 1969 Aerial View Looking Northwest Over the Clifton Court Forebay Construction Site Showing
   the Land Divisions within the Clifton Court Tract before the Completion of the Project (DWR n.d.). .... 38
D 1969 Aerial View Looking Northwest Over the Clifton Court Forebay Construction
   Site Showing the Inlet Structure and its Five Control Gates in the Foreground (DWR n.d.) ................. 38

FIGURES
1 Project Location – Clifton Court Forebay .................................................................................................. 53
2 Proposed Activities at Clifton Court Forebay ......................................................................................... 55
3 Clifton Court Forebay – Cultural Resources, Built Environment - Area of Potential Effects ................. 57

APPENDICES
A Clifton Court Forebay DPR Update
B Interested Party Correspondence
## Acronyms and Abbreviations

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>APE</td>
<td>area of potential effect</td>
</tr>
<tr>
<td>CCaIC</td>
<td>Central California Information Center</td>
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<tr>
<td>CEQA</td>
<td>California Environmental Quality Act</td>
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<tr>
<td>CFR</td>
<td>Code of Federal Regulations</td>
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<tr>
<td>CRHR</td>
<td>California Register of Historic Resources</td>
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<tr>
<td>CVP</td>
<td>Central Valley Project</td>
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<tr>
<td>Delta</td>
<td>Sacramento–San Joaquin River Delta</td>
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<td>DWR</td>
<td>California Department of Water Resources</td>
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<td>SHPO</td>
<td>State Historic Preservation Officer</td>
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<td>SWP</td>
<td>California State Water Project</td>
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Executive Summary

This built environment inventory and evaluation report documents historical resources inventory efforts conducted by Dudek for the Delta Dams Rodent Burrow Remediation Project (Project) at Clifton Court Forebay located in the southwestern portion of Contra Costa County. The purpose of the Project is to address and remediate burrow holes in the earthen embankments of the reservoir. Proposed improvements also include removal of trees, and repairs to the intake channel for Clifton Court Forebay. The Project Area of Potential Effect (APE) falls within Public Lands Survey System Sections 13, 24, and 25 of Township 1 South, Range 3 East, and Sections 7, 8, 17, 18, 19, 20, and 30 of Township 1 South, Range 4 East, Mount Diablo Baseline Meridian, of the Clifton Court Forebay U.S. Geological Survey 7.5-minute quadrangle. This built environment inventory and evaluation report was conducted in compliance with the California Environmental Quality Act and National Historic Preservation Act Section 106.

A records search of the Project site and surrounding 1 mile was completed by Northwest Information Center and Central California Information Center staff on November 30, 2020, and December 23, 2020. Dudek conducted an intensive, pedestrian-level cultural survey of the APE on January 13, 2021. One resource, Clifton Court Forebay (recorded in both P-07-003122 and P-07-004698), constructed between 1967 and 1969, was identified within the APE. Both records indicated that Clifton Court Forebay is eligible under National Register of Historic Places/California Register of Historical Resources Criteria A/1 and C/3, retains the requisite integrity to convey its significance, and is a contributing component to the California Aqueduct (1960–1974) and the California State Water Project (1959–1974).

This report includes a summary of the results of the California Historical Resources Information System record search, archival research efforts, historical context development, survey inventory, and previous findings and provides an analysis and discussion of potential adverse effects. This report concludes that Clifton Court Forebay is considered an individually eligible historic property under Section 106 of the National Historic Preservation Act and a historical resource under the California Environmental Quality Act. Preparation of a detailed effects assessment indicates that the proposed Project would have a less-than-significant impact on historical resources under the California Environmental Quality Act and no adverse effect on historic properties in the APE under Section 106.
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# 2 Introduction

## 2.1 Project Description and Location

Clifton Court Forebay is located in southeast Contra Costa County, on the west side of California’s Central Valley at the southwestern edge of the Sacramento–San Joaquin River Delta (Delta), approximately 10 miles northwest of the City of Tracy and adjacent to Byron Road. The Project site lies in the Clifton Court Forebay U.S. Geological Survey 7.5-minute quadrangles, which fall on Public Lands Survey System Sections 13, 24, and 25 of Township 1 South, Range 3 East, and Sections 7, 8, 17, 18, 19, 20, and 30 of Township 1 South, Range 4 East, Mount Diablo Baseline Meridian (Figure 1, Project Location – Clifton Court Forebay, all figures are provided at the end of the report). The forebay is surrounded on the northwest, north, and east sides by the Italian Slough, the Old River, and the West Canal. Water from the Delta enters the forebay through a gated intake control structure at the southeast end of the reservoir. This structure connects the forebay to the West Canal. Other related California State Water Project (SWP) nearby features include the California Aqueduct intake channel, located along the southwest side of the forebay reservoir, the Delta Fish Protective Facility (Skinner Fish Facility), and a control gate structure.

### 2.1.1 Project Description

The California Department of Water Resources (DWR) Delta Dams Rodent Burrow Remediation Project (Project) would involve rodent burrow remediation (burrow collapse, excavation, compaction, and backfilling), erosion prevention measures, restoration measures, ongoing monitoring, and permanent measures to prevent future burrowing where warranted. These measures are described in DWR’s proposed Rodent Burrow Maintenance and Monitoring Plan. Initial remediation actions would be taken in 2021 and 2022. Ongoing monitoring would continue in future years, and additional remediation and restoration measures may be warranted.

Clifton Court Forebay is located 10 miles northwest of the City of Tracy in Contra Costa County. Clifton Court Forebay Dam is an earthen dam that is subject to rodent burrowing that leads to piping and internal erosion. A burrow that intercepts the phreatic surface (water level) within the dam can cause erodible material from the dam embankment to migrate and be carried away. This “piping” action progresses upstream, elongating the pipe, until it reaches the reservoir. Once connection is made to the reservoir, the piping can cause a catastrophic breaching of the dam, ultimately leading to dam failure.

Burrowing activity has been identified at locations in all portions of the approximately 8-mile-long Clifton Court Forebay Dam. The most extensive burrowing—and therefore the most severe damage—occurs mostly along three segments (in the northwest corner, along the central portion of the western side, and along central and eastern portions of the southern side), while less widespread individual burrow holes and burrow clusters occur throughout all reaches of the dam. Burrow remediation activities are expected to affect a total of 37.5 acres of the downstream face of Clifton Court Forebay Dam. Rodent burrow remediation work to restore the dam embankments and complete burrow prevention measures would take place over 1 to 2 years. After construction, any materials not used or reused in the Project would be hauled off site and reused, disposed of in a landfill, or recycled at a recycling facility. Construction would include clearing and grubbing of trees and shrubs, including any stumps. Cleared and grubbed vegetation would be removed from the site and disposed of at an approved location. Construction would occur continuously during daylight hours between May and October in each year that construction takes place, with no work occurring for 24 hours following a rain event.
Where shallow ruts and near-surface deformations occur, DWR would fill and compact these areas with native soil of similar type to that of the downstream dam embankment slope. This would require use of lightweight and heavy construction equipment such as skid-steer, dozer, backhoe, skip-loader, soil compactor, excavator, and water truck. Fill material would be delivered to the site from a stockpile location using dump trucks or light-duty trucks. No export of soil is anticipated for excavation and recompaction of the dam face, but some limited import may be needed while armoring the dam. Rock, bedding material, mesh, or other suitable materials required for armoring would be imported to the site via the existing or proposed construction access roads and staged in staging areas or access roads.

Clifton Court Forebay Dam has a seepage collection system consisting of perimeter drainage channels and several collection sumps. The drainage channels capture seepage water and convey it into the sumps, which continuously pump water back into the forebay. Sump No. 4 is located at the northwest end of the dam and several large trees within its footprint are proposed to be removed in the fall of 2021 to prevent leaves and limbs from obstructing the intake pump screens.

DWR has identified a high-priority repair area at the Clifton Court Forebay intake channel to restore the slope and install permanent improvement measures to prevent animal burrowing. The repairs include excavation, grouting, backfill, and recompaction; installation of PVC-coated steel wire mesh and bedding material; and placement of armoring rock. This work would occur on the downstream slope (channel side) from the downstream crest (at approximately 16.5 feet above mean sea level) to an elevation of 4 feet, and be performed during low tide conditions to avoid working directly within waters. Clearing and grubbing would occur on the downstream slope to remove debris, vegetation, and existing riprap remains from original construction of the dam. Restoration of the dam intake channel slope would require excavating to a depth of approximately 2 feet. After excavation has exposed subgrade, any holes or cavities that remain would be grouted as needed. Grouting is expected to be performed on a limited basis and as determined by the field engineer. Once grouting is complete, the excavated areas would be backfilled and recompacted in lifts, back to the original design slope. The embankment slope would be backfilled with a combination of impervious native soil, cementitious-soil slurry, or similar embankment material. It is anticipated that any excavation and recompaction of the dam’s face would result in minor import or export of materials. Following the recompaction effort, a layer of bedding material (6 inches thick) and wire mesh would be placed over the restored embankment slope. The bedding material and PVC-coated steel wire mesh would be placed on the entire remediation area. An 18-inch-thick layer of large armoring rock would be placed over the bedding material and PVC wire mesh to deter future animal burrowing and prevent erosion within the intake channel slope due to wave action.

2.1.2 Project Location, Access, and Staging

Clifton Court Forebay is located in Contra Costa County, California. The primary access to the dam is via Byron Highway to Clifton Court Road, and a secondary access is provided from Byron Highway via the Skinner Fish Facility entrance. The primary access point provides access to the west, north, and east dam segments. Typical access to the south dam segment is also from Clifton Court Road, but this access point is subject to traffic load restrictions because it passes over the intake control structure bridge. Thus, the additional access point through the Skinner Fish Facility entrance would provide access to the southern dam embankment and intake channel for heavy haul trucks or construction equipment. Clifton Court Forebay Dam is approximately 8 miles long, impounds 28,653 acre-feet, and serves as the intake point and northernmost terminus of the California Aqueduct. The dam embankment has a maximum height of 30 feet and a crest width of 20 feet. The overall crest length of the dam is 36,500 feet (6.9 miles).
DWR has identified 11 staging areas around the perimeter of the dam totaling approximately 10.4 acres. Staging areas would be used to stockpile material needed to implement the burrow remediation, including filling of ruts and deformations. The materials would include rock, bedding material, wire mesh, or other materials required for armoring and/or backfilling the burrow holes.

In addition to the access provided by the dam’s paved crest roadway, existing maintenance roads may be used along the dam toe. An additional maximum of 10.6 acres of permanent toe access roads may be necessary for construction and long-term operations and maintenance. It is anticipated that any excavation and recomposition of the dam’s face will require import. Rock, bedding material, wire mesh, or other materials required for armoring and/or backfilling the burrow holes, will be imported to the site via the existing crest and maintenance access roads. Placement of materials will be achieved from the dam crest and toe.

2.1.3 Construction Equipment

The following construction equipment would be used to implement the proposed dam remediation efforts:

- concrete truck
- skid-steer
- scraper
- grader
- dozer
- backhoe
- mobile grout mixing plant
- concrete pump truck
- skip-loader
- soil compactor
- excavator
- dump truck
- water truck

2.2 Regulatory Setting

This study was completed in compliance with federal cultural resources laws and regulations, including Section 106 of the National Historic Preservation Act (NHPA). Under Section 106, historic and archaeological districts, sites, buildings, structures, and objects are assigned significance based on their exceptional value or quality in illustrating or interpreting history, architecture, archaeology, engineering, and culture. The sections below provide the critical federal and state regulatory framework by which historic properties and historic resources are identified and evaluated, as well as the rubric by which adverse effects under NHPA Section 106 and significant impacts under the California Environmental Quality Act (CEQA) are evaluated.

2.2.1 Federal

**National Historic Preservation Act of 1966**

The NHPA established the National Register of Historic Places (NRHP) and the President’s Advisory Council on Historic Preservation, and provided that states may establish State Historic Preservation Officers (SHPOs) to carry out some of the functions of the NHPA. Most significantly for federal agencies responsible for managing cultural resources, Section 106 of the NHPA directs that
Section 106 also affords the President’s Advisory Council on Historic Preservation a reasonable opportunity to comment on the undertaking (16 U.S. Code 470[f]).

The content of Title 36 of the Code of Federal Regulations, Part 800, implements Section 106 of the NHPA. It defines the steps necessary to identify historic properties (those cultural resources listed in or eligible for listing in the NRHP), including consultation with federally recognized Native American tribes to identify resources with important cultural values; to determine whether or not they may be adversely affected by a proposed undertaking; and to outline the process for eliminating, reducing, or mitigating the adverse effects.

The President’s Advisory Council on Historic Preservation provides methodological and conceptual guidance for identifying historic properties. In Title 36 of the Code of Federal Regulations, Part 800.4, the steps necessary for identifying historic properties are as follows:

- Determine and document the area of potential effect (APE) (36 CFR [Code of Federal Regulations] 800.16[d]).
- Review existing information on historic properties within the APE, including preliminary data.
- Confer with consulting parties to obtain additional information on historic properties or concerns about effects to these.
- Consult with Native American tribes (36 CFR 800.3[f]) to obtain knowledge on resources that are identified with places where they attach cultural or religious significance.
- Perform appropriate fieldwork (including phased identification and evaluation).
- Apply NRHP criteria to determine resource eligibility for NRHP listing.

Fulfilling these steps is generally thought to constitute a reasonable effort to identify historic properties within the APE for an undertaking. The obligations of a federal agency must also assess whether an undertaking will have an adverse effect on cultural resources. An undertaking will have an adverse effect when:

an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the National Register. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative (36 CFR Part 800.5[1]).

The process of determining whether an undertaking may have an adverse effect requires the federal agency to confer with consulting parties to appropriately consider all relevant stakeholder concerns and values. Consultation regarding the treatment of a historic property may result in a Programmatic Agreement and/or Memorandum of
Agreement between consulting parties that typically include the lead federal agency, SHPO, and other applicable parties if they agree to be signatories to these documents. Treatment documents—whether resource-specific or generalized—provide guidance for resolving potential or realized adverse effects to known historic properties or to those that may be discovered during implementation of an undertaking. In all cases, avoidance of adverse effects to historic properties is the preferred treatment measure, and it is generally the burden of the federal agency to demonstrate why avoidance may not be feasible.

**National Register of Historic Places**

The resources identified within the APE have been previously evaluated in consideration of NRHP designation criteria. NRHP guidelines for the evaluation of historic significance were developed to be flexible and to recognize the accomplishments of all who have made significant contributions to the nation’s history and heritage. Its criteria are designed to guide state and local governments, federal agencies, and others in evaluating potential entries in the NRHP. For a property to be listed in or determined eligible for listing, it must be demonstrated to possess integrity and to meet at least one of the following criteria:

A. That are associated with events that have made a significant contribution to the broad patterns of our history; or

B. That are associated with the lives of persons significant in our past; or

C. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

D. That have yielded, or may be likely to yield, information important in prehistory or history.

Integrity is defined in NRHP guidance, “How to Apply the National Register Criteria,” as “the ability of a property to convey its significance. To be listed in the NRHP, a property must not only be shown to be significant under the NRHP criteria, but it also must have integrity” (Andrus and Shrimpton 2002). NRHP guidance further asserts that properties be completed at least 50 years ago to be considered for eligibility. Properties completed fewer than 50 years before evaluation must be proven to be “exceptionally important” (criteria consideration) to be considered for listing.

2.2.2 State

**California Environmental Quality Act**

As described further below, the following CEQA statutes and State of California CEQA Guidelines (CEQA Guidelines) are of relevance to the analysis of archaeological, historic, and tribal cultural resources:

- California Public Resources Code Section 21084.1 and CEQA Guidelines Section 15064.5(a) define “historical resources.” In addition, CEQA Guidelines Section 15064.5(b) defines the phrase “substantial adverse change in the significance of an historical resource.” It also defines the circumstances when a project would materially impair the significance of an historical resource.

- California Public Resources Code Sections 21083.2(b)-(c) and CEQA Guidelines Section 15126.4 provide information regarding the mitigation framework for archaeological and historic resources, including examples of preservation-in-place mitigation measures; preservation-in-place is the preferred manner of mitigating impacts to significant archaeological sites because it maintains the relationship between artifacts and the archaeological context and may also help avoid conflict with religious or cultural values of groups associated with the archaeological site(s).
More specifically, under CEQA, a project may have a significant effect on the environment if it may cause “a substantial adverse change in the significance of an historical resource” (California Public Resources Code Section 21084.1; CEQA Guidelines Section 15064.5[b]). If a site is either listed or eligible for listing in the CRHR, or if it is included in a local register of historic resources or identified as significant in a historical resources survey (meeting the requirements of California Public Resources Code, Section 5024.1[q]), it is a historical resource and is presumed to be historically or culturally significant for purposes of CEQA (California Public Resources Code Section 21084.1; CEQA Guidelines Section 15064.5[a]). The lead agency is not precluded from determining that a resource is a historical resource even if it does not fall within this presumption (California Public Resources Code Section 21084.1; CEQA Guidelines Section 15064.5[a]).

A “substantial adverse change in the significance of an historical resource” reflecting a significant effect under CEQA means “physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of an historical resource would be materially impaired” (CEQA Guidelines Section 15064.5[b][1]; California Public Resources Code Section 5020.1[q]). In turn, CEQA Guidelines Section 15064.5(b)(2) states the significance of an historical resource is materially impaired when a project:

1. Demolishes or materially alters in an adverse manner those physical characteristics of an historical resource that convey its historical significance and that justify its inclusion in, or eligibility for, inclusion in the California Register of Historical Resources; or
2. Demolishes or materially alters in an adverse manner those physical characteristics that account for its inclusion in a local register of historical resources pursuant to section 5020.1(k) of the Public Resources Code or its identification in an historical resources survey meeting the requirements of section 5024.1(g) of the Public Resources Code, unless the public agency reviewing the effects of the project establishes by a preponderance of evidence that the resource is not historically or culturally significant; or
3. Demolishes or materially alters in an adverse manner those physical characteristics of a historical resource that convey its historical significance and that justify its eligibility for inclusion in the California Register of Historical Resources as determined by a lead agency for purposes of CEQA.

Pursuant to these sections, the CEQA inquiry begins with evaluating whether a project site contains any “historical resources,” then evaluates whether that project will cause a substantial adverse change in the significance of a historical resource such that the resource’s historical significance is materially impaired.

California Register of Historical Resources

In California, the term “historical resource” includes but is not limited to “any object, building, structure, site, area, place, record, or manuscript which is historically or archaeologically significant, or is significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California” (California Public Resources Code Section 5020.1[j]). In 1992, the California legislature established the California Register of Historic Resources (CRHR) “to be used by state and local agencies, private groups, and citizens to identify the state’s historical resources and to indicate what properties are to be protected, to the extent prudent and feasible, from substantial adverse change” (California Public Resources Code Section 5024.1[a]). The criteria for listing resources on the CRHR were expressly developed to be in accordance with previously established criteria developed for listing in the NRHP, enumerated below. According to California Public Resources Code Section
5024.1(c)(1–4), a resource is considered historically significant if it (i) retains “substantial integrity,” and (ii) meets at least one of the following criteria:

1. Is associated with events that have made a significant contribution to the broad patterns of California’s history and cultural heritage.
2. Is associated with the lives of persons important in our past.
3. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values.
4. Has yielded, or may be likely to yield, information important in prehistory or history.

In order to understand the historic importance of a resource, sufficient time must have passed to obtain a scholarly perspective on the events or individuals associated with the resource. A resource less than 50 years old may be considered for listing in the CRHR if it can be demonstrated that sufficient time has passed to understand its historical importance. The criteria for the CRHR are nearly identical to those for the NRHP, and properties listed or formally designated as eligible for listing in the NRHP are automatically listed in the CRHR, as are the state landmarks and points of interest. The CRHR also includes properties designated under local ordinances or identified through local historical resource surveys.

2.3 Area of Potential Effect

The APE is the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties. Determination of the APE is influenced by a project’s setting, the scale and nature of the undertaking, and the different kinds of effects that may result from the undertaking.

The built environment APE for the Project is shown in Figure 3, Clifton Court Forebay – Cultural Resources, Built Environment – Area of Potential Effects. The APE for this Project follows the maximum possible area of potential impacts resulting from the proposed Project, including all construction, repairs, easements, and staging areas located in the Project area. Based on the construction proposed for this Project, the APE encompasses the extent of the one historic-era built environment structure located in the Project area of direct impact: Clifton Court Forebay. Clifton Court Forebay has been previously recorded and is over 45 years old. It is discussed in detail in this report.
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3 Research and Field Methods

3.1 Literature Review

In preparation of the historical context, significance evaluation, integrity discussion, and application of criteria of adverse effect sections of this report, Dudek first conducted extensive archival research on the Project area, DWR, and the SWP. These research efforts are summarized below.

3.1.1 California Historical Resources Information System Record Search

A records search of the APE, including a 1-mile buffer was completed by Central California Information Center (CCaIC) and Northwest Information Center (NWIC) staff on November 30, 2020, and December 23, 2020. While the APE lies entirely within Contra Costa County, the 1-mile buffer falls partially into San Joaquin County, necessitating a search at both the NWIC and the CCaIC. These searches included their collections of mapped prehistoric, historical, and built-environment resources; California Department of Parks and Recreation Site Records; technical reports; archival resources; and ethnographic references. Additional consulted sources included the NRHP, California Inventory of Historical Resources/CRHR and listed Office of Historic Preservation Archaeological Determinations of Eligibility, California Points of Historical Interest, California Historical Landmarks, and California Department of Transportation Bridge Survey information. A complete overview of the Dudek record search can be found in the Archaeological Resources Inventory Report for the Delta Dams Safety of Dams Project: Clifton Court Forebay, Contra Costa County, California, prepared by Dudek for DWR (Giacinto et al. 2021).

Previously Conducted Cultural Resources Studies

CCaIC and NWIC records indicate that 83 previous cultural resources technical investigations have been conducted within 1 mile of the Project site. Of these, 16 studies intersect the current Clifton Court Forebay Project site (Table 1).

Table 1. Clifton Court Forebay – Previously Conducted Technical Studies

<table>
<thead>
<tr>
<th>Report ID</th>
<th>Authors</th>
<th>Year</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-008942</td>
<td>J. T. Ruckle</td>
<td>1974</td>
<td>Archeology of the California State Water Project</td>
</tr>
<tr>
<td>S-010040</td>
<td>Allan Bramlette, Mary Praetzellis, Adrian Praetzellis, and David A. Fredrickson</td>
<td>1988</td>
<td>Archaeological and Historical Resources Within the Los Vaqueros/Kellogg Study Area, Contra Costa and Alameda Counties, California</td>
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<tr>
<td>S-010040a</td>
<td>Allan G. Bramlette, Mary Praetzellis, Adrian Praetzellis, Katherine M. Dowdall, Patrick Brunmeier, and David A. Fredrickson</td>
<td>1991</td>
<td>Archaeological Resources Inventory for Los Vaqueros Water Conveyance Alignments, Contra Costa County, California</td>
</tr>
<tr>
<td>S-011826</td>
<td>Dorothea J. Theodoratus, Mary Pyle Peters, Clinton</td>
<td>1980</td>
<td>Montezuma I and II Cultural Resources</td>
</tr>
</tbody>
</table>
Table 1. Clifton Court Forebay – Previously Conducted Technical Studies

<table>
<thead>
<tr>
<th>Report ID</th>
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<th>Year</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Michael Crist, Billy J. Peck, and Myrna Saxe</td>
<td></td>
<td>Joaquin and Contra Costa Counties, California</td>
</tr>
<tr>
<td>S-035187</td>
<td>G. James West</td>
<td>2008</td>
<td>Archaeological Survey Report, Clifton Court Forebay Delta Maintenance Project</td>
</tr>
<tr>
<td>S-038654</td>
<td>Tiffany A. Schmid</td>
<td>2012</td>
<td>Department of Water Resources, Archaeological Survey Report, Clifton Court Forebay Pump, Sump</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>and Seep Maintenance Project</td>
</tr>
<tr>
<td>S-038655</td>
<td>Rebecca Gilbert and Tiffany Schmid</td>
<td>2012</td>
<td>Department of Water Resources, Archaeological Survey Report, Clifton Court Forebay Beaver Den</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Repair Project</td>
</tr>
<tr>
<td>S-038656</td>
<td>Rebecca H. Gilbert and Tiffany A. Schmid</td>
<td>2012</td>
<td>Department of Water Resources, Archaeological Survey Report, Clifton Court Forebay Seepage</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Monitoring Station Repair Project</td>
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<tr>
<td>S-046747</td>
<td>Monica Nolte</td>
<td>2015</td>
<td>Confidential, Department of Water Resources, Cultural Resources Technical Report, Geotechnical</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Drilling near Clifton Court Forebay, Contra Costa County, California</td>
</tr>
<tr>
<td>S-046748</td>
<td>Rebecca H. Gilbert</td>
<td>2012</td>
<td>Cultural Resources Inventory, Evaluation and Finding of Effect Report for the Clifton Court</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Forebay Fishing Facility Project, Contra Costa County, California</td>
</tr>
<tr>
<td>S-046748a</td>
<td>Rebecca H. Gilbert</td>
<td>2012</td>
<td>Department of Water Resources Archaeological Survey Report Clifton Court Forebay Pump, Sump,</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>and Seep Maintenance Project</td>
</tr>
<tr>
<td>S-046748b</td>
<td>AECOM</td>
<td>2013</td>
<td>Updated Cultural Resources Inventory, Evaluation and Finding of Effect Report for the Clifton</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Court Forebay Fishing Facility Project, Contra Costa County, California</td>
</tr>
<tr>
<td>S-046748c</td>
<td>William Guthrie</td>
<td>2012</td>
<td>COE_2012_1129_001: Determination of Eligibility and Effect that Issuing a Permit (Undertaking)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>would have on Cultural Resources within the Area of Potential Effects (APE) for the Clifton</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Court Forebay Fishing Facility Project</td>
</tr>
<tr>
<td>S-046749</td>
<td>Meg Scantlebury</td>
<td>2013</td>
<td>Addendum 1 to the Built Historical Resources Evaluation Report for the Bay Delta Conservation</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Plan Project, Sacramento, Yolo, Solano, San Joaquin, Contra Costa, and Alameda Counties,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>California</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>and Contra Costa Counties, California</td>
</tr>
</tbody>
</table>

**Previous Technical Studies within 1 Mile of the Project Site**

<table>
<thead>
<tr>
<th>Report ID</th>
<th>Authors</th>
<th>Year</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-006113</td>
<td>U.S. Bureau of Reclamation, Mid-Pacific Region,</td>
<td>1983</td>
<td>Class II Archaeological Survey, San Luis Drain and Alternatives, Central Valley Project, San</td>
</tr>
<tr>
<td></td>
<td>Office of Environmental Quality</td>
<td></td>
<td>Luis Unit, California</td>
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</table>
Table 1. Clifton Court Forebay – Previously Conducted Technical Studies

<table>
<thead>
<tr>
<th>Report ID</th>
<th>Authors</th>
<th>Year</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-010508</td>
<td>G. James West</td>
<td>1982</td>
<td>Class II Archaeological Survey, Kellogg Unit Reformulation, Contra Costa County, California</td>
</tr>
<tr>
<td>S-011849</td>
<td>G. James West and Barry G. Scott</td>
<td>1990</td>
<td>A Class II Archaeological Survey of the South Delta Water Management Program Area, San Joaquin and Contra Costa Counties, California</td>
</tr>
<tr>
<td>S-012275</td>
<td>Melinda Romano</td>
<td>1990</td>
<td>Archaeological Survey and Cultural Resources Inventory, Brentwood Alternative, California, PGT-PG&amp;E Pipeline Expansion Project</td>
</tr>
<tr>
<td>S-012800</td>
<td>Allan Bramlette, Mary Praetzellis, Adrian Praetzellis, Margaret Purser, and David A. Fredrickson</td>
<td>1990</td>
<td>Archaeological and Historical Resources Inventory for the Vasco Road and Utility Relocation Project, Contra Costa and Alameda Counties</td>
</tr>
<tr>
<td>S-016210</td>
<td>Paul Bouey</td>
<td>1992</td>
<td>Test excavations at PEP 11-24 (letter report)</td>
</tr>
<tr>
<td>S-017993</td>
<td>Brian Hatoff, Barb Voss, Sharon Waechter, Stephen Wee, and Vance Bente</td>
<td>1995</td>
<td>Cultural Resources Inventory Report for the Proposed Mojave Northward Expansion Project</td>
</tr>
<tr>
<td>S-017993a</td>
<td>Woodward-Clyde Consultants</td>
<td>1995</td>
<td>Proposed Mojave Northward Expansion Project: Appendix A - Native American Consultation</td>
</tr>
<tr>
<td>S-017993b</td>
<td>Woodward-Clyde Consultants</td>
<td>1995</td>
<td>Proposed Mojave Northward Expansion Project: Appendix B - Looping Segments - Class 1</td>
</tr>
<tr>
<td>S-017993c</td>
<td>Woodward-Clyde Consultants</td>
<td>1995</td>
<td>Proposed Mojave Northward Expansion Project: Appendix C - Monitoring and Emergency Discovery Plan</td>
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<tr>
<td>S-017993l</td>
<td>Woodward-Clyde Consultants</td>
<td>1995</td>
<td>Proposed Mojave Northward Expansion Project: Appendix L - Photo-documentation</td>
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<tr>
<td>S-017993m</td>
<td>Woodward-Clyde Consultants</td>
<td>1995</td>
<td>Proposed Mojave Northward Expansion Project: Appendix M - Curricula Vitae of Key Preparers</td>
</tr>
</tbody>
</table>
Table 1. Clifton Court Forebay – Previously Conducted Technical Studies

<table>
<thead>
<tr>
<th>Report ID</th>
<th>Authors</th>
<th>Year</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-018762</td>
<td>Allen G. Pastron</td>
<td>1989</td>
<td>Cultural Resources Evaluation of the Proposed Mountain House Planned Community, Alameda and San Joaquin Counties, California</td>
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</tbody>
</table>
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</tr>
</thead>
</table>

Source: California Historical Resources Information System Record search at NWIC and CCaIC, December 23, 2020.

Previously Recorded Cultural Resources

The CCaIC and NWIC records searches identified four previously recorded cultural resources within the Clifton Court Forebay Project site: P-07-003093, P-07-003122, P-07-004507, and P-07-004698. These resources are described in further detail below. There are an additional 44 cultural resources within a 1-mile radius of the Project site (Table 2).
Table 2. Clifton Court Forebay – Previously Recorded Resources

<table>
<thead>
<tr>
<th>Primary ID</th>
<th>Trinomial</th>
<th>Name</th>
<th>Type</th>
<th>Age</th>
<th>Attributes</th>
<th>CHRS Status Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>P-07-003093/P-07-39-004856</td>
<td>CA-CCO-000822H</td>
<td>West Canal Structure</td>
<td>Historic</td>
<td></td>
<td>Canal</td>
<td>6: Ineligible</td>
</tr>
<tr>
<td>P-07-003122</td>
<td>None</td>
<td>Clifton Court Forebay Structure</td>
<td>Historic</td>
<td></td>
<td>Reservoir</td>
<td>3D: Appears Eligible</td>
</tr>
<tr>
<td>P-07-004507</td>
<td>None</td>
<td>GandA-809-62H; Italian Slough, Middle River, and West Canal Levee Structure, Site</td>
<td>Historic</td>
<td></td>
<td>Roadbed; Canal; Levee</td>
<td>none listed</td>
</tr>
<tr>
<td>P-07-004698</td>
<td>CA-CCO-000842H</td>
<td>Delta Field Division Facilities: Clifton Court Forebay, Skinner Delta Fish Protective Facility, Harvey O. Banks Pumping Plant Building, Structure, Element of district</td>
<td>Historic</td>
<td></td>
<td>Ancillary building; Public utility building; Engineering structure; Canal</td>
<td>3D: Appears Eligible</td>
</tr>
<tr>
<td>P-01-001783</td>
<td>CA-ALA-000623H</td>
<td>Southern Pacific Railroad Structure</td>
<td>Historic</td>
<td></td>
<td>Railroad grade; Power line; Engineering structure; Bridge</td>
<td>—</td>
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<tr>
<td>P-01-010435</td>
<td>None</td>
<td>Segment of the Delta Mendota Canal and Intake Channel (No.27) Structure, District</td>
<td>Historic</td>
<td></td>
<td>Canal</td>
<td>—</td>
</tr>
<tr>
<td>P-01-010446</td>
<td>CA-ALA-000595H</td>
<td>Segment of PG&amp;E Distribution Line (No. 7) Structure</td>
<td>Historic</td>
<td></td>
<td>Engineering structure</td>
<td>—</td>
</tr>
<tr>
<td>P-01-010447</td>
<td>CA-ALA-000596H</td>
<td>Segment of the Tracy-Contra Costa-Ygnacio Transmission Line (No. 5) Structure, Element of district</td>
<td>Historic</td>
<td></td>
<td>Engineering structure</td>
<td>—</td>
</tr>
<tr>
<td>P-01-010448</td>
<td>CA-ALA-000597H</td>
<td>Segment of the Tracy-Los Vaqueros Transmission Line (No. 6) Structure</td>
<td>Historic</td>
<td></td>
<td>Engineering structure</td>
<td>—</td>
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<tr>
<td>P-01-010449</td>
<td>CA-ALA-000598H</td>
<td>Segment of Hurley-Tracy Transmission Line (No. 4) Structure</td>
<td>Historic</td>
<td></td>
<td>Engineering structure</td>
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</table>
### Table 2. Clifton Court Forebay – Previously Recorded Resources

<table>
<thead>
<tr>
<th>Primary ID</th>
<th>Trinomial</th>
<th>Name</th>
<th>Type</th>
<th>Age</th>
<th>Attributes</th>
<th>CHRS Status Code</th>
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<tbody>
<tr>
<td>P-01-010450</td>
<td>CA-ALA-000599H</td>
<td>Segment of Mountain House Road (No. 3)</td>
<td>Structure</td>
<td>Historic</td>
<td>Road</td>
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<tr>
<td>P-01-010451</td>
<td>CA-ALA-000600H</td>
<td>Segment of Byron Bethany Road (No.2)</td>
<td>Structure</td>
<td>Historic</td>
<td>Road</td>
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</tr>
<tr>
<td>P-01-010951</td>
<td>None</td>
<td>Delta Mendota Canal Construction Spoil Piles</td>
<td>Structure</td>
<td>Historic</td>
<td>Engineering structure</td>
<td></td>
</tr>
<tr>
<td>P-01-010952</td>
<td>None</td>
<td>Alternative Intake Channel</td>
<td>Structure</td>
<td>Historic</td>
<td>Canal</td>
<td></td>
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<tr>
<td>P-01-010953</td>
<td>None</td>
<td>Tracy Fish Facility</td>
<td>Object</td>
<td>Historic</td>
<td>Ancillary building; Government building; Fish collection structure</td>
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<tr>
<td>P-01-011471</td>
<td>None</td>
<td>Livermore Yacht Club (No. 15)</td>
<td>Building, District</td>
<td>Historic</td>
<td>Multiple family property; Ancillary building; 1-3 story commercial building; Canal</td>
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<tr>
<td>P-07-000072</td>
<td>CA-CCO-000130</td>
<td>CCO-130</td>
<td>Site</td>
<td>Prehistoric</td>
<td>Habitation debris</td>
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<tr>
<td>P-07-000085</td>
<td>CA-CCO-000143</td>
<td>CCO-143</td>
<td>Site</td>
<td>Prehistoric</td>
<td>Lithic scatter; Shell bead</td>
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<tr>
<td>P-07-000086</td>
<td>CA-CCO-000144</td>
<td>CCO-144</td>
<td>Site</td>
<td>Prehistoric</td>
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<td>P-07-000086</td>
<td>CA-CCO-000653</td>
<td>PEP 11-24</td>
<td>Site</td>
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<td>Lithic scatter; Burials</td>
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<td>P-07-000813</td>
<td>CA-CCO-000733H</td>
<td>Southern Pacific Railroad</td>
<td>Building, Structure</td>
<td>Historic</td>
<td>Railroad grade; Industrial building; Engineering structure; Bridge</td>
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<tr>
<td>P-07-002546</td>
<td>None</td>
<td>PG&amp;E Substation (No. 22)</td>
<td>Building, Structure</td>
<td>Historic</td>
<td>Ancillary building; Public utility building; Engineering structure</td>
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<tr>
<td>P-07-002547</td>
<td>CA-CCO-000738H</td>
<td>Byron Bethany Irrigation District Main Canal (No. 9)</td>
<td>Structure</td>
<td>Historic</td>
<td>Canal</td>
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<tr>
<td>P-07-002548</td>
<td>CA-CCO-000739H</td>
<td>Segment of PG&amp;E Distribution Line No. 7</td>
<td>Structure</td>
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<td>Engineering structure</td>
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<td>P-07-002549</td>
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<td>Segment of the Tracy-Contra Costa-Ygnacio</td>
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### Table 2. Clifton Court Forebay – Previously Recorded Resources

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<th>Primary ID</th>
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<th>Type</th>
<th>Age</th>
<th>Attributes</th>
<th>CHRS Status Code</th>
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<tr>
<td>P-07-002550</td>
<td>CA-CCO-000741H</td>
<td>Transmission Line (No. 5)</td>
<td>Structure</td>
<td>Historic</td>
<td>Engineering structure</td>
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<tr>
<td>P-07-002551</td>
<td>CA-CCO-000742H</td>
<td>Segment of the Tracy-Los Vaqueros Transmission Line (No. 6)</td>
<td>Structure</td>
<td>Historic</td>
<td>Engineering structure</td>
<td></td>
</tr>
<tr>
<td>P-07-002552</td>
<td>CA-CCO-000743H</td>
<td>Segment of Byron Bethany Road (No. 2)</td>
<td>Structure</td>
<td>Historic</td>
<td>Road</td>
<td></td>
</tr>
<tr>
<td>P-07-002558</td>
<td>None</td>
<td>Segment of the Delta Mendota Canal and Intake Channel (No. 27)</td>
<td>Structure, District</td>
<td>Historic</td>
<td>Canal</td>
<td></td>
</tr>
<tr>
<td>P-07-002924</td>
<td>CA-CCO-000795H</td>
<td>Segment of Mountain House Road (No. 3)</td>
<td>Structure</td>
<td>Historic</td>
<td>Road</td>
<td></td>
</tr>
<tr>
<td>P-07-002981</td>
<td>None</td>
<td>Delta Mendota Canal Construction Spoil Piles</td>
<td>Structure</td>
<td>Historic</td>
<td>Engineering structure</td>
<td></td>
</tr>
<tr>
<td>P-07-002982</td>
<td>None</td>
<td>Alternative Intake Channel</td>
<td>Structure</td>
<td>Historic</td>
<td>Canal</td>
<td></td>
</tr>
<tr>
<td>P-07-002983</td>
<td>None</td>
<td>Tracy Fish Collection Facility</td>
<td>Building, Structure</td>
<td>Historic</td>
<td>Ancillary building; Government building; Fish collection structure</td>
<td></td>
</tr>
<tr>
<td>P-07-003091</td>
<td>None</td>
<td>Intake Channel to Delta Pumping Plant; State Water Project</td>
<td>Structure</td>
<td>Historic</td>
<td>Canal</td>
<td></td>
</tr>
<tr>
<td>P-07-004508</td>
<td>None</td>
<td>ISO-709-53</td>
<td>Other</td>
<td>Prehistoric</td>
<td>Isolated chert artifacts</td>
<td></td>
</tr>
<tr>
<td>P-07-004512</td>
<td>CA-CCO-000829H</td>
<td>COTP0106-210</td>
<td>Structure, Site</td>
<td>Historic</td>
<td>Farmstead; Trash scatter</td>
<td></td>
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<tr>
<td>P-07-004516</td>
<td>None</td>
<td>GandA-609-17H</td>
<td>Site</td>
<td>Historic</td>
<td>Glass bottles; Irrigation Ditch</td>
<td></td>
</tr>
<tr>
<td>P-07-004517</td>
<td>None</td>
<td>GandA-609-18H</td>
<td>Site</td>
<td>Historic</td>
<td>Glass bottles</td>
<td></td>
</tr>
<tr>
<td>P-07-004518</td>
<td>None</td>
<td>GandA-609-19H</td>
<td>Site</td>
<td>Historic</td>
<td>Glass scatter</td>
<td></td>
</tr>
<tr>
<td>P-07-004519</td>
<td>None</td>
<td>GandA-609-20H</td>
<td>Site</td>
<td>Historic</td>
<td>Glass scatter</td>
<td></td>
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</table>
Table 2. Clifton Court Forebay – Previously Recorded Resources

<table>
<thead>
<tr>
<th>Primary ID</th>
<th>Trinomial</th>
<th>Name</th>
<th>Type</th>
<th>Age</th>
<th>Attributes</th>
<th>CHRS Status Code</th>
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<tr>
<td>P-07-004520</td>
<td>None</td>
<td>GandA-609-21H</td>
<td>Site</td>
<td>Historic</td>
<td>Glass scatter</td>
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<tr>
<td>P-07-004730</td>
<td>None</td>
<td>1940 canal</td>
<td>Structure</td>
<td>Historic</td>
<td>Canal</td>
<td>—</td>
</tr>
<tr>
<td>P-39-004309</td>
<td>None</td>
<td>Byron-Bethany Road; AKA Bethany Rd., Co. Rd. 2388; TRWP-30</td>
<td>Structure</td>
<td>Historic</td>
<td>Road</td>
<td>—</td>
</tr>
<tr>
<td>P-39-004310</td>
<td>None</td>
<td>Segment of PG&amp;E Distribution Line (No 7); Sierra and San Francisco Power Company Distribution Line</td>
<td>Structure</td>
<td>Historic</td>
<td>Engineering structure</td>
<td>—</td>
</tr>
<tr>
<td>P-39-004312</td>
<td>None</td>
<td>Byron-Bethany Irrigation District Main Canal</td>
<td>Structure</td>
<td>Historic</td>
<td>Canal</td>
<td>—</td>
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<tr>
<td>P-39-004348</td>
<td>CA-SJO-000282H</td>
<td>Grant Line Canal</td>
<td>Structure</td>
<td>Historic</td>
<td>Canal</td>
<td>—</td>
</tr>
<tr>
<td>P-39-004886</td>
<td>None</td>
<td>Victoria Canal and Levees</td>
<td>Structure</td>
<td>Historic</td>
<td>Engineering structure; Canal</td>
<td>—</td>
</tr>
<tr>
<td>P-39-005265</td>
<td>None</td>
<td>ISO-609-22H</td>
<td>Site</td>
<td>Historic</td>
<td>Trash scatter</td>
<td>—</td>
</tr>
</tbody>
</table>

Source: California Historical Resources Information System Record search at NWIC and CCaIC, December 23, 2020.

P-07-003093/P-39-004856, West Canal

The West Canal travels along the east side of Clifton Court Forebay and extends about 3.5 miles from the west end of the Grant Line/Fabian and Bell Canal to the west end of the Victoria and North Canal. It was initially recorded in 2003 by Madeline R. Bowen at Jones & Stokes Associates as part of the Cultural Resources Inventory and Evaluation Report for the South Delta Improvement Program, Contra Costa and San Joaquin Counties, CA. According to this record, the West Canal was constructed ca. 1890 as a cut-off to the Old River until the construction of Clifton Court Forebay, at which point it became classified as a canal. The report associated with the record concludes that the West Canal “does not appear to meet the criteria for listing in the NRHP or the CRHR” (Bowen 2003, p. 2). However, it also concludes that “an argument could be made for eligibility under Criterion A of the NRHP or Criterion 1 of the CRHR for association with events that made a significant contribution to patterns of history in the Sacramento-San Joaquin Delta in the area of irrigation and land development” (Bowen 2003, p. 2). According to the DPR form, by the time of the 2003 record, the canal had lost its integrity of setting, design, materials, and workmanship, which were compromised over time.
P-07-003122, Clifton Court Forebay

Clifton Court Forebay was initially recorded in January 2012 by DWR and re-recorded and evaluated in May 2013 by Patricia Ambacher of AECOM as part of the Cultural Resources Inventory, Evaluation and Findings of Effect Report for the Clifton Court Forebay Fishing Facility Project. In the 2013 site record by Ambacher, she recommended that the forebay “appears to meet the Criteria A/1 and C/3 of the NRHP and the CRHR at the state level of significance as a contributing element to the California Aqueduct.” The California Aqueduct had been determined eligible under Criteria A/1 and C/3 of the NRHP and the CRHR and had received SHPO concurrence in July 2012 for its relationship to the SWP and for its engineering and complex design (Donaldson 2012, p. 1). Ambacher recommended Clifton Court Forebay was also eligible as a “critical component of the SWP” (Ambacher 2013, p. 3) regulating water flow into the California Aqueduct.

Clifton Court Forebay was constructed between 1967 and 1969, which fall within the California Aqueduct’s period of significance (1960–1974) (Ambacher 2013, pp. 2–5). Further, Ambacher writes that Clifton Court Forebay is a contributor and “is a character-defining feature of the California Aqueduct” because it was a critical and planned element of the SWP, as the location where the California Aqueduct begins (Ambacher 2013, p. 4). She also writes that as a character-defining feature of the California Aqueduct, Clifton Court Forebay “serves as a focal point of the aqueduct with regards to facilitating regulation of the surges a drawdown created during peak pumping periods,” and “the feature gates, which are a character-defining feature of the [Clifton Court Forebay] . . . can be closed to prevent backflow into the Delta at low tides” (Ambacher 2013, p. 4). Overall, Clifton Court Forebay “contributes to the common engineering objective of the Aqueduct” (Ambacher 2013, p. 5). At the time of this record, Clifton Court Forebay also retained all aspects of integrity necessary to convey its significance.

P-07-004507, Italian Slough, Middle River, and West Canal Levee

The levee includes three parts, the Italian Slough east levee, the southern levee for a portion of Middle River, and the West Canal west levee, and was initially recorded in 2015 by Margaret Kress of DWR as part of the Revised Archeological Survey Report for the Houston Canal and West Canal Erosion Repair Project: OM-DFD 2014-014, Sacramento, California and 2019 by J. Lang and B. Cox of Garcia and Associates in the Cultural Resources Inventory for the San Joaquin Valley Right-of-Way Maintenance Environmental Assessment Project prepared for Western Area Power Administration, Folsom, California. The site record documents the canal levees surrounding Clifton Court Forebay on the west, northwest, north, and east sides, and dates the West Canal to ca. 1890 and Italian Slough as early as ca. 1870 (Kress 2015, p. 1). The site record prepared for the same resource by Garcia and Associates gives measurements for the levee structure, citing it as approximately 60 feet wide at its base, 10 to 20 feet wide at its top, and 10 to 15 feet higher on the water side (Lang and Cox 2009, p. 1). Neither record formally evaluates the significance of the Italian Slough, Middle River, and the West Canal levee structure.

P-07-004698, Delta Field Division Facilities: Clifton Court Forebay, Skinner Delta Fish Protective Facility, Harvey O. Banks Pumping Plant

The Delta Field Division Facilities, constructed 1963–1969, include Clifton Court Forebay, John E. Skinner Delta Fish Protective Facility, and the Harvey O. Banks Pumping Plant (Banks Pumping Plant), which are located within the Bay–Delta Conservation Plan Project study area. The site record was prepared by Monte Kim and James Williams of ICF International as part of the Built Historical Resources Evaluation Report for the Bay Delta Conservation Plan Project (Kim and Williams 2013, p. 1). This site record appears to re-record Clifton Court Forebay as part of the Delta Field Division Facilities. The record includes the Skinner Fish Facility, a fish protection and data
collection facility with 14 associated buildings. This is used to keep fish out of the Banks Pumping Plant located downstream. The record also includes the Harvey O. Banks (Delta) Pumping Plant, which consists of a 11-pump pumping station, an intake channel, and an electrical switchyard. The Delta Field Divisions Facilities were initially recorded by ICF International in 2013 for Addendum 1: Built Historical Resources Evaluation Report for the Bay Delta Conservation Plan Project. According to the site record (Kim and Williams 2013, p. 2):

> The significance of this subsystem of the California State Water Project, constructed between 1963 and 1969, is due to the important role that its three components played as part of an expansive, engineered water-conveyance system, which was designed to store water in Northern California and distribute it to urban and agricultural areas elsewhere in the state. These three facilities of the Delta Field Division also appear to be eligible for NRHP and CRHR listing as contributing elements to a potential California State Water Project Historic District.

This Kim and Williams (2013) site record was created at roughly the same time and arrives at the same conclusion as the Ambacher (2013) evaluation: that the Delta Field Division Facilities are eligible for their relationship to the larger SWP system. The Kim and Williams (2013) record notes components of the Delta Field Division Facilities had not yet achieved the 50-year threshold at the time of recording, but that those constructed prior to 1969—Clifton Court Forebay, the Skinner Fish Facility, and the Harvey O. Banks Pumping Plant—appeared to be eligible at the state level of significance for listing in the NRHP under Criteria A and C, and the CRHR under Criteria 1 and 3. They are also potentially eligible as contributing elements of a suggested California State Water Project Historic District (Kim and Williams 2013, p. 10). This historic district has only been suggested and has not been formally studied or defined.

3.1.2 Other Relevant Studies

**California Department of Water Resources—Provided Reports**

On September 2, 2021, DWR provided Dudek with four additional reports related to Clifton Court Forebay and the proposed Project. These reports are listed in Table 3 and summarized below the table.

**Table 3. California Department of Water Resources—Held Previously Conducted Technical Studies**

<table>
<thead>
<tr>
<th>Report Source</th>
<th>Authors</th>
<th>Year</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Studies Intersecting</td>
<td>Kress, M.</td>
<td>2015</td>
<td>Cultural Resources Clearance for OMDFD-2015-004: CCF Gate Refurbishment</td>
</tr>
<tr>
<td>the Project Site</td>
<td>Nolte, M.</td>
<td>2016</td>
<td>Cultural Resources Clearance for OM-DFD-2016-042: Clifton Court Forebay Fence Replacement – Phase I</td>
</tr>
<tr>
<td>DWR-provided</td>
<td>Prince-Buitenhuys</td>
<td>2020</td>
<td>Cultural Resources Review OM-DFD-2020-011 BAPP V-Ditch and Culvert Clearing CR-DFD-2020-008</td>
</tr>
</tbody>
</table>

*Source: Reports provided to Dudek Built Environment staff on September 2, 2021.*

This cultural resources technical report was prepared by DWR’s Environmental Planning-Archaeology department in 2015 in support of a project proposing to conduct geotechnical exploration near the northeastern extent of Clifton Court Forebay. The project was prepared to comply with NHPA Section 106 and CEQA requirements. The Clifton Court Forebay is eligible for the NRHP and CRHR and constitutes a historic resource under CEQA and a historic property under Section 106. The project, as proposed, would not result in changes to the aspects of integrity or significance of the Clifton Court Forebay. Therefore DWR recommended that the project would result in No Significant Impacts to Historical Resources under CEQA (Section 15064.5), and a Finding of No Adverse Effect under Section 106 (36 CFR 800.5(b)).


This memorandum was prepared by DWR’s Environmental Planning-Archaeology department in 2015 to satisfy CEQA requirements in support of a project that proposed to remove and repair all five radial gates at Clifton Court Forebay. This project was conducted after emergency repairs in 2013, when Gate No. 2 had a catastrophic failure. Refurbishment of the radial gate features entailed sandblasting, recoating, seal replacement, and new anchorages, which would take place off site, and repairs to the gate assembly and new anchor tendons at Gates Nos. 1, 3, and 5. The memorandum found that because Clifton Court Forebay was eligible for the NRHP and CRHR and the radial gates were considered character-defining features, that Clifton Court Forebay constituted a historic resource under CEQA. The memorandum further posed that repairs and refurbishments to the radial gates would be accomplished using like materials and returning the original gates back to working condition, and the outcome was “no significant impacts to historical resources.”

Cultural Resources Clearance for OM-DFD-2016-042: Clifton Court Forebay Fence Replacement –Phase I (2016)

This memorandum was prepared by DWR’s Environmental Planning-Archaeology department in 2016 to satisfy CEQA requirements in support of a project that proposed to place up to 5,000 feet of right-of-way fencing along the southeastern property line of Clifton Court Forebay. The project also included vegetation removal and gravel road construction along the levee toe, as well as minor erosion repair along the levee crest. The memorandum recognized that because Clifton Court Forebay was eligible for the NRHP and CRHR, it constituted a historic resource under CEQA. According to the memorandum, further study was not conducted because the proposed work would not affect either historic built environment resources.


This memorandum was prepared by DWR’s Environmental Planning-Archaeology department in 2020 in support of a project that proposed to remove accumulated dirt from road-adjacent ditches at the Banks Pumping Plant lower intake channel. The project proposed to use a high pressure water hose to remove the dirt for a 2-mile-long segment of ditch; then dirt would be removed with a skid steer and loader bucket and/or front end loader. The report investigated the project’s potential impacts to the Banks Pumping Plant, which was recorded as a component of the California State Water Project Delta Field Division Facilities (P-07-004698), and had been previously recorded in 2013 by JRP Consulting (Kim and Williams 2013) and recommended eligible for the CRHR and NRHP under Criteria A/1 and C/3. The proposed project activities were deemed to have no significant impact to historical resources for the purposes of CEQA regarding the Banks Pumping Plant or the Delta Field Division Facilities (P-07-004698) as a whole.
Additional Reports and Records

Dudek has concluded that because Clifton Court Forebay was previously recommended eligible as a contributing component of the California Aqueduct, the following DPR record and all records pertaining to the California Aqueduct are also relevant. This record was shared with Dudek through a separate record search by Southern San Joaquin Valley Information Center staff on November 11, 2020.

**P-15-015820, California Aqueduct (Kern County)**

The Kern County segments of the California Aqueduct were initially recorded in 2008 by Three Girls and a Shovel LLC, and were re-recorded multiple times: in 2009 by JRP Historical Consulting LLC, in 2011 by AECOM, in 2012 by Daly & Associates, in 2013 by ESA, in 2016 by Applied Earthworks Inc., and in 2015 by ASM Affiliates Inc. Site records for other segments of the California Aqueduct, recorded in Fresno County as P-10-006207 and in Kings County as P-16-000266, are also held by the Southern San Joaquin Valley Information Center, while other counties’ segments are held by their respective information centers. Each recording was for the same resource (the California Aqueduct), but they were separate, as-needed segments for different projects. In the 2011 AECOM record by Patricia Ambacher of AECOM, she recommended the California Aqueduct as eligible under NRHP Criteria A and C and CRHR Criteria 1 and 3, with a period of significance spanning 1960–1974, the period of construction (Ambacher 2011, p. 2). The California Aqueduct was also recommended eligible under Criterion Consideration G for its exceptional significance, because at this time it did not yet meet the 50 year threshold for consideration. Ambacher proposed that the California Aqueduct was the “largest and most significant” (Ambacher 2011, pp. 5, 25) of the water conveyance systems in the SWP, and “profoundly altered” (Ambacher 2011, p. 25) the distribution of water across California, facilitating population increases and agricultural development of the San Joaquin Valley and Southern California. Ambacher also noted that it was significant due to its open trapezoidal design, concrete lining, and alignment and engineered relationship to the surrounding topography. In 2012, SHPO concurred with a finding of individual eligibility for the entirety of the California Aqueduct (Donaldson 2012, pp. 1–2). This determination automatically listed it in the CRHR.

### 3.2 Archival Research

**California Department of Water Resources**

In preparation of this report, DWR shared Bulletin 200, as well as multiple internal documents, PowerPoint presentations, maps, fact sheets, and department learning tools with the built environment staff at Dudek. The Bulletin 200 series is a comprehensive, six-volume bulletin that recounts the conceptualization, history, planning, design, operation, customers and users, and planned future expansion for the SWP. It was completed and published in 1974, the same year the SWP was deemed complete. Each volume discusses a different subject pertaining to the larger SWP system:

- Volume I, “History, Planning, and Early Progress” (DWR 1974a)
- Volume II, “Conveyance Facilities” (DWR 1974b)
- Volume III, “Storage Facilities” (DWR 1974c)
- Volume IV, “Power and Pumping Facilities” (DWR 1974d)
- Volume V, “Control Facilities” (DWR 1974e)
- Volume VI, “Project Supplements” (DWR 1974f)
Bulletin 200 and the various other bulletins and reports shared by DWR were used in the preparation of the general DWR historical context statement, as well as the resource-specific historical context, both of which are in Section 4, Historical Overview.

**California Water Libraries Collection, University of California Davis Library**

Many DWR, California Department of Public Works, and Bureau of Reclamation (Reclamation) reports, bulletins, and manuals were available through University of California Davis' California Water Libraries collection, available as digitized PDFs through the Internet Archive (archive.org) website. Any bulletin or report not provided by DWR was found through this library collection. Historical information obtained from this collection was used in the preparation of the general DWR historical context statement and the SWP-specific historical context, both of which are in Section 4.

**Water Resources Collections & Archives, Special Collections and Archives, University of California Riverside Orbach Science Library**

General background information and primary sources, reports, maps, and photographs related to the history of water management and infrastructure in California are held by the Water Resources Collections & Archives. Though a digital collection was available, neither the Orbach Science Library nor the Special Collections and Archives at University of California Riverside were open to researchers due to COVID-19 closures and in-person visit restrictions, and as such, this collection was not fully available to Dudek staff for research. Digital collections were used in the preparation of the general DWR historical context statement in Section 4. Dudek recommends future study of this collection when it becomes available to the public.

**California Water Library**

The California Water Library is a digital repository that provides public access to reports, articles, essays, research, white papers, and other materials published by the State of California, federal agencies, and environmental stakeholders. Dudek used this repository to find state-published water bulletins that were otherwise unavailable from the collections listed above. Digital collections were used in the preparation of the general DWR historical context statement in Section 4.

**Los Angeles County Library**

Dudek utilized a local county library in order to gain access to physical books and newspaper articles not provided through other venues. These items were used in the preparation of the general DWR historical context statement in Section 4.

3.3 Field Survey

3.3.1 Methods

During the surface reconnaissance for archaeological resources, William Burns, MA, and Nicholas Hanten, MA, completed a thorough photo documentation of Clifton Court Forebay in the Project APE on January 13, 2021. Dudek Architectural Historians Kathryn Haley, MA, and Kate G. Kaiser, MSHP, conducted an in-depth review of the photo documentation. The photo documentation was adequate to show specific structural details and to contextualize...
Clifton Court Forebay within the land surrounding the APE. Ms. Haley and Ms. Kaiser were able to view the character-defining features, spatial relationships, observed alterations, and historic landscape features via the photo documentation. All field notes, photographs, and records related to the current study are on file at the Dudek office in Auburn, California.

### 3.3.2 Results

During the course of the pedestrian survey, Dudek identified one structure over 45 years old: Clifton Court Forebay (P-01-003122, constructed 1967–1969), which has been previously recorded. Fieldwork photographs are not included in this report and may be found in Appendix A. Clifton Court Forebay and its relationship to the Project APE are indicated in Figure 2. Section 6, Application of Criteria of Adverse Effect, provides a detailed physical description of Clifton Court Forebay within the Project area and the associated significance evaluation under all applicable NRHP and CRHR criteria and integrity requirements. Photographs of the California Aqueduct from Dudek’s January 2021 site visit may be found in Appendix A.

### 3.4 Interested Party Correspondence

On May 11, 2021, Dudek Architectural Historian Kate G. Kaiser sent electronic contact letters to the Contra Costa Historical Society, the East Contra Costa Historical Society, Museum of the San Ramon Valley, Alameda Architectural Preservation Society, the Museum on Main in Pleasanton, and the Alameda County Historical Society. The letters briefly described the proposed Project and requested information about cultural resources near the proposed Project area. Dudek received a response from the Contra Costa Historical Society on May 25, 2021. The historical society assumed that Dudek was asking that they conduct research into the proposed Project area. They did not identify any known cultural resources in the proposed Project area, but outlined research opportunities available through their facility. Dudek responded to the historical society on May 27, 2021, provided clarification regarding our correspondence, and thanked them for the information regarding research opportunities available through their facility. Copies of all correspondence to and from interested parties are located in Appendix B.
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4 Historical Overview

The following historic context provides an overview of the history of the Project area, development summary of the APE, and specific relevant information on the built environment resource in the APE.

4.1 General Historic Context

The subject property is located on the edge of the San Joaquin Valley at the southeasternmost corner of Contra Costa County where it meets San Joaquin and Alameda Counties. The San Joaquin Valley region of California’s Central Valley has been settled since the prehistoric era. Spanish explorers first arrived in the valley in 1772 and named it San Joaquin de los Tulares after the rushes and wetland plants that grew abundantly there. Despite multiple explorations to the region, the Spanish did not establish any permanent settlements in the area (ARG 2000; Lewis et al. 1979; Tinkham 1880).

Following more than a decade of intermittent rebellion and warfare, New Spain (Mexico and the California territory) won independence from Spain in 1821. In 1822, the Mexican legislative body in California decreed California ports open to foreign merchants. Beginning in 1828, trappers including Jedediah Smith and John Work traveled to the San Joaquin Valley to trap beaver at the French Camp settlement (south of present-day Stockton). Many pioneers arriving in Central California during the 1840s passed through French Camp before making plans to stay permanently in the valley, including the founder of Stockton, Charles M. Weber, who passed through in 1841. Weber, along with his business partner, William Gulnac, applied for one of the many extensive land grants distributed by the Mexican government in the interior of the state during this period in an effort to increase the population inland from the more settled coastal areas. Despite this, the wetlands acreage that once surrounded the subject property was never distributed as part of a Mexican land grant (Hoover et al. 2002, pp. 370–371).

The Mexican-American War ended with the Treaty of Guadalupe Hidalgo in 1848, ushering California into its American Period. The APE for the Project is located in Contra Costa County which was designated among the 27 original counties of California on February 18, 1850. The early economic profile of the area surrounding the APE during this period is closely tied to the Delta and its shipping potential as a physical outlet into the San Francisco Bay. Shipping and freighting lines in the valley transported and outfitted hopeful California Gold Rush miners heading from San Francisco into the Sierra Nevada goldfields. When the goldfields later dried up, shipping and transportation continued as a major industry, but many new arrivals also refocused towards other economic opportunities presented by the region. Agriculture emerged as a prosperous industry that benefitted from the fertile, alluvial soil and temperate climate in the valley. During the later nineteenth century, land in the valley became valuable enough that companies such as the Old River Land and Reclamation Company purchased large swaths of marshlands in the San Joaquin Valley and converted it for use as farmland. The process of creating earthen levees and manually draining the delta wetlands through the use of dredges and pumps was known as land reclamation (Hoover et al. 2002, p. 369; The Evening Mail 1898, p. 2).

4.2 Water Management in California—Development of the State Water Project

The history associated with water management facilities in California is as vast and complex as the systems themselves. To best understand the development of DWR and the SWP, it is important first to understand the
context of water management policy and construction in California. The SWP was shaped by the successes and shortfalls of numerous water management policies and projects at the local, state, and national level over many decades. The following sections are intended to give a broad context of water development in California from the Spanish and Mexican periods, to the mining and agriculturally dominated water needs in the nineteenth century, to the engineered water reclamation solutions of the early twentieth century, and finally to the events and planning which led to the founding of DWR and implementation of the SWP.

4.2.1 Early Water Development

Beginning in the Spanish era (circa 1769 to 1823), the larger missions and pueblos established by the Spanish were located along rivers or coastal creeks. Various missions used neophyte laborers to exploit local water supplies, dig wells, divert streams, and dam reservoirs for irrigation and livestock uses. Spanish law granted missions a right to adequate water supply for their residents and irrigation and the result was often a collection of small-scale earthen dams and stone- or wood-lined zanjas (canals or ditches) associated with each mission. After Mexico gained independence in 1823, little changed with respect to water rights and supply, as the rights afforded to secular ranchos were derived from those used by the missions, presidios, and pueblos of Spanish and Mexican settlements. The cattle hide and tallow trade in Alta California rose as a major industry because cattle could graze on the unimproved, arid lands of the vast rancho holdings, and although ranchos typically had small, irrigated gardens, most never built substantial irrigation systems (Hanak et al. 2011, p. 21–22; JRP and Caltrans 2000, p. 11).

New water demands and uses emerged with the onset of the Gold Rush. First, the population of California exploded during this period, quadrupling from roughly 92,000 before 1849, to 380,000 by 1860. Second, water was a key tool in a type of industrial-scale gold mining called hydraulicking. Hydraulic miners in the Sierra Nevada foothills diverted water from high elevation streams through flumes and penstocks to create hydraulic pressure, then used that pressurized water to blast hillsides to expose gold. Hydraulic mining also generated competition for water resources that ultimately led to disputes like Irwin v. Phillips (1855), in which the California Supreme Court sided with appropriation rights used by most miners, rather than riparian rights (Cooper 1968, p. 36; Hanak et al. 2011, pp. 22–23; JRP and Caltrans 2000, pp. 11–12).

Hydraulic mining created environmental problems because mining debris floated downstream, which caused waterways to build up with debris and then overflow their banks and flood adjacent land. Some private landowners along rivers running through valley lands built their own flood protection levees, but these early efforts were small scale and failed during seasonal floods made worse by hydraulic mining debris. Major flooding in 1862 and again in 1865–1866 inundated farmland and pasture with mining waste–laden water. In 1868, the California legislature approved local reclamation districts so that landowners could fund flood control projects, one of the first water management strategies enacted at the state level. This new policy, however, was ultimately ineffectual because it was still more economical to push floodwaters to neighboring land than to build a system of soundly engineered levees (Hanak et al. 2011, pp. 23–25; JRP and Caltrans 2000, p. 12).

After the 1865–1866 floods, and other factors such as wheat market volatility and extended droughts, irrigated agriculture started to replace cattle raising and dry-farmed crops in the San Joaquin and Sacramento Valleys. As early as 1873, President Ulysses S. Grant directed the U.S. Army Corps of Engineers to study San Joaquin Valley

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1 Appropriation rights or the rule of prior appropriation held that the right to water is “based on actual use, not ownership of land, and there are no place-of-use restrictions. Moreover, in times of shortage, water is apportioned on the basis of first-in-time, first-in-right” (Hanak et al. 2011, p. 23). Riparian rights in California were derived from English common law, guaranteeing the rights of any landowner to surface water sources within or adjacent to their lands (Hanak et al. 2011, p. 23; Pisani 1984, pp. 34, 218, 246).
and Sierra Nevada water resources for their potential as irrigation sources. The study concluded that a system of canals that could transport water from the Sacramento Valley to the San Joaquin Valley for irrigation was warranted. A few years later, newly appointed State Engineer William Hammond Hall started California’s first comprehensive study of water resources by launching a 5-year study of Sacramento Valley rivers in 1878, the results of which led to the first flood control plan for the Sacramento Valley in the 1880s (Cooper 1968, pp. 42–43; JRP and Caltrans 2000, pp. 12–13; USACE 1990, pp. 4–5).

California cities continued to grow, using surface water and groundwater as sources for municipal water supply as the nineteenth century drew to a close. Some cities contracted with private water companies to provide water to their citizens, while other communities and some agricultural landowners formed mutual water companies to serve their needs. Larger cities like Los Angeles and San Francisco initially depended on private water companies as well, but by the end of the century both were developing plans and acquiring reservoir sites and water rights for what would become massive, municipally owned, inter-basin water supply systems. The population of California continued to increase exponentially in the late 1880s and 1890s, in both urban and rural areas, as more rail lines connected to the state to other parts of the nation and West Coast agriculture and industry grew. With the passage of the Wright Irrigation Act in 1887, local irrigation districts finally had the legal toolkit to fund, build, and operate conveyance systems for themselves. Some of these districts were formed and built as wholly new systems under the act and others took over and expanded upon earlier irrigation schemes and networks (DWR 1957, p. 24; Hanak et al. 2011, pp. 30–31; JRP and Caltrans 2000, pp. 14, 21–23).

4.2.2 Twentieth Century Water Management Planning

At the turn of the twentieth century, California cities started to recognize their water needs were outpacing what was readily available. The state and federal government also began making efforts to ensure water supplies, as well as regulate water rights. The U.S. Congress passed the Reclamation Act in 1902, beginning large-scale federal investment in dams and reservoir projects for irrigation in the American West. With this, the “federal government promoted occupation of undeveloped land with construction of irrigation systems and their fair distribution of water through reclamation” and established the Bureau of Reclamation (Reclamation) (Herbert et al. 2004, p. 2-3). A year later, the California Supreme Court struck down the historical rule of absolute ownership of groundwater and modified groundwater rights to “safe yield” water extraction that did not affect other users in *Katz v. Walkinshaw*.2 The California legislature also took steps towards state-sponsored flood control when it created the State Reclamation Board in 1911 to assist in management of the San Joaquin and Sacramento rivers. Lawmakers continued to refine state water policy, this time revising water rights laws by passing the Water Commission Act in 1914, and the following year creating the State Water Commission (later the State Water Resources Control Board) to oversee permits and diversion claims for surface water throughout the state (Cooper 1968, p. 50; Hanak et al. 2011, pp. 32, 38; Herbert et al. 2004, p. 2-4).

As the new state water regulations were enacted, several California cities had already begun to turn to imported water by the early decades of the twentieth century. San Diego was among several cities that started purchasing privately developed reservoirs outside of city boundaries to supplement water supplies and provide for projected growth. Others, like Los Angeles and San Francisco, embarked on large-scale engineered water projects that would

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2 “Safe yield,” also called sustainable yield, is defined in DWR Bulletin 118 as “the amount of groundwater that can be continuously withdrawn from a basin without adverse impact” (DWR 2003, p. 99). Bulletin 118 also further describes the 1903 *Katz v. Walkinshaw* decision as a rejection of English Common Law doctrine of groundwater rights and adoption of the Doctrine of Correlative Rights. The decision reflected that the Common Law approach was unsuitable for the natural water conditions in California and that overlaying rights holders or appropriative rights holders should not be able to pump water in excess of what a groundwater basin could sustain on a yearly basis.
bring water from more distant sources, like the 233-mile (later extended to 419 miles) Los Angeles Aqueduct, the initial phase of which was built between 1908 and 1913. The U.S. Congress passed the Raker Act in 1913, which allowed San Francisco to dam the Tuolumne River into the Hetch Hetchy Reservoir and transport water 167 miles to the Bay Area (1914–1934). In 1922, California entered the Colorado River Compact to supply several southern California cities with water from the Colorado River. The Metropolitan Water District of Southern California was formed in 1927 to bring Colorado River water to Los Angeles, as well as to suburbs not serviced by the Los Angeles Department of Water and Power. Oakland and the East Bay cities formed the East Bay Municipal Utility District in 1923 to supply the nine member cities with water from the Mokelumne River (Cooper 1968, pp. 52, 59–68; DWR 1957, pp. 24–26; Hanak et al. 2011, pp. 33–36; Herbert et al. 2004, p. 2-3).

Meanwhile, a major drought struck the state in 1917 that left San Joaquin Valley farmers who relied on surface water for irrigation at a disadvantage compared with cities, especially those served by new large, inter-basin systems. In 1919, Colonel Robert B. Marshall of the U.S. Geological Survey published a study that was the first to propose moving water from the northern Sacramento Valley to the southern San Joaquin Valley by way of an integrated system of reservoirs and canals. The state legislature created the Department of Public Works in 1921 and authorized a series of studies that incorporated elements of Marshall’s proposal in developing the first comprehensive plans for redistributing water from more abundant sources in northern California watersheds to agricultural areas farther south. Ultimately, a lack of state funding led Reclamation to implement this concept as the Central Valley Project (CVP) more than a decade later. Meanwhile, multiple federal and state agencies produced a series of reports on various watersheds capabilities, and, in 1930, State Engineer Edward Hyatt proposed the first State Water Plan. The plan proposed seven management units based upon the geographic regions of the state (e.g., Great Central Valley, San Francisco Bay Basin), and which units to address first because of the acute water needs of those regions. The plan proposed 24 reservoirs, 13 of which would have hydroelectric power features. The plan stressed immediate development for certain plan features: the Kennett Reservoir (Shasta Dam), Contra Costa Conduit, San Joaquin River-Kern County canal, Madera canal, Magunden-Edison pumping system, San Joaquin River pumping system, the Delta cross channel, and Friant Reservoir. Other plan components, like Oroville Reservoir, would be included in the Feather River Project, within the larger program ultimately known as the State Water Project. For Southern California, Hyatt recommended importing Colorado River Water, leaving Northern and Central California water for irrigation purposes (Cooper 1968, pp. 60–68; DPW 1930, pp. 37, 44-45; DWR 1974a, p. 11; Hanak et al. 2011, pp. 33–36; Herbert et al. 2004, p. 2-6).

Hyatt’s State Water Plan was approved by the state legislature and authorized as the CVP in 1933. It passed voter referendum by a slim margin as it was opposed by major energy companies, area-of-origin advocates, conservationists, and senior water-rights holders. Although voters approved $170,000,000 in bonds to pay for the initial project components, California was in the middle of a multi-year drought and the Great Depression and bonds did not sell. The Roosevelt administration responded by funding the CVP as a New Deal federal reclamation project to be implemented by Reclamation. Congressional approval of the CVP allowed construction to begin in 1937 and Reclamation moved forward with five elements of Hyatt’s plan for initial construction: Kennett Dam (now Shasta Dam), Contra Costa Conduit, Friant Dam, Madera Canal, and the Friant-Kern Canal, with the expectation that more units that could be added over time. The project was hampered by diversion of resources to the war effort and did not make its first water deliveries until 1944, but progress continued until Northern California water made it to the southern San Joaquin Valley end of the system in 1951. Reclamation’s administration of the CVP brought certain acreage and water user limitations, intended to support small farmers. This policy had worked well for small farms in the East and Midwest, but it was problematic in California where much of the CVP service area was held in established large land holdings and corporate ranches. Also, as California’s population boomed during and after World War II, leading municipal and industrial users, who had been largely excluded in favor of agricultural interests

### 4.2.3 Construction and Implementation of the State Water Project

Planning for a state water delivery system to complement the CVP and address some of its shortfalls began in 1945 with the State Water Resources Act. This authorized the State Water Resource Control Board, formerly the State Water Resource Board, to conduct investigations of the water resources of California, including 1951 Bulletin No. 1, *Water Resources of California* (SWRB 1951), and 1955 Bulletin No. 2, *Water Utilization and Requirements of California*. These two studies formed the basis for 1957 Bulletin No. 3, *The California Water Plan*, which presented a plan for the “practical development of California’s water resources, both by local projects and a major State project to meet the State’s ultimate needs” (DWR 2006, p. 11). As the statewide investigations progressed, State Engineer A.D. Edmonston began planning for their implementation and in 1951 he presented the state legislature with the Feather River Project that had its origins as part of Hyatt’s plan. The Feather River Project included a dam on the river near Oroville, two powerplants, a Delta cross-channel, an electric transmission system, an aqueduct between the Delta and Santa Clara and Alameda Counties, and an aqueduct “to transport water from the Delta to the San Joaquin Valley and Southern California” (DWR 1974a, p. 7). That year the state legislature authorized the “Feather River and Sacramento-San Joaquin Delta Diversion Projects” using the State Central Valley Project Act (DWR 1974a, p. 7). The Feather River Project was revised and resubmitted in 1955 and in 1957. After the 1955 revision, the California legislature referred the Feather River Project report to engineering contractors, the Bechtel Corporation, for independent review. The Bechtel Corporation issued their own report that agreed the engineered elements were sound. Modifications proposed by the Bechtel Corporation were incorporated in the 1957 plan, shortly after California created a new state agency, the DWR, to manage the project (Cooper 1968, pp. 190–193; DWR 1974a, p. 7; DWR 2006, pp. 11–12; Hanak et al. 2011, p. 49; Herbert et al. 2004, pp. 2-12, 2-13).

Political groups in both Northern and Southern California began to voice opposition to the massive water project during this period as well. State Assemblywoman Pauline Davis, representing seven Northern California counties, rallied behind inclusion of county-of-origin rights in state law (Water Code Sections 10500–10506). In Southern California, the Metropolitan Water District opposed any project that would not guarantee water deliveries and requested a constitutional amendment to that effect. The City of San Francisco and Bay Area cities also perceived the project as a threat to expanding their municipal water supply systems. The project’s biggest and most vocal proponents, however, were farmers from the San Joaquin Valley and Santa Clara County. The most high-profile and influential supporter was Edmund G. “Pat” Brown, then the state’s attorney general, who believed a statewide water system was essential for the state’s future and pushed for its approval. His support for the SWP helped him win election as California governor in 1958 and the project would ultimately be one of his proudest legacies (Cooper 1968, p. 209; Herbert et al. 2004, p. 2-14).

As both the political battle and SWP project planning continued, winter storms in 1955 caused flooding throughout Northern and Central California. Major rainfalls on December 18 and 19 flooded the Eel River, Russian River, and San Lorenzo River near the coast. On December 21 and 22 an intense rainfall period raised water levels in watersheds north of San Francisco and caused flooding throughout the Bay Area, as well as the northern and coastal communities of Klamath, Orick, Pepperwood, Weott, Myers Flat, Shively, Healdsburg, Cloverdale, Guerneville, Santa Cruz, Ben Lomond, and Soquel. Continuous rainfall not only caused flooding directly, rising river levels caused other flood control measures to fail. On Christmas Eve night, the Gum Tree Levee on the Feather River broke, sending a 21-foot wave into Yuba City, killing 38 people and inundating Yuba City in 8 feet of water. Flood damages reached more than $200 million in direct...
losses alone. The floods were declared a national emergency and the California legislature responded by making emergency appropriation funding available to the newly created DWR to start components of the Feather River Project, touting the flood control aspects of the project. Construction began on Oroville facilities in May 1957 (DWR 1974a, p. 8; Herbert et al. 2004, p. 2-13; JRP and Caltrans 2000, p. 82; USACE 1956, p. 11).

With site preparation work at Oroville underway, negotiations to resolve conflicts over water law in the state legislature using a constitutional amendment fell short. By the end of 1958, discussions had reached a stalemate as amendment proponents were unable to satisfy the various factions in the state legislature, and unable to get the two-thirds majority vote. SWP proponents then discovered an alternate solution that required only a majority vote while still offering Southern Californians the assurance they needed that the system would be constructed as planned. The state would issue bonds to fund the SWP that specified in its financial language every major storage and conveyance facility to be constructed. Because the state constitution prohibited the legislature from amending bond terms while the debt remained to be paid, this effectively guaranteed the system’s construction. With this in mind, state legislators pushed forward a more bi-partisan solution: the California Water Resources Development Bond Act, called the Burns-Porter Act (Cooper 1968, pp. 221–223; Herbert et al. 2004, p. 2-16).

The Burns-Porter act included $1.75 billion in general obligation bond funds for the first phase of construction of the SWP, to be paid by water and power users. It also included several additional acts, passed as a package, to assurances and concessions to Northern Californians. These include, but weren’t limited to, the Davis-Grunsky Act, which made assurances to Northern Californians that water from their home areas would be available for future, local water projects, and the Davis-Dolwig Act, which provided for recreational facilities and fish and wildlife enhancement projects, such as fish hatcheries, as integral components of the SWP. These acts were passed in 1959 along with the Burns-Porter Act. In 1960, the Metropolitan Water District entered negotiations with DWR for what would become the prototype water service contract. The SWP would go on to service 31 agencies under contracts for long-term water supplies, from Plumas County to the state’s southern border with Mexico. Just days after Metropolitan Water District signed its service contract, voters ratified the Burns-Porter Act by a margin of nearly 174,000 votes in the 1960 election. Southern California provided the critical support for the bond issue as every county in the north state voted against the measure, with the exception of Butte County where Oroville Dam was to be constructed (Cooper 1968, pp. 224, 241; DWR 1974a, pp. 8, 21; DWR 2006, pp. 16, 25; Hanak et al. 2011, p. 49; JRP and Caltrans 2000, p. 82).

Because the Burns-Porter Act served as a guarantee of construction for Southern Californians, it named specific facilities for development and their locations. Rather than a vague order for construction, the DWR would be held to the SWP construction plans. The SWP called for construction of the Oroville and Upper Feather River dams and reservoir facilities; the California Aqueduct, as well as all associated infrastructure such as conduits, tunnels, pumping facilities, dams, and reservoirs, as needed; a few specifically defined branch aqueducts; levees and control structures; and water conservation and supply measures in the Delta. The San Luis Unit of the CVP was authorized by Congress in 1959, to be jointly operated by Reclamation and DWR. The constitutionality of Burns-Porter was challenged in courts, but in the end, DWR’s authority to issue bonds and create water service contracts was affirmed. DWR went on to execute water supply contracts for a total of nearly 3.5 million acre-feet of the original 4 million acre-feet projected minimum project yield (DWR 1974a, pp. 9, 12–13; DWR 2006, p. 22; Water Code Sections 12934.d.1–7).

Construction had already begun on the Oroville facilities in 1957 under the emergency funding and a few select projects, such as the South Bay Aqueduct, Bethany Reservoir, and Frenchman Dam and were started before 1960. Construction on the remainder of the SWP system began after Burns-Porter was passed in 1960. The work was staged from north to south, organized into regional divisions, and was completed in 1974. Exhibit A, below, shows the mapped locations of all the SWP project components completed between 1959 and 1974, and their dates of completion (Exhibit A) (DWR 2006, p. 22; Herbert et al. 2004, p. 2-21).
Exhibit A. SWP project components and their dates of completion (DWR 1974g, p. 13).
The engineering involved in the construction of the SWP was unparalleled for its time and the project overall was exceptionally large in physical scale, as was the scale of planning and management required. For example, the Oroville Dam was 770 feet tall at the crest, and at 6,920 feet it was more than 1 mile long and required 80 million cubic yards of fill material (DWR 2006, p. 26). While earth fill dam technology had been around for millennia, advancements in soil science and innovative engineering techniques allowed the height of Oroville Dam to be substantially taller and longer than ever before. Other aspects of the SWP’s engineering importance are reflected in the fact that the California Aqueduct measures 444 miles long, which rivals the length of the CVP canal system, but SWP designs also account for earthquake fault crossings, challenging terrain crossings, and subsidence and seismic issues, in addition to incorporating automation technology to operate all components. This fully automated remote monitoring and control system allowed DWR operators to control dozens of pumping plants, check structures, and other miscellaneous facilities from five regional control centers and the Project Operations Control Center in Sacramento. DWR also borrowed the Project Management Information System used by Reclamation and other federal agencies to manage project components, plans and specifications, right-of-way acquisition, and construction activities, as well as to administer its 31 water supply contracts from one database application (DWR 1974e, pp. 1, 7; DWR 2006, p. 29; Herbert et al. 2004, pp. 2-21, 4-5–4-7).

As the initial phase of construction drew to a close in the 1970s, the SWP began to gain national recognition as a feat of modern engineering. In 1967, Oroville Dam was named one of the seven wonders of engineering in California by the California Society of Professional Engineers. The American Society of Civil Engineers (ASCE) gave Oroville Dam and the Hyatt Powerplant an award for outstanding engineering achievement in 1969 and the National Society of Professional Engineers named the SWP to its top 10 engineering achievements of 1971. The American Public Power Association gave the Delta Pumping Plant the First Honor Award and the Oroville-Thermalito Hydroelectric powerplants the Honor Award that same year. The ASCE not only gave SWP the ASCE Outstanding Civil Engineering Award for 1971, it later ranked the SWP in the top 100 Greatest Engineering Achievements of the twentieth century in 2000, and a Civil Engineering Monument of the Millennium in 2001 (DWR 2006, p. 29; Herbert et al. 2004, p. 2-27).

4.2.4 The State Water Project After 1974: Realization and Expansion

Water from Northern California finally reached Southern California via the California Aqueduct after the Edmonston Pumping Plant was completed in 1971, and within two years, regular water deliveries were being made throughout the state. The initial construction phase concluded in 1974 and DWR made efforts to expand the SWP as planned in Phase II. However, with the advent of environmental regulation starting in the 1960s that gained substantial legislative traction in the early 1970s, the proposed expansion projects of SWP Phase II were analyzed and debated more intensely than projects completed during the first phase (DWR 1974a, pp. 78–83, 91; Hanak et al. 2011, p. 56).

As the environmental movement grew more powerful throughout California and the nation, the state and federal government enacted several laws aimed at environmental and natural resources protection, including CEQA (1970), the National Environmental Policy Act (1970), California Endangered Species Act (1970), California Wild and Scenic Rivers Act (1972), Clean Water Act (1972), and Federal Endangered Species Act (1973). The outcome was that the SWP expansion projects had to meet new standards for environmental analysis and mitigation that delayed or in some cases limited the ability of the DWR to expand the SWP in the late 1970s and 1980s. For example, some rivers in Northern California slated for SWP reservoirs were added to the Wild and Scenic Rivers list and had to remain undeveloped. Other projects, such as the Peripheral Canal, Sites Reservoir, and the Los Banos Grande Reservoir, also lacked public support for development because of their projected environmental impacts. This resulted in implementation of only a few SWP expansion projects after 1974, which led to a lower annual water yield than originally planned (DWR 2006, p. 34; Hanak et al. 2011, pp. 56–60).
Droughts in 1976–1977 and another between 1987 and 1994 forced DWR to curtail water deliveries to both urban and agricultural customers. In response, DWR purchased land in Kern County on the Kern Fan Element in 1988 to bank water for droughts, but development of this water bank was delayed by legal and environmental disputes. Starting in the mid-1990s, DWR worked with a select group of SWP water contractors to create the Monterey Amendment, which resulted in restructuring water supply contracts. The Monterey Amendment was a statement of principles that allowed water storage excess during wet years, established protection for water contractors against sudden rate increases during drought years, and allowed contractors to take more water from Castaic Lake and Lake Perris in Southern California. Another result of the Monterey Amendment was the development of the 1 million acre-foot Kern Water Bank and its subsequent transfer to the privately controlled Kern Water Bank Authority. Over the years, the Monterey Amendment faced several legal challenges by environmental groups, requiring revised environmental documentation as recently as 2016. Other successful SWP Phase II expansions to the system include the Coastal Branch Aqueduct (constructed 1993–1998) and the East Branch Aqueduct Extensions (constructed 1998–2003 and 2005–2018), and their associated pumping plants, dams, and reservoirs (DWR 2006, pp. 44–45; DWR 2019, pp. 10, 319; Folmer 2018; Hanak et al. 2011, p. 67; WEF 2021).

Today, the main components of the SWP system date to the Phase I (1959–1974) construction and operate as initially intended. The SWP provides flood control, power generation, recreation opportunities, and fish and wildlife habitat, as well as serving its primary purpose—providing agricultural and municipal water supply for California. In efforts to meet its mission: “to sustainably manage the water resources of California, in cooperation with other agencies, to benefit the state’s people and protect, restore, and enhance the natural and human environments,” DWR continues to fulfill 29 water supply contracts for public agencies and local water districts across the state. With ever-increasing water demands, DWR remains charged with the challenge of planning for future SWP expansion and enhancement, while also continuing its operations, maintenance. And repair of the existing system (DWR 2019, pp. 3–6, 10, 236–237; DWR 2021).

4.3 Historic Development of Clifton Court Forebay

The historical development of Clifton Court Forebay is discussed at length in the P-07-003122 Clifton Court Forebay DPR record (Ambacher 2013), the P-07-004698 Delta Field Division Facilities DPR record (Kim and Williams 2013), and the Clifton Court Forebay entry in the 1974 Bulletin 200: California State Water Project, Volume III Storage Facilities context (DWR 1974c). The DPR entries are appended to this report in Appendix A, Clifton Court Forebay DPR Update. Below is a brief summary of this historical context.

The development of Clifton Court Forebay began with early land reclamation efforts in the San Joaquin Delta wetlands. In 1898, the Old River Land and Reclamation Company set out to drain and convert 4,000 acres of company-owned land located west of Union Island and south of the Byron Tract, also both reclaimed lands, for use as farmland. This newly reclaimed area was surrounded on three sides by earthen levees and canals and was named the Clifton Court Tract (Kim and Williams 2013, p. 3; The Evening Mail 1898, p. 2).

In 1960, financing for the SWP was approved by the voters of California as a result of the Burns-Porter Act, which authorized $1.75 billion in general obligation bonds to assist with funding for necessary water facilities for the SWP. The unique configuration and location of the Clifton Court Tract was identified as an ideal site for a storage component of the SWP to be located at the head of the California Aqueduct, which serves as the primary delivery system of the SWP. The purpose of Clifton Court Forebay was to provide storage for off-peak pumping and to regulate the flow into the Delta Pumping Plant. This management lessens potential surges and drawdown during the height of pumping periods (Ambacher 2013, p. 3; Kim and Williams 2013, p. 3; DWR 1974c, p. 201).
Preliminary planning for Clifton Court Forebay was underway early in 1965, which sought to locate a low, 30-foot dam within the existing levees of the Clifton Court Tract (Exhibit B). Construction of the 28,653-acre-foot reservoir began on December 12, 1967, and was completed during December 1969 (Exhibits C and D). Clifton Court Forebay has served in its capacity as an importance storage component of the SWP since the time of its construction into the present (Kim and Williams 2013, p. 3; DWR 1974c, p. 201).
Exhibit B. Illustration of Clifton Court Forebay showing the related pump and drainage systems (DWR 1974c, p. 210).
Exhibit C. 1969 aerial view looking northwest over the Clifton Court Forebay construction site showing the land divisions within the Clifton Court Tract before the completion of the project (DWR 1969).

Exhibit D. 1969 aerial view looking northwest over the Clifton Court Forebay construction site showing the inlet structure and its five control gates in the foreground (DWR 1969).
5 Results of Identification and Evaluation Efforts

Clifton Court Forebay was initially recorded in January 2012 by DWR and re-recorded and evaluated in May 2013 by Patricia Ambacher of AECOM (P-07-003122) as part of the Cultural Resources Inventory, Evaluation and Findings of Effect Report for the Clifton Court Forebay Fishing Facility Project (Ambacher 2013, pp. 1–5). It was re-recorded the same year, in 2013, as a component of the Delta Field Division Facilities (P-07-004698), constructed 1963–1969, by Monte Kim and James Williams of ICF International as part of the Built Historical Resources Evaluation Report for the Bay Delta Conservation Plan Project (Kim and Williams 2013, p. 1). The Delta Field Division Facilities included Clifton Court Forebay, Skinner Fish Facility, and the Harvey O. Banks Pumping Plant. Both records evaluated Clifton Court Forebay using NRHP and CRHR criteria and determined significance for listing in the NRHP under Criteria A and C and the CRHR under Criteria 1 and 3. Both records also recommended that Clifton Court Forebay was potentially a contributing component to a larger potential district.3 In Ambacher (2013), the district proposed is the California Aqueduct, and in Kim and Williams (2013) the suggested district is the California State Water Project Historic District.

This report serves to update the prior documentation and evaluation of this resource, as approaches to evaluating elements of the SWP have evolved since Clifton Court Forebay was recorded in 2013. The evaluation affirms that Clifton Court Forebay is eligible for listing in the NRHP and CRHR individually and as a component of the SWP, as part of its original phase of construction, 1959–1974. Contributing components of Clifton Court Forebay include its earth fill construction and materials, its shallow depth, its five-bay radial gate, and its overall role in the SWP as the functional headwaters of the California Aqueduct. Clifton Court Forebay is, therefore, considered a historic resource for the purposes of CEQA. See the DPR form update in Appendix A for a full evaluation and integrity discussion of Clifton Court Forebay.

5.1 Site Description

Clifton Court Forebay is a shallow reservoir formed by an earth fill dam, located approximately 10 miles northwest of the City of Tracy in the southwest corner of Contra Costa County. It is located along the southwestern edge of the Delta and at the head of the Northern San Joaquin Division of the California Aqueduct. It is part of the Delta Field Division facilities located in this area. Clifton Court Forebay was constructed between 1967 and 1969, provides storage for off-peak pumping, and permits regulation of flows into the Harvey O. Banks (Delta) Pumping Plant.

Clifton Court Forebay Dam was constructed inside the levee of the Clifton Court Tract. The dam is of notable construction because it encircles the forebay as a levee on the northwest, north, east, and south sides, leaving only the southwest side free for the California Aqueduct intake channel, rather than forming a single monolithic dam and utilizing surrounding topography to form the reservoir. The dam measures 30 feet tall above its foundation, though this height is only 14 feet above mean sea level. It measures 20 feet wide and 36,500 feet long, or 6.9 miles, at the dam crest. The waterside slope of the dam levee is treated with a cement-soil slurry, while the outer side of the dam levee is compacted native soil, ballasted with uncompacted soil and organic materials on the outer edge. The reservoir measures approximately 2.6 miles long and 2.1 miles wide, its maximum operating storage volume is 28,653 acre-feet, and its minimum operating storage volume is 13,965 acre-feet.

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3 Several previous significance evaluation records created for components of the SWP have suggested the potential for a SWP-related historic district. It is important to note that to date, no such historic district has ever been formally documented or defined.
Water from the Delta enters Clifton Court Forebay through a gated intake control structure at the southeast end of the reservoir. This structure connects Clifton Court Forebay with the West Canal, which is a channel of the Old River. The inlet works is a five-bay concrete structure and each bay features 20-foot-wide and 25.5-foot-tall radial gates housed in a reinforced concrete gay-bay structure. Atop the inlet works is a 10-foot-wide vehicle bridge stop log slots and a platform. There is a channel to the side of the inlet works covered in riprap.

There are also four pumps stationed around the forebay reservoir intended to dewater the outer sides of the dam levee (those that do not face the interior reservoir). This is needed because there are canals with levees on the opposite side, and drainage channels and ditches that form between Clifton Court Forebay Dam and the West Canal, the Old River, Italian Slough, the California Aqueduct, or the pumping plant intake channel that are 14 feet below sea level and must be kept clear of water.

Water leaves the forebay through the southwestern end of the reservoir, through a designed breach in the dam, which opens to an earth-lined channel in the east levee of the Harvey O. Banks Pumping Plant intake channel. The Harvey O. Banks Pumping Plant, intake channel, control gates, and the Skinner Fish Facility (P-07-004698) fall outside of the Project APE.

### 5.2 National Register of Historic Places/California Register of Historic Resources Statement of Significance

Clifton Court Forebay (P-07-003122) was initially recorded in January 2012 by DWR, and was re-recorded and evaluated in May 2013 by Patricia Ambacher. In 2013, Ambacher recommended that Clifton Court Forebay appeared eligible as a contributing resource to the California Aqueduct, which has already been determined eligible for the NRHP and CRHR under Criteria A/1 and C/3 and Criterion Consideration G as the largest and most significant of the water conveyance systems developed as part of the SWP and for its complex design necessary to redistribute water throughout the State of California on a massive level (Donaldson 2012, pp. 1–2). Clifton Court Forebay was constructed from 1967 to 1969, within the period of significance for the California Aqueduct (1960–1974) established by Ambacher. Ambacher posed that Clifton Court Forebay was eligible under NRHP/CRHR Criteria A/1 as a “character-defining feature of the California Aqueduct” (Ambacher 2013, p. 4) because it was a critical and planned element of the SWP, as the location where the California Aqueduct begins. She also posed that Clifton Court Forebay was eligible under NRHP/CRHR Criteria C/3 because the forebay was a functional, designed necessity for the continued operation of the California Aqueduct that facilitated regulation of surges and drawdown in peak pumping periods, as well as preventing backflow into the Delta at low tides by closing its intake gates. A complete significance statement may be found in the Ambacher (2013) DPR forms for Clifton Court Forebay, and an update to this record is included in this report as Appendix A.

Clifton Court Forebay was also evaluated in August 2013 by Monte Kim and James Williams in conjunction with the other Delta Field Division Facilities (P-07-004698): the John E. Skinner Delta Fish Protective Facility and the Harvey O. Banks (Delta) Pumping Plant. The Kim and Williams (2013) record also poses that these facilities are eligible under NRHP/CRHR Criteria A/1 and C/3 due to the important role that these facilities played as part of an expansive, engineered water-conveyance system, which was designed to store and distribute water to customers of the SWP throughout the state (Kim and Williams 2013, p. 2). Kim and Williams also pose that the Delta Field Division Facilities are eligible as contributing components to a potential SWP historic district.
Both Ambacher’s 2013 evaluation and Kim and Williams’s 2013 evaluation found that Clifton Court Forebay was not eligible under either Criteria B/2 or D/4.

Dudek’s review of the CHRIS record search results, the BERD, and other repositories and databases indicates that neither of these findings have been concurred with by SHPO. The purpose of Dudek’s recordation of Clifton Court Forebay is to update prior documentation and evaluation of this resource, as approaches to evaluating elements of the SWP have evolved since 2013. It should be noted, that Clifton Court Forebay is a key structural feature of the SWP and feeds the California Aqueduct, which was determined eligible in 2012 (Donaldson 2012, pp. 1–2). However, the Clifton Court Forebay is eligible as an individual property/resource within its own right as a critical and planned element of the SWP and as the functional California Aqueduct headwaters. Without the Clifton Court Forebay, the California Aqueduct could not function as it does. It is also eligible individually for its design, facilitating water flow from the Delta into the California Aqueduct.

During the 2021 field visit to Clifton Court Forebay, Dudek found that the forebay retains its character-defining features: design as a shallow reservoir bound by a 6.9-mile-long earth fill dam, compacted and uncompacted native soil materials, five-bay radial gate intake structure, and historical association with the California Aqueduct and its role within the larger SWP. Clifton Court Forebay also appears to retain all aspects of integrity necessary to convey its significance that were called out in both the Ambacher (2013) and Kim and Williams (2013) records.

Therefore, Clifton Court Forebay is individually eligible under NRHP/CRHR Criteria A/1 for its association with California Aqueduct and as a critical component of the SWP system that distributes water throughout the state, as well as under NRHP/CRHR Criteria C/3 for its design as the functional headwater/reservoir, regulating the surges and drawdown for the California Aqueduct during peak pumping periods and preventing backflow into the Delta during low tide. Clifton Court Forebay is individually eligible as a component of the SWP as part of its original phase of construction, 1959–1974.

5.3 Integrity Discussion

Clifton Court Forebay retains sufficient integrity to convey its significance under NRHP/CRHR Criteria A/1 and C/3 as an individual historic property/resource. It retains integrity of location in its original location, situated between the Old River, the West Canal, and Italian Slough in the southwestern portion of the Delta. It retains integrity of setting as it retains its historically appropriate, agricultural and sparsely populated setting in the reclaimed Delta marshlands. Integrity of design is retained as it retains the character-defining features of the low, 6.9-mile-long earth fill dam encircling the forebay; the shallow depth reservoir; compacted soil, uncompacted soil and organics, and cementitious soil slurry materials; the five-bay radial gate intake structure; and its historical association with the SWP system. Integrity of materials and workmanship are retained as the original materials and construction techniques are visible and all repairs have been undertaken with in-kind materials. Clifton Court Forebay is still able to convey the feeling of a twentieth century large scale public works project and can still convey a sense of the time and space in which it was constructed. Finally, Clifton Court Forebay retains integrity of association as it retains its association with DWR and its historical associations with the California Aqueduct as a contributing component of the largest conveyance system in the SWP. Clifton Court Forebay, therefore, retains the requisite level of integrity to convey significance under Criteria A/1 and C/3.
5.4 Character-Defining Features

Character-defining features of Clifton Court Forebay include the following:

- The low, 6.9-mile-long dam of earth fill construction, encircling nearly all of the forebay structure
- The shallow average depth of the forebay reservoir
- The combination of compacted soil, uncompacted soil mixed with organics, and cementitious soil slurry that comprise the materials of the earth fill dam Clifton Court Forebay
- The five-bay radial gate intake structure in the southeastern corner of the reservoir
- The historical association with the California Aqueduct as its functional headwaters and with the SWP as a statewide system
6 Application of Criteria of Adverse Effect

6.1 Physical Effects of the Proposed Project

The Project would entail rodent burrow and shallow rut remediation to Clifton Court Forebay Dam, which includes filling and compacting areas where these occur and the clearing and grubbing of vegetation. Tree removal, vegetation clearing, and grubbing activities are proposed in the ditch separating Clifton Court Forebay from the surrounding channels, near Sump No. 4. The Project would also include a high-priority repair to the intake channel. The intake channel repairs include excavation, grouting, backfill, and recompaction; installation of PVC-coated steel wire mesh and bedding material; and placement of armoring rock to deter further animal burrowing. This work would occur between the downstream crest and the downstream slope within the intake channel.

6.2 Clifton Court Forebay

6.2.1 Summary of Resource Significance

Clifton Court Forebay is individually eligible under NRHP/CRHR Criteria A/1 and C/3; historical and architectural significance are expressed through the following major character-defining features:

- The low, 6.9-mile-long dam of earth fill construction encircling nearly all of the forebay structure
- The shallow average depth of the forebay reservoir
- The combination of compacted soil, uncompacted soil mixed with organics, and cementitious soil slurry that comprise the materials of the earth fill dam Clifton Court Forebay
- The five-bay radial gate intake structure in the southeastern corner of the reservoir
- The historical association with the California Aqueduct as its functional headwaters and with the SWP as a statewide system

6.2.2 Analysis of Potential Adverse Effect

The proposed Project activities were analyzed in consideration of the adverse effect examples provided in Title 36 of the Code of Federal Regulations, Part 800.5(a)(2). The Project will have no adverse effect on Clifton Court Forebay within the APE. For a detailed assessment of potential adverse effects please refer to Table 4.

Table 4. Application of Criteria of Adverse Effects for Clifton Court Forebay

<table>
<thead>
<tr>
<th>Examples of adverse effects. Adverse effects on historic properties include, but are not limited to:</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) Physical destruction of or damage to all or part of the property;</td>
<td>No Adverse Effect. The Project would not demolish all or part of Clifton Court Forebay.</td>
</tr>
<tr>
<td>(ii) Alteration of a property, including restoration, rehabilitation, repair, maintenance, stabilization, hazardous</td>
<td>No Adverse Effect. The purpose of this Project is to remediate rodent burrows, remove trees near a sump, and repair the intake channel and Clifton Court Forebay so it continues to function as part of the SWP.</td>
</tr>
</tbody>
</table>
Table 4. Application of Criteria of Adverse Effects for Clifton Court Forebay

<table>
<thead>
<tr>
<th>Examples of adverse effects. Adverse effects on historic properties include, but are not limited to:</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>material remediation, and provision of handicapped access, that is not consistent with the Secretary's Standards for the Treatment of Historic Properties (36 CFR part 68) and applicable guidelines;</td>
<td>The construction activities geared toward repairing rodent burrows and shallow ruts in the earthen reservoir embankment have been identified all around the 6.9-mile-long dam, and projected repairs areas will encompass 64.58 acres of the downstream dam face. The proposed fill materials for the rodent burrows would be substantially similar in appearance to the existing reservoir embankment. The removal of trees and vegetation grubbing at Sump No. 4 would have no effect on Clifton Court Forebay and would not constitute an adverse effect to the structure. The high-priority repair to the intake channel in the southeast corner of Clifton Court Forebay will not affect a character-defining feature of the intake channel (the intake gates or housing bay structure), nor will new materials in the intake channel be visible from the intake gate or affect its setting. The forebay itself and its intake gates (a character-defining feature of Clifton Court Forebay) will continue to look and function as they do currently. Overall, the proposed repairs appear to be consistent with the Secretary's Standards for the Treatment of Historic Properties (36 CFR part 68) and applicable guidelines and would not constitute an adverse effect to Clifton Court Forebay or its character-defining features.</td>
</tr>
<tr>
<td>(iii) Removal of the property from its historic location;</td>
<td>No Potential to Effect. No changes in location are proposed for this Project.</td>
</tr>
<tr>
<td>(iv) Change of the character of the property's use or of physical features within the property's setting that contribute to its historic significance;</td>
<td>No Adverse Effect. No changes to the use of Clifton Court Forebay are proposed. No changes to the physical features of the structure's setting which contribute to its historic setting are proposed.</td>
</tr>
<tr>
<td>(v) Introduction of visual, atmospheric or audible elements that diminish the integrity of the property's significant historic features;</td>
<td>No Potential to Effect. Clifton Court Forebay's historic integrity would not be diminished by the introduction of new visual, atmospheric, or audible elements.</td>
</tr>
<tr>
<td>(vi) Neglect of a property which causes its deterioration, except where such neglect and deterioration are recognized qualities of a property of religious and cultural significance to an Indian tribe or Native Hawaiian organization; and</td>
<td>No Potential to Effect. Not applicable</td>
</tr>
<tr>
<td>(vii) Transfer, lease, or sale of property out of Federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property's historic significance.</td>
<td>No Potential to Effect. Clifton Court Forebay will not be transferred out of DWR’s ownership or control as part of the proposed Project.</td>
</tr>
</tbody>
</table>
6.3 Finding of No Adverse Effect

The NRHP- and CRHR-eligible Clifton Court Forebay would not be adversely impacted as a result of the proposed Project. Therefore, Dudek recommends a Finding of No Adverse Effect to historic properties.
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Summary of Findings

As a result of archival research, review of previous records for Clifton Court Forebay (P-07-003122 and P-07-004698), and the established eligibility finding for the California Aqueduct and SHPO concurrence in 2012 (Donaldson 2021, pp. 1–2), one previously recorded built environment property/resource over 45 years in age was identified within the Project APE: Clifton Court Forebay. Table 5 summarizes these findings. Previous evaluations indicate that Clifton Court Forebay is eligible as a district contributor to a historic district for the California Aqueduct that has been recommended but never defined or formalized (Ambacher 2013, pp. 2–5). Another previous evaluation indicated that Clifton Court Forebay was eligible as a “contributing element to a potential California State Water Project Historic District” (Kim and Williams 2013, p. 2). Presently a historic district for the SWP has also not yet been defined or formalized.

To clear up and better define the eligibility parameters, Dudek finds the Clifton Court Forebay individually eligible under NRHP/CRHR Criteria A/1 and C/3. It is important for its association with the California Aqueduct (1960–1974) and as a component of the larger SWP (1959–1974). As such, Clifton Court Forebay is considered a historic property under Section 106 of the NHPA and a historical resource under CEQA. Preparation of a detailed effects assessment in Section 6.3 of this report indicates that the proposed Project would have a less-than-significant impact on historical resources under CEQA and no adverse effect on historic properties in the APE under Section 106.

Table 5. Summary of Findings

<table>
<thead>
<tr>
<th>APE Map Figure</th>
<th>Property Name</th>
<th>Property Type</th>
<th>NRHP Significance Criteria</th>
<th>Previous CHRS code (if applicable)</th>
<th>Current CHRS code</th>
<th>Section 106 Finding of Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Clifton Court Forebay (1967–1969)</td>
<td>Dam and Reservoir</td>
<td>A/1, C/3</td>
<td>3D: Appears eligible for NRHP as a contributor to a NRHP-eligible district through survey evaluation (Ambacher 2013)</td>
<td>3S: Appears eligible for NRHP as an individual property through survey evaluation</td>
<td>No adverse effect</td>
</tr>
</tbody>
</table>

No adverse effect
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8 References and Preparers

8.1 References Cited


Ambacher, P. 2013. “P-07-003122 (Clifton Court Forebay).” DPR 523-series forms on file at the CHRIS Northwest Information Center, Sonoma State University, Rohnert Park, California. Prepared by AECOM for DWR.


BUILT ENVIRONMENT INVENTORY AND EVALUATION REPORT FOR THE DELTA DAMS RODENT BURROW REMEDIATION PROJECT AT CLIFTON COURT FOREBAY, CONTRA COSTA COUNTY, CALIFORNIA


Kim, M. and J. Williams. 2013. “P-07-004698 (MPTO_002_001; California State Water Project, Delta Field Division Facilities).” DPR 523-series forms on file at the CHRIS Northwest Information Center, Sonoma State University, Rohnert Park, California. Prepared by ICF International for DWR.


8.2 List of Preparers

Kathryn Haley, MA, Co-author, Senior Architectural Historian and Built Environment Project Lead
Kate G. Kaiser, MSHP, Co-author, Architectural Historian
Fallin E. Steffen, MPS, Co-author, Architectural Historian

Publications
Nicole Sanchez-Sullivan, Technical Editor
Hannah Wertheimer, Technical Editor
BASEMAP SOURCE: DWR 1/8/2021; USGS 7.5-Minute Series Clifton Court Forebay Quadrangle

Project Location - Clifton Court Forebay

Delta Dams Rodent Burrow Remediation Project
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Segment 4
Segment 5

Clifton Court Forebay

Project Site
Burrow Remediation Area
Staging Area
Tree Removal
Construction Access

SOURCE: DWR 2021-05-12; ESRI World Imagery

FIGURE 2
Proposed Activities at Clifton Court Forebay
Delta Dams Rodent Burrow Remediation Project
Clifton Court Forebay - Cultural Resources - Built Environment - Area of Potential Effects

SOURCE: DWR 2021/05/13; Contra Costa County 2020; USGS 2020; ESRI World Imagery

FIGURE 3

Clifton Court Forebay - Historic Age
Built Environment APE
Contra Costa County Parcels
Appendix A

Clifton Court Forebay DPR Update
CHRIS Record search results indicate that there are two duplicate records for Clifton Court Forebay:

Clifton Court Forebay (P-07-003122) was initially recorded in January 2012 by DWR, and was re-recorded and evaluated in May 2013 by Patricia Ambacher. In 2013, Ambacher recommended that Clifton Court Forebay appeared eligible as a contributing resource to the California Aqueduct. While the California Aqueduct has separately been determined eligible and received SHPO Concurrence, the Clifton Court Forebay eligibility has not received concurrence from the SHPO to date.

Concurrently with the Ambacher report and record, Clifton Court Forebay was also evaluated in August 2013 by Monte Kim and James Williams as part of the Delta Field Division Facilities (P-07-004698), which also included the John E. Skinner Delta Fish Protective Facility and the Harvey O. Banks (Delta) Pumping Plant.

Dudek’s review of the CHRIS record search results, the BERD, and other repositories and databases indicates that neither of these findings have been concurred with by SHPO. The purpose of Dudek’s recordation of Clifton Court Forebay is to update the prior documentation and evaluation of this resource, as approaches to evaluating elements of the SWP have evolved since 2013. The Clifton Court Forebay is eligible as an individual property/resource within its own right as a critical and planned element of the California State Water Project and as the functional California Aqueduct headwaters. Without the Clifton Court Forebay, the California Aqueduct could not function as it does. It is also eligible individually for its design, facilitating water flow from the Delta into the California Aqueduct.

Dudek recommends that one of these records and primary numbers be retired to avoid future confusion. Dudek also research also indicates that the Clifton Court Forebay receive an updated CHRIS code of 3S, 3CS. Previous site records are appended behind the 2021 update record.
Clifton Court Forebay is located in southeast Contra Costa County, on the west side of California’s Central Valley at the southwestern edge of the Sacramento–San Joaquin River Delta (Delta), approximately 10 miles northwest of the City of Tracy and adjacent to Byron Road. (See Continuation Sheet)

Clifton Court Forebay is a shallow reservoir formed by an earth fill dam, located approximately 10 miles northwest of the City of Tracy in the southwest corner of Contra Costa County. It is located along the southwestern edge of the Delta and at the head of the Northern San Joaquin Division of the California Aqueduct. It is part of the Delta Field Division facilities located in this area. Clifton Court Forebay was constructed between 1967 and 1969, provides storage for off-peak pumping, and permits regulation of flows into the Harvey O. Banks (Delta) Pumping Plant. (See Continuation Sheet)
Map Name: Clifton Court Forebay, Calif  *Scale: 1:24,000  *Date of map: 1978

Clifton Court Forebay (constructed 1967-1969)
**Resource Name or #** (Assigned by recorder)  Clifton Court Forebay  **NRHP Status Code**  3S, 3CS

**B1.** Historic Name:  Clifton Court Forebay

**B2.** Common Name:  Clifton Court Forebay

**B3.** Original Use:  Storage

**B4.** Present Use:  Storage

**B5.** Architectural Style:  Utilitarian

**B6.** Construction History:  (Construction date, alterations, and date of alterations)

1959 – Burns-Porter Act enables funding for Clifton Court Forebay as part of the SWP
1965 – Clifton Court Forebay planning begins
1967 – Construction begins
1969 – Construction concludes
1974 – Construction of the California Aqueduct concludes and Clifton Court Forebay begins to operate as intended

**B7.** Moved?  ☐ No  ☑ Yes  ☐ Unknown  Date:  

**B8.** Related Features:

**B9a.** Architect:  California Department of Water Resources  

**B9b.** Builder:  Gordon H. Ball Enterprises

**B10.** Significance:  Theme: Water Development and Supply in California  

**B10a.** Period of Significance:  1967-1969  

**B10b.** Property Type:  Dam and Reservoir

**B10c.** Applicable Criteria:  A/1, C/3

(Discuss importance in terms of historical or architectural context as defined by theme, period, and geographic scope. Also address integrity.)

Dudek finds the Clifton Court Forebay individually eligible under NRHP/CRHR Criteria A/1 and C/3. It is important for its association with the California Aqueduct (1960–1974) and as a component of the larger SWP (1959–1974). As such, Clifton Court Forebay is considered a historic property under Section 106 of the NHPA and a historical resource under CEQA. Clifton Court Forebay is individually eligible under NRHP/CRHR Criteria A/1 and C/3; historical and architectural significance are expressed through the following major character-defining features:

- The low, 6.9-mile-long dam of earth fill construction encircling nearly all of the forebay structure
- The shallow average depth of the forebay reservoir
- The combination of compacted soil, uncompacted soil mixed with organics, and cementitious soil slurry that comprise the materials of the earth fill dam Clifton Court Forebay
- The five-bay radial gate intake structure in the southeastern corner of the reservoir
- The historical association with the California Aqueduct as its functional headwaters and with the SWP as a statewide system

(See Continuation Sheet)

**B11.** Additional Resource Attributes:  (List attributes and codes)

**B12.** References:

(See Continuation Sheet)

**B13.** Remarks:

**B14.** Evaluator:  Kate Kaiser, MSHP  

**Date of Evaluation:**  04/07/2021

(This space reserved for official comments.)
The forebay lies in the Clifton Court Forebay, Calif. U.S. Geological Survey 7.5-minute quadrangles, which fall on Public Lands Survey System Sections 13, 24, and 25 of Township 1 South, Range 3 East, and Sections 7, 8, 17, 18, 19, 20, and 30 of Township 1 South, Range 4 East, Mount Diablo Baseline Meridian (Figure 1, Project Location – Clifton Court Forebay, all figures are provided at the end of the report). The forebay is surrounded on the northwest, north, and east sides by the Italian Slough, the Old River, and the West Canal. Water from the Delta enters the forebay through a gated intake control structure at the southeast end of the reservoir. This structure connects the forebay to the West Canal. Other related California State Water Project (SWP) nearby features include the California Aqueduct intake channel, located along the southwest side of the forebay reservoir, the Delta Fish Protective Facility (Skinner Fish Facility), and a control gate structure.

Clifton Court Forebay Dam (Figures 3-10) was constructed inside the levee of the Clifton Court Tract. The dam is of notable construction because it encircles the forebay as a levee on the northwest, north, east, and south sides, leaving only the southwest side free for the California Aqueduct intake channel, rather than forming a single monolithic dam and utilizing surrounding topography to form the reservoir. The dam measures 30 feet tall above its foundation, though this height is only 14 feet above mean sea level. It measures 20 feet wide and 36,500 feet long, or 6.9 miles, at the dam crest. The waterside slope of the dam levee is treated with a cement-soil slurry, while the outer side of the dam levee is compacted native soil, ballasted with uncompacted soil and organic materials on the outer edge. The reservoir measures approximately 2.6 miles long and 2.1 miles wide, its maximum operating storage volume is 28,653 acre-feet, and its minimum operating storage volume is 13,965 acre-feet.

Water from the Delta enters Clifton Court Forebay through a gated intake control structure at the southeast end of the reservoir. This structure connects Clifton Court Forebay with the West Canal, which is a channel of the Old River. The inlet works is a five-bay concrete structure and each bay features 20-foot-wide and 25.5-foot-tall radial gates housed in a reinforced concrete gay-bay structure. Atop the inlet works is a 10-foot-wide vehicle bridge stop log slots and a platform. There is a channel to the side of the inlet works covered in riprap.

There are also four pumps stationed around the forebay reservoir intended to dewater the outer sides of the dam levee (those that do not face the interior reservoir). This is needed because there are canals with levees on the opposite side, and drainage channels and ditches that form between Clifton Court Forebay Dam and the West Canal, the Old River, Italian Slough, the California Aqueduct, or the pumping plant intake channel that are 14 feet below sea level and must be kept clear of water.

Water leaves the forebay through the southwestern end of the reservoir, through a designed breach in the dam, which opens to an earth-lined channel in the east levee of the Harvey O. Banks Pumping Plant intake channel. The Harvey O. Banks Pumping Plant, intake channel, control gates, and the Skinner Fish Facility (P-07-004698) fall outside of the Project APE.
Property Name: Clifton Court Forebay

Figure 4. Clifton Court Forebay, view looking northeast (IMG_3808)

Figure 5. Clifton Court Forebay at California Aqueduct intake, looking north (IMG_3840)
Figure 6. Clifton Court Forebay, gated intake control structure, looking southwest (IMG_3917)

Figure 7. Clifton Court forebay, gated intake control structure, looking northwest (IMG_3924)
Figure 8. Clifton Court forebay, showing levee structure from access road, looking west (IMG_3949)

Figure 9. Clifton Court forebay, looking northeast (IMG_3786)
**B10. Significance (Continued):**

**Historic Context: Development of Clifton Court Forebay**

The historical development of Clifton Court Forebay is discussed at length in the P-07-003122 Clifton Court Forebay DPR record (Ambacher 2013), the P-07-004698 Delta Field Division Facilities DPR record (Kim and Williams 2013), and the Clifton Court Forebay entry in the 1974 Bulletin 200: California State Water Project, Volume III Storage Facilities context (DWR 1974c). Please refer to the original DPR records appended to the end of this update for a complete context.

The development of Clifton Court Forebay began with early land reclamation efforts in the San Joaquin Delta wetlands. In 1898, the Old River Land and Reclamation Company set out to drain and convert 4,000 acres of company-owned land located west of Union Island and south of the Byron Tract, also both reclaimed lands, for use as farmland. This newly reclaimed area was surrounded on three sides by earthen levees and canals and was named the Clifton Court Tract (Kim and Williams 2013, p. 3; The Evening Mail 1898, p. 2).

In 1960, financing for the SWP was approved by the voters of California as a result of the Burns-Porter Act, which authorized $1.75 billion in general obligation bonds to assist with funding for necessary water facilities for the SWP. The unique configuration and location of the Clifton Court Tract was identified as an ideal site for a storage component of the SWP to be located at the head of the California Aqueduct, which serves as the primary delivery system of the SWP. The purpose of Clifton Court Forebay was to provide storage for off-peak pumping and to regulate the flow into the Delta Pumping Plant. This management lessens potential surges and drawdown during the height of pumping periods (Ambacher 2013, p. 3; Kim and Williams 2013, p. 3; DWR 1974c, p. 201).

Preliminary planning for Clifton Court Forebay was underway early in 1965, which sought to locate a low, 30-foot dam within the existing levees of the Clifton Court Tract (Figure 11). Gordon H. Ball Enterprises was chosen as the general contractor in early 1967, and construction of the 28,653-acre-foot reservoir began on December 12, 1967, and was completed during December 1969 (Figure 12 and 13). The Clifton Court Forebay has served in its capacity as an importance storage component of the SWP since the time of its construction into the present (Kim and Williams 2013, p. 3; DWR 1974c, p. 201).
Figure 11. Illustration of Clifton Court Forebay showing the related pump and drainage systems (DWR 1974c, p. 210).
| State of California & Natural Resources Agency | Primary# | P-07-003122 and P-07-004698 |
| DEPARTMENT OF PARKS AND RECREATION | HRI # | Trinomial |

**CONTINUATION SHEET**

Property Name: Clifton Court Forebay

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**Figure 12.** Exhibit C. 1969 aerial view looking northwest over the Clifton Court Forebay construction site showing the land divisions within the Clifton Court Tract before the completion of the project (DWR n.d.).

**Figure 13.** 1969 aerial view looking northwest over the Clifton Court Forebay construction site showing the inlet structure and its five control gates in the foreground (DWR n.d.).

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**National Register of Historic Places/California Register of Historic Resources Statement of Significance**

Clifton Court Forebay (P-07-003122) was initially recorded in January 2012 by DWR and was re-recorded and evaluated in May 2013 by Patricia Ambacher. In 2013, Ambacher recommended that Clifton Court Forebay appeared eligible as a contributing resource to the California Aqueduct, which has already been determined eligible for the NRHP and CRHR under Criteria A/1 and C/3 and Criterion Consideration G as the largest and most significant of the water conveyance systems developed as part of the SWP and for its complex design necessary to redistribute water throughout the State of California on a massive level (Donaldson 2012, pp. 1–2). Clifton Court Forebay was constructed from 1967 to 1969, within the period of significance for the California Aqueduct (1960–1974) established by Ambacher. Ambacher posed that Clifton Court Forebay was eligible under NRHP/CRHR Criteria A/1 as a “character-defining feature of
the California Aqueduct” (Ambacher 2013, p. 4) because it was a critical and planned element of the SWP, as the location where the California Aqueduct begins. She also posed that Clifton Court Forebay was eligible under NRHP/CRHR Criteria C/3 because the forebay was a functional, designed necessity for the continued operation of the California Aqueduct that facilitated regulation of surges and drawdown in peak pumping periods, as well as preventing backflow into the Delta at low tides by closing its intake gates. A complete significance statement may be found in the Ambacher (2013) DPR forms for Clifton Court Forebay, appended to this DPR update.

Clifton Court Forebay was also evaluated in August 2013 by Monte Kim and James Williams in conjunction with the other Delta Field Division Facilities (P-07-004698): the John E. Skinner Delta Fish Protective Facility and the Harvey O. Banks (Delta) Pumping Plant. The Kim and Williams (2013) record also poses that these facilities are eligible under NRHP/CRHR Criteria A/1 and C/3 due to the important role that these facilities played as part of an expansive, engineered water-conveyance system, which was designed to store and distribute water to customers of the SWP throughout the state (Kim and Williams 2013, p. 2). Kim and Williams also pose that the Delta Field Division Facilities are eligible as contributing components to a potential SWP historic district. Kim and Williams’ evaluation is also appended to this DPR update.

Both Ambacher’s 2013 evaluation and Kim and Williams’s 2013 evaluation found that Clifton Court Forebay was not eligible under either Criteria B/2 or D/4.

Dudek’s review of the CHRS record search results, the BERD, and other repositories and databases indicates that neither of these findings have been concurred with by SHPO. The purpose of Dudek’s recordation of Clifton Court Forebay is to update this prior documentation and evaluation of this resource as approaches to evaluating elements of the SWP has evolved since 2013. It should be noted, that Clifton Court Forebay is a key structural feature of the SWP and feeds the California Aqueduct, which was determined eligible in 2012 (Donaldson 2012, pp. 1–2). However, the Clifton Court Forebay is eligible as an individual property/resource within its own right as a critical and planned element of the SWP and as the functional California Aqueduct headwaters. Without the Clifton Court Forebay, the California Aqueduct could not function as it does. It is also eligible individually for its design, facilitating water flow from the Delta into the California Aqueduct.

During the 2021 field visit to Clifton Court Forebay, Dudek found that the forebay retains its character-defining features: design as a shallow reservoir bound by a 6.9-mile-long earth fill dam, compacted and uncompacted native soil materials, five-bay radial gate intake structure, and historical association with the California Aqueduct and its role within the larger SWP. Clifton Court Forebay also appears to retain all aspects of integrity necessary to convey its significance that were called out in both the Ambacher (2013) and Kim and Williams (2013) records.

Therefore, Clifton Court Forebay is individually eligible under NRHP/CRHR Criteria A/1 for its association with California Aqueduct and as a critical component of the SWP system that distributes water throughout the state, as well as under NRHP/CRHR Criteria C/3 for its design as the functional headwater/reservoir, regulating the surges and drawdown for the California Aqueduct during peak pumping periods and preventing backflow into the Delta during low tide. Clifton Court Forebay is individually eligible as a component of the SWP as part of its original phase of construction, 1959–1974.

**Integrity Discussion**

Clifton Court Forebay retains sufficient integrity to convey its significance under NRHP/CRHR Criteria A/1 and C/3 as an individual historic property/resource. It retains integrity of location in its original location, situated between the Old River, the West Canal, and Italian Slough in the southwestern portion of the Delta. It retains integrity of setting as it retains its historically appropriate, agricultural and sparsely populated setting in the reclaimed Delta marshlands. Integrity of design is retained as it retains the character-defining features of the low, 6.9-mile-long earth fill dam encircling the forebay; the shallow depth reservoir; compacted soil, uncompacted soil and organic, and cementitious soil slurry materials; the five-bay radial gate intake structure; and its historical association with the SWP system. Integrity of materials and workmanship are retained as the original materials and construction techniques are visible and all repairs have been undertaken with in-kind materials. Clifton Court Forebay is still able to convey the feeling of a twentieth century large scale public works project and can still convey a sense of the time and space in which it was constructed. Finally, Clifton Court Forebay retains integrity of association as it retains its association with DWR and its historical associations with the California Aqueduct as a contributing component of the largest conveyance system in the SWP. Clifton Court Forebay, therefore, retains the requisite level of integrity to convey significance under Criteria A/1 and C/3.

**Character-Defining Features**

Character-defining features of Clifton Court Forebay include the following:

- The low, 6.9-mile-long dam of earthfill construction, encircling nearly all of the forebay structure
- The shallow average depth of the forebay reservoir
- The combination of compacted soil, uncompacted soil mixed with organics, and cementitious soil slurry that comprise the
materials of the earthfill dam Clifton Court Forebay

- The five-bay radial gate intake structure in the southeastern corner of the reservoir
- The historical association with the California Aqueduct as its functional headwaters and with the SWP as a statewide system

*B12. References (Continued):


Ambacher, P. 2013. “P-07-003122 (Clifton Court Forebay).” DPR 523-series forms on file at the CHRIS Northwest Information Center, Sonoma State University, Rohnert Park, CA. Prepared by AECOM for DWR.


<table>
<thead>
<tr>
<th>State of California</th>
<th>Natural Resources Agency</th>
</tr>
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<tbody>
<tr>
<td>DEPARTMENT OF PARKS AND RECREATION</td>
<td></td>
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</table>

**CONTINUATION SHEET**

Property Name: Clifton Court Forebay

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Kim, M. and J. Williams. 2013. “P-07-004698 (MPTO_002_001; California State Water Project, Delta Field Division Facilities).” DPR 523-series forms on file at the CHRIS Northwest Information Center, Sonoma State University, Rohnert Park, CA. Prepared by ICF International for DWR.

Kress, M. 2015. “P-07-004507 (Italian Slough, Middle River, and West Canal Levee).” Recorded November 23, 2015. DPR 523-series forms on file at the CHRIS Northwest Information Center, Sonoma State University, Rohnert Park, CA.


P1. Other Identifier: Clifton Court Forebay

*P2. Location: □ Not for Publication □ Unrestricted and (P2b and P2c or P2d. Attach a Location Map as necessary.)

*P3a. Description: (Describe resource and its major elements. Include design, materials, condition, alterations; size, setting, and boundaries)

Clifton Court Forebay (CCF) is a shallow, 28,653-acre-foot reservoir (Photograph 1). CCF is approximately 2.6 miles long and 2.1 miles wide. It is an earthen reservoir with a 15 foot high dam. The dam surrounding the CCF has a 3:1 waterside slope, a 3:1 landside slope, and a paved crown approximately 20 feet wide. The waterside slope of the dam is treated with sprayed concrete or mortar (Photograph 2). Several concrete block mattresses and concrete ramps on the waterside provide access to the CCF for DWR management and maintenance purposes. The waterside and landside slope of the outer levee along Old River/West Canal is 3:1. An unpaved gravel road approximately 20 feet wide comprises the crown of the outer levee (Photograph 3). (See Continuation Sheet)

*P3b. Resource Attributes: (List attributes and codes) HP22. Reservoir

*P4. Resources Present: □ Building □ Structure □ Object □ Site □ District □ Element of District □ Other (Isolates, etc.)

P5b. Description of Photo: (View, date, accession #) Photograph 1, Overview, camera facing southwest, May 9, 2012

*P6. Date Constructed/Age and Sources: □ Historic □ Prehistoric □ Both

1969 / CA Dept. of Water Resources

*P7. Owner and Address:

CA Dept. of Water Resources
1416 9th Street
Sacramento, CA 95814

*P8. Recorded by: (Name, affiliation, address)

Patricia Ambachner
AECOM
2020 L Street, Suite 400
Sacramento, CA 95811

*P9. Date Recorded:

May 9, 2012

*P10. Survey Type: (Describe)

Intensive

*P11. Report Citation: (Cite survey report and other sources, or enter "none.") AECOM, Cultural Resources Inventory, Evaluation and Finding of Effect Report for the Clifton Court Forebay Fishing Facility Project, August 2012.

*Attachments: NONE □ Location Map □ Sketch Map □ Continuation Sheet □ Building, Structure, and Object Record □ Archaeological Record □ District Record □ Linear Feature Record □ Milling Station Record □ Rock Art Record □ Artifact Record □ Photograph Record

DPR 523 for Clifton Court Forebay, January 2012

DPR 523A (1/95)

*Required Information
B1. Historic Name: Clifton Court Forebay
B2. Common Name: Clifton Court Forebay
B3. Original Use: Reservoir
B4. Present Use: Reservoir

*85. Architectural Style: Utilitarian

*86. Construction History: (Construction date, alteration, and date of alterations) 1969

*87. Moved? ☐ No ☑ Yes ☐ Unknown Date: Original Location: 

*88. Related Features: California Aqueduct


*810. Significance: Theme Water Conveyance Area California
Period of Significance 1960-1974 Property Type Reservoir Applicable Criteria A/1 and C/3
(Discuss importance in terms of historical or architectural context as defined by theme, period, and geographic scope. Also address integrity.)

The CCF appears to meet the Criteria A/1 and C/3 of the National Register of Historic Places (NRHP) and the California Register of Historical Resources (CRHR) at the state level of significance as a contributing element to the California Aqueduct. The California Aqueduct was determined eligible by the State Historic Preservation Officer on July 3, 2012, at the state level of significance under NRHP Criterion A as the largest and most significant of the water conveyance systems developed as part of the State Water Project (SWP). The district was also determined eligible under NRHP Criterion C for its complex design. The period of significance is 1960-1974, the years of construction.

The SWP was a massive project in the state of California that includes aqueducts, canals, pipelines, and storage and pumping facilities. The purpose of the SWP was to address efforts to control the distribution of water to meet California’s rising population and the demands for this resource.

State Water Project
The idea of a statewide water project was first discussed in 1919, when Lt. Robert B. Marshall, chief hydrographer of the U.S. Geological Survey, proposed to California's governor a redistribution of water from the Sacramento River to the San Joaquin Valley and then over the Tehachapi Mountains to southern California. Marshall’s plan was met with resistance, but it served as the basis for what eventually became the SWP (Cooper 1968:50–52, DWR 2011). (See Continuation Sheet)

B11. Additional Resource Attributes: (List attributes and codes)

*B12. References: See Continuation Sheet

B13. Remarks:

*B14. Evaluator: Patricia Ambacher

*Date of Evaluation: March 22, 2013

(This space reserved for official comments.)
Location (cont)

Range 3E, Sections 12, 13, 24, and 25 and Range 4E, Sections 7, 8, 17, 18, 19, 20, and 30

Description (cont)

At the southeast corner of the CCF, a radial gate structure consisting of five radial gates, each 20 feet wide controls the flow of water into the CCF (Photograph 4 and 5). A concrete apron enclosed by wing walls is located on the CCF-side of the radial gate structure (Photograph 6). The wing walls are approximately 100 feet long. A one lane bridge over the gates can accommodate light vehicle traffic (Photograph 7).

To the west of the radial gates are two buildings (Photograph 8). One is square in plan with a flat roof and sheathed entirely in corrugated metal. The primary entrance has aflush, metal, single-entry door. The second building is a CMU building, rectangular in plan with a flat roof sheathed in corrugated metal. Doors are single-entry, flush metal doors.

Southeast of CCF is a small boat dock exists along the outer levee (Photograph 9).

Significance (cont)

Planning for the SWP began in earnest after World War II, during a period when California experienced a population surge. Local governments and water officials quickly realized that their water supplies could not meet the growing demand of their communities. Farmers were also draining regional groundwater basins to irrigate their land (DWR 2011). State engineer Arthur D. Edmonston published a proposal that suggested building a multipurpose dam, reservoir, and power plant on the Feather River, northeast of the small town of Oroville in the northern Sacramento Valley; an aqueduct to transport water from the Delta to Santa Clara and Alameda Counties; and a second aqueduct to serve the San Joaquin Valley and southern California (DWR 2011).

The storage of water would reduce flooding hazards, and the stored water could be released into the Sacramento River at planned intervals and then deposited into the Sacramento-San Joaquin Delta. Here it would be able to check the flow of salt water from the San Francisco Bay, which during droughts had seeped as far inland as Sacramento. The project would be paid for in part by the electricity generated at the dam's power plant. Edmonston also proposed constructing a giant aqueduct fed by massive, custom-designed pumps that would force the water from the Delta southward, where it could be used to water the dry southern valley and the cities of southern California after pumps lifted it over the Tehachapi Mountains at the southern end of the San Joaquin Valley (DWR 1974a:7). Financing for the SWP was approved by the voters of California in 1960 as a result of the Burns-Porter Act (DWR 2010).

This act authorized the issuance of $1.75 billion in general obligation bonds to assist with funding for building necessary water facilities for the SWP. Construction began shortly thereafter, and the first phase of the SWP was completed between 1961 and 1974 (DWR 1974a:8; Cooper 1968:201–204; JRP and Caltrans 2000:82; Rarick 2005:205–228).

Clifton Court Forebay and the California Aqueduct

The CCF is a 28,653-acre-foot reservoir designed to regulate the flow of water that enters the California Aqueduct and the SWP Harvey O. Banks Pumping Plant (Banks Pumping Plant). The CCF's regulation reduces the surges and drawdown created during peak-pumping periods. The CCF features gates that can be closed to prevent backflow into the Delta during low tides (DWR 1974b:201). Construction of the CCF began on December 12, 1967, and was completed in 1969 (DWR 2012:8). The CCF is at the head of the California Aqueduct, a critical component of the SWP. The California Aqueduct serves as the primary delivery system of the SWP. The main line of the California Aqueduct has five divisions: North San Joaquin, San Luis, South San Joaquin, Tehachapi, and the East Branch (previously the Mojave and Santa Ana Divisions). It stretches 444 miles, from the CCF to Perris Reservoir in Riverside County (DWR 1974a:52). The Banks Pumping Plant also delivers water to the South Bay Aqueduct (Golze 1965:7).

The California Aqueduct and the CCF were essential to the development of California. The water serves users in the San Joaquin Valley where the aqueduct allowed thousands of acres of land to be cultivated, thereby dramatically increasing
California's agricultural efforts in the region and propelling the state to the top in nationwide agricultural production. In Southern California, the aqueduct serves municipal users by supplying drinking water.

The SWP is the largest state-built water conveyance system in the United States, spanning more than 600 miles between northern and southern California. In 2001, the American Society of Civil Engineers recognized the SWP as one of the greatest American engineering achievements of the 20th century, listing it as one of only 10 internationally ranked “Monuments of the Millennium” for its remarkable engineering aspects and for the positive impact it had on regional economic trade and development. Today, the SWP provides drinking water for 25 million people; irrigates approximately 750,000 acres; and features 34 storage facilities, 20 pumping plants, four pumping-generating plants, five hydroelectric power plants, and 700 miles of open canals and pipelines (American Society of Civil Engineers 2011; DWR 2010).

The CCF is a character-defining feature of the California Aqueduct. The CCF was built in between 1967 and 1969 as part of the California Aqueduct and the SWP. The California Aqueduct had an tremendous impact on the agricultural industry of California and allowed farmers to cultivate large new tracts of land, particularly in the western and southern San Joaquin Valley (Jelinek 1982:89). The CCF was a critical and planned element of the SWP and is where the 444 mile long aqueduct begins. As a contributor to the California Aqueduct, which is notable for the political and planning process of the public works project that provided benefits statewide, the CCF appears to meet Criterion A of the NRHP and Criterion 1 of the CRHR for its facilitation of a comprehensively planned and publicly sanctioned water conveyance public works project that facilitated development throughout California, and for its complex design necessary to redistribute water throughout California.

The CCF and the California Aqueduct are associated with many individuals who contributed to the planning and implementation of the project. Within certain contexts those individuals could be considered significant under NRHP/CRHR Criterion B/2. One notable person associated with the California Aqueduct and the SWP is Governor Edmund G. "Pat" Brown. Brown was instrumental in spurring political and public support for the construction of the SWP and the California Aqueduct and its completion was one of his most significant accomplishments as governor. Brown was committed to California's future growth and development and the SWP and the California Aqueduct were crucial to his vision of California. He took an active role in drafting the legislation for the SWP and succeeded in putting the Burns-Porter Act before the voters in 1960 (Hundley 2001:283). The SWP and the California Aqueduct, however, were one of several significant accomplishments in Brown's career as governor. He was also responsible for the Fair Housing Act, Fair Unemployment Act, the master plan for higher education in California and the expansion of the state highway system. Each of these is also important for their association for Governor Brown.

According to National Register Bulletin 32: Guidelines for Evaluating and Documenting Properties Associated with Significant Persons, an eligible property must be directly associated with the significant individual and be the best property to represent the person's significance. The CCF does not appear significant under NRHP/CRHR Criterion B/2 for its association with Governor Brown because it is not the best representation of Brown's significance. His significance can be tied to other properties, including places such as his former office or home. Those are the properties where Brown conducted his work, which included the planning and drafting of critical legislation that brought the California Aqueduct to fruition. The CCF was part of the larger California Aqueduct project, one of several important initiatives that Governor Brown undertook for the betterment of California as would have been his directive under the Governor's office. The CCF is not the place where important decisions were made. The CCF and the California Aqueduct symbolizes Brown's dedication to California's development, but the symbolic value of the California Aqueduct is not a substitute for direct association. Nor is it the best representation or only surviving property that can convey Brown's significance. The CCF also has no direct association with Governor Brown and does not appear as an individual structure to meet NRHP/CRHR Criterion B/2.

Under NRHP/CRHR Criterion C/3 the CCF is a character-defining feature of the California Aqueduct: a significant and distinguishable engineering entity significant for its type, period and method of construction. Therefore, it appears eligible under this requirement of NRHP/CRHR Criterion C/3. The CCF serves as a focal point of the aqueduct with regards to facilitating regulation of the surges and drawdown created during peak pumping periods. The CCF features gates, which are a character-defining feature of the CCF, that can be closed to prevent backflow into the Delta during low tides (DWR 1974b:201). The construction of the CCF was a planned and necessary part of the aqueduct. The CCF is historically a functionally-related element of the aqueduct. The aqueduct was an extensively planned system intended to facilitate development, particularly agriculture interests, of the entire state. The period that followed World War II was a period of
tremendous growth, particularly in California. This period also saw an increase in agricultural production in California making it the major source of food for the United States (Cooper 1968:177). The CCF is united historically by both plan and physical development to the California Aqueduct and contributes to the common engineering objective of the aqueduct. Therefore, under Criterion C/3 the CCF is a character-defining feature of the California Aqueduct and a contributing resource to the aqueduct. Other character-defining features of the CCF include its embankment slope, depth, and size. Because the CCF lacks individual distinction for its type, period, and method of construction it does not appear individually significant under NRHP/CRHR Criterion C/3.

Under NRHP/CRHR Criterion D/4 the CCF is not likely to yield information important to history because it is not the principal source of important information. Therefore, the CCF does not appear to meet this criterion.

Because the CCF is less than 50 years old, it is also evaluated under NRHP Criterion Consideration G and the CRHR special consideration for properties less than 50 years old. As an individual structure it does not appear that its design value or its consideration as part of the planned system is immediately recognized as historically significant in the engineering profession. However, when taken in context with the initial phase of construction of the California Aqueduct (1960-1974), the contributing CCF is a feature of a planned comprehensive water redistribution system that helped shape the development of much of California following the mid-20th century. Water development is an important and ongoing historic theme within the history of the west. Added to this is the magnitude of planned change to the California landscape brought about by this single engineered public works project and the ability for the California Aqueduct to meet the definition of "exceptional importance" at the statewide level is clear. The general understanding of the exceptional importance of this system is evidenced in the ASCE listing it as one of only 10 internationally ranked "Monuments of the Millennium" for its remarkable engineering aspects, as well as for the positive impact it had on regional economic trade and development.

In addition to being significant, the CCF also retains integrity of location, design, materials, workmanship, setting, feeling, and association. The CCF retains integrity of location because it is in its original location. The design of the CCF is not altered because the form, plan, and style have not changed. Integrity of materials is retained because no new materials have been introduced. Integrity of workmanship is also retained and is expressed in the utilitarian construction methods of the CCF. Lastly, the CCF retains integrity of setting, feeling and association because there is limited development around the resource and it retains its rural sense of place of time. Overall, the CCF retains a high degree of integrity and its ability to convey its significance as a character-defining feature of the California Aqueduct.

References (cont)


Photographs (cont)

Photograph 2. Treated portion of dam, camera facing west
Photograph 3. Gravel levee road, camera facing west

Photograph 4. Radial gates, camera facing southwest
Photograph 5. Radial gates, camera facing southwest

Photograph 6. Concrete wing walls, camera facing southwest
Photograph 7. Bridge, camera facing northeast

Photograph 8. Buildings, camera facing southwest
Photograph 9. Boat ramp/dock, camera facing south
P1. Other Identifier: N/A

P2. Location:  Box Not for Publication  □ Unrestricted
   a. County: Contra Costa
   b. USGS 7.5' Quad: Clifton Court Forebay, CA  Date: 2009 (see Continuation Sheet)  M.D. B.M.
   c. Address: N/A  City: N/A  Zip: N/A
   d. UTM: Zone: 10
   e. Other Locational Data:
      From Sacramento, take I-5 south approximately 50 miles to slight CA-4-W and follow for approximately 20 miles. Clifton Court Forebay is located on the north side of CA-4-W

P3a. Description:

Clifton Court Forebay (CCF) is part of the California State Water Project. CCF is a shallow, 28,653-acre-foot reservoir at the beginning of the California Aqueduct. CCF serves as a storage facility for off-peak pumping and permits regulation of flows into the Harvey O. Banks Pumping Plant. Waters enter from West Canal (a channel of Old River) in the east and exit into the Intake Channel to Delta Pumping Plant to the west, where water then flows into the California Aqueduct.

Construction began on December 12, 1967 and was completed two years later on December 17, 1969 (DWR 1974). (see continuation sheet)

P3b. Resource Attributes: HP22 – Reservoir

P4. Resources Present: □ Building  □ Structure  □ Object  □ Site  □ District  □ Element of District  □ Other (Isolates, etc.)

P5a. Photo or Drawing

P5b. Description of Photo: 01/25/2012; View to North; Original kept at DWR

P6. Date Constructed/Age and Sources: □Historic  □ Prehistoric  □ Both
   Construction Completed 1969

P7. Owner and Address:
   California Department of Water Resources
   1416 9th Street
   Sacramento, CA 95814

P8. Recorded by:
   Rebecca H. Gilbert
   California Department of Water Resources
   3500 Industrial Blvd.
   West Sacramento, CA 95691

P9. Date Recorded: 01/30/2012

P10. Survey Type: Systematic surface survey.

P11. Report Citation: (see continuation sheet)

Attachments: □ NONE  □ Location Map  □ Sketch Map  □ Continuation Sheet  □ Building, Structure, and Object Record
□ Archaeological Record  □ District Record  □ Linear Feature Record  □ Milling Station Record  □ Rock Art Record
□ Artifact Record  □ Photograph Record  □ Other (List):
P2b. Location:
  Township 1 South, Range 3 East, Sections 12, 13, 24, and 25
  Township 1 South, Range 4 East, Sections 7, 8, 17, 18, 19, 20, and 30

P3a. Description:

The State Water Project’s first phase of construction completed all initial features between 1961 and 1972. It began delivering water to Alameda County in 1962 through the South Bay Aqueduct, and in 1968, the project began irrigating land in the San Joaquin Valley through the northern half of the California Aqueduct. Northern water reached areas south of the Tehachapis by 1972 (DWR 2011; Herbert, Webb, and Blosser 2004).

The State Water Project’s branch canals, which carry water to areas off the main California Aqueduct, include the North Bay Aqueduct, the South Bay Aqueduct, the Coastal Branch Aqueduct, and the Cross Valley Canal (DWR 2011; Herbert, Webb, and Blosser 2004).

Today, the State Water Project has the capacity to supply around 4.2 million acre-feet of water to about 20 million people throughout the State, and enough water to irrigate approximately 660,000 acres of land. Twenty-nine public agencies that cover a quarter of the State’s area and two-thirds of its population contract for water through the State Water Project. The State Water Project, stretching from the northern foothills of the Sierra Nevada to the San Diego County, consists of 34 storage facilities, reservoirs and lakes that together have a gross capacity of more than 5.8 million acre-feet. The project includes 20 pumping plants as well as 4 pumping-generating plants, and 5 hydroelectric power plants that produce over 6.5 billion kilowatt hours of power, making it the fourth-largest generator of electricity in the State and the largest user of its own power. It also includes 701 miles of open canals and pipelines (including the 444-mile-long California Aqueduct) that convey water from Northern California, over the Tehachapis, to Riverside County in Southern California (DWR 2011; Herbert, Webb, and Blosser 2004).

The State Water Project represents one of the boldest, complex, and successful water development projects ever undertaken. Not only is the State Water Project the largest state-built, multi-purpose water project in the nation, it was the first of its kind. Within the context of state politics and the planning, economics, and engineering of civil works, the State Water Project is recognized as a great achievement on the state and national scale (Herbert, Webb, and Blosser 2004).

CCF marks the beginning of the 444-mile-long California Aqueduct.

P11. Report Citation:

California Department of Water Resources (DWR)

Herbert, R. T., T. Webb, and A. Blosser

Gilbert, R. H.
The subject property consists of three components of the Delta Field Division of the California State Water Project (SWP): (1) the Clifton Court Forebay (CCF), (2) the John E. Skinner Delta Fish Protective Facility (Skinner Fish Facility), and (3) the Harvey O. Banks Delta Pumping Plant (Banks Pumping Plant). While the Delta Field Division encompasses more than a dozen SWP facilities in the Delta and Bay Area regions, the current evaluation addresses only the three Delta Field Division facilities located within the Bay-Delta Conservation Plan Project study area. Located in a rural area of Contra Costa and Alameda counties, within the western Sacramento-San Joaquin Delta and the Diablo Foothills, these three facilities work together as a cohesive subsystem of the SWP, drawing and storing Delta fresh water and delivering it via pumps to the head of the California Aqueduct.

Clifton Court Forebay
Situated at the head of the California Aqueduct in the southeastern corner of Contra Costa County, CCF is a SWP facility used to retain Sacramento-San Joaquin Delta water before distributing it via the California and South Bay aqueducts. CCF is bounded on the north and west by the Italian Slough; on the northeast and southeast by Old River; on the east by an artificial channel, and on the south by CCF’s intake channel, private crop fields, (see Continuation Sheet.)
B1. Historic Name: Clifton Court Forebay, John E. Skinner Delta Fish Protective Facility, Harvey O. Banks Delta Pumping Plant
B2. Common Name: Clifton Court Forebay, Skinner Fish Facility, Banks Pumping Plant
B3. Original Use: Water storage and conveyance, wildlife management
B4. Present Use: Same
B5. Architectural Style: N/A
B7. Moved? No
B8. Related Features: See section P3a.
B9a. Architect: California Department of Water Resources
B9b. Builder: California Department of Water Resources
B10. Significance: Theme: Water Conveyance Development in California During The Second Half of The Twentieth Century
   Area: Sacramento-San Joaquin Delta
   Period of Significance: 1963-1969
   Property Type: reservoir, engineering structure, industrial building, ancillary building
   Applicable Criteria: NRHP Criteria A and C and CRHR Criteria 1 and 3.

The study-area components of the Delta Field Division of the California State Water Project—the Clifton Court Forebay, the John E. Skinner Delta Fish Protective Facility, and the Harvey O. Banks Pumping Plant—appear to be eligible for listing in the National Register of Historic Places (NRHP) at the state level of significance under Criteria A and C and the California Register of Historical Resources (CRHR) under Criteria 1 and 3. The significance of this subsystem of the California State Water Project, constructed between 1963 and 1969, is due to the important role that its three components played as part of an expansive, engineered water-conveyance system, which was designed to store water in Northern California and distribute it to urban and agricultural areas elsewhere in the state. These three facilities of the Delta Field Division also appear to be eligible for NRHP and CRHR listing as contributing elements to a potential California State Water Project Historic District.

As the second of two major multi-purpose water systems in California, the SWP was developed to provide, among other services, flood control, drinking and irrigation water for ill-served sections of the state, and water quality maintenance in the Sacramento-San Joaquin Delta. A major feat of engineering, the SWP consists of dozens of associated water storage and conveyance facilities whose coordinated operations provide water to millions of users through much of the state. Its federally operated counterpart, the Central Valley Project (CVP), preceded the SWP by several years, delivering water to the San Joaquin Valley by 1951. The California Department of Water Resources (DWR) constructed the first phases of the SWP in the late 1950s, ultimately building an integrated system that began with a hydro-electric dam on Northern California’s Feather River and delivering water to Southern California in 1972 (JRP 2000, 74,75,80, 82). (See Continuation Sheet)

B12. References:
   See continuation sheet.
B13. Remarks:

*B14. Evaluators:
   James Williams and Monte Kim, Ph.D.
   ICF International, 630 K Street, Suite 400, Sacramento, CA

*Date of Evaluation: August 2, 2013

(DThis space reserved for official comments.)

DPR 523B (1/95)
and the Skinner Fish Facility. CCF’s major components are a levee system, an intake channel and control gate, and an outlet channel.

Approximately 7.5 miles of 30-foot-high earthen levees hold as much as 28,653 acre feet of water in the reservoir. These barriers, constructed within the existing Clifton Court Tract levees in 1969, measure approximately 20 feet wide at the crown. The levee crown features an asphalt-paved access road, which is also used as a publicly-accessible bicycle route. Measurements for the base width of the levees were unavailable, but measurements using Google Earth suggest that the levees are as much as 145 feet across at the base. According to a 2012 Department of Water Resources (DWR) description, the levees are composed of three principal materials. DWR built the interior banks of a compacted mixture of silty and sandy clays, while a compacted mix of “clays, sands, and silts” form the outside slopes. “Waste materials, such as peats and soft organics” serve as “ballast” on the exterior slope, stabilizing the structure where necessary (DWR 2012, 19). Additional gravel and riprap covering protect the levees from erosion in some sections of the barrier. Minor associated features include at least three centrifugal pumps (Photo 2) situated on the levee’s exterior slope. Placed at irregular intervals along the embankment, the pumps draw seepage and surface water from an earthen drainage ditch (Photo 3) that runs parallel to much of the northern section of the levee (DWR 1974b, 202). Water pumped from the ditch flows into the forebay from concrete discharge openings built into the interior slope of the levee. In addition, there are at least two concrete-block boat ramps (Photo 4) on the inside of the embankment.

The CCF draws water from the Old River via a 900-foot artificial intake channel situated at the southeastern corner of the forebay. Water courses west from the confluence of the Old River and the West Canal to the end of the manmade inlet, where an intake mechanism regulates flows into the CCF using five steel radial gates (Photos 5 and 6). The steel and concrete gate assembly fills a 200-foot gap in the embankment and merges with the earthen levee slopes by way of two pairs of concrete wing walls—one on the inside of the forebay and the other on the outside. Four vertical concrete supports hold a concrete-bedded roadway and platform. The supports appear to separate the five 20-foot-wide inflow gates. The tops of the arched radial floodgate control structures emerge above the north side of platform with their convex sides facing south. The barriers are connected by 25-foot steel arms to an axis on the inside of the forebay. Operators open the intake system by mechanically pivoting the floodgates upward toward the interior of the CCF. Two adjoined single-story outbuildings sit atop the levee to the immediate southwest of the intake structure. The larger of the two is a 30-by-12-foot concrete building with a shed roof and two openings on its south façade. A smaller flat-roofed building clad in standing seam steel is located adjacent to the west wall of the larger building. It measures approximately 7 feet square (Photo 6).

A 575-foot wide, uncontrolled outlet sits on the west side of the CCF (Photo 7). It empties into the northernmost section of the Banks Pumping Plant intake channel, running south for approximately 3,200 feet before heading southwest for an additional 900 feet to the Skinner Fish Facility.

**John E. Skinner Delta Fish Protective Facility**

The Skinner Fish Facility is a fish protective and data collection facility located just north of the area where the Byron Highway crosses the California Aqueduct (Photo 8). In addition to the site’s fish protection and collection mechanisms, the facility includes 14 associated buildings built between 1968 and 2008 (NETR Online, 1966, 1979, 1987, 1993; Google Earth 1993, 2002, 2004, 2006, 2008). Buildings at the site are clustered into three groupings: one just west of an intake channel, and two east of the channel, separated by a service roadway. The fish protection mechanism is situated mostly above and within the channel near the center of the facility (See Figure 1). The Skinner Fish Facility is bounded on the north by the CCF, on the south by the Byron Highway, and on the east and west by crop fields.

The centerpiece of the facility is the 1968-built fish protection mechanism (Figure 2 and Photo 9), installed to keep fish out of the Banks Pumping Plant downstream. Most of this steel and concrete structure straddles the concrete- and dirt-lined...
Building 8 sits to its east and is of similar, if not identical, construction. Finally, Building 9 is the southernmost building in Buildings 5 and 6. Built between 2002 and 2004, it includes a corrugated-metal gabled roof and horizontal-plank siding.

A prefabricated, portable building includes a flat roof and what appears to be plywood siding. Building 7 stands just south of aligned parallel to each other in a north-south orientation. Of these, only Building 5 is visible from the right-of-way. The southeastern corner of the fish protection mechanism are Buildings 5 and 6, which are rectangular, utilitarian buildings.

The northern ends of these pools open to pipelines that carry the fish to seven tanks located just west of the secondary louvers (Google Earth; California State Water Project 2011). According to the California State Water Project, these concrete tanks are 20 feet in diameter and hold water from 10 to 12 feet deep. DWR empties the collection tanks twice daily, taking the collected fish by truck to upstream locations on the Sacramento and San Joaquin rivers (California State Water Project 2011).

Immediately to the west of the primary louvers is a gantry crane in its resting location (Photo 9). Likely used to maintain the primary louvers, the moveable crane stands an estimated 70 feet tall on two pairs of legs, approximately 90 feet apart. Placed the same distance from one another are two parallel tracks running above the primary louvers for the width of the channel. The crane and track system likely allows operators to move the crane over the louvers and into a position suitable for conducting maintenance from above the channel.

The easternmost group of buildings is just east of the channel. Four buildings make up this grouping. Three of these likely composed the facility’s original 1968 building complex. Building 1 is a two- or three-story, flat-roofed, building constructed on a rectangular ground plan (Photos 10 and 11). Its mostly-concrete walls include what appear to be corrugated metal panels on portions of the east elevation and most of the south-facing main façade. A covered entry sits below the large metal panel on this wall. It includes full-length, metal-framed, fixed-pane windows and a covered breezeway that adjoins the building to Building 2. Large vents punctuate the east wall above and below the four metal panels placed on that wall.

Building 2 (Photo 11), relatively small in comparison, is built in a style similar to that of Building 1. The concrete-block, single-story building sits on a rectangular plan and features an east-facing main façade. There are covered entryways at either end of the main façade. Both entries include an assembly consisting of a standard door, fixed-pane windows (ceiling-height in the case of the northern entry), and translucent glass or plastic panels built into sections of the window frame. To the south of Building 2 is Building 3 (Photo 12). This warehouse is of concrete-block composition the facility’s original 1968 building complex.

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The second grouping of modern, utilitarian buildings sits to the southeast of the protection mechanism, north of a set of concrete tanks and other associated equipment, and west of several large shipping containers (Photo 13). Two of these buildings were erected between 1993 and 2002, and the remaining three were completed between 2002 and 2004 (Google Earth 1993, 2002, and 2004). Four of the 5 buildings in this group are visible from the public right-of-way. Near the southeastern corner of the fish protection mechanism are Buildings 5 and 6, which are rectangular, utilitarian buildings aligned parallel to each other in a north-south orientation. Of these, only Building 5 is visible from the right-of-way. The prefabricated, portable building includes a flat roof and what appears to be plywood siding. Building 7 stands just south of Buildings 5 and 6. Built between 2002 and 2004, it includes a corrugated-metal gabled roof and horizontal-plank siding.

Building 8 sits to its east and is of similar, if not identical, construction. Finally, Building 9 is the southernmost building in this grouping. This circa-2002 building includes a shed roof and a rectangular plan.

The third grouping of buildings is similarly composed of four modern, utilitarian buildings. Buildings 10 and 11 date to around 2004 (Photo 14). Building 10 is a large metal warehouse with a low-pitched, gabled roof. Located to the south is Building 11, a portable trailer building. Building 12 (Photo 15) sits to the east of Building 10. The circa-2008 building possesses a flat roof and is situated near several containers and other associated equipment (Google Earth, 2004, 2006, 2008).
Harvey O. Banks Delta Pumping Plant

The Banks Pumping Plant sits on the Alameda-Contra Costa county line in the Diablo Foothills approximately 2.5 miles southwest of the CCF. The resource consists of an eleven-pump station, a 2.5 mile intake channel, and an electrical switchyard. As access to the site was limited, this evaluation of the resource was completed mostly by use of aerial images.

Water approaches the Banks Pumping Plant through a 3.3-mile-long intake channel (Photo 16). Constructed in two phases between 1963 and 1967 (DWR 1974c, 133), the riprap-lined, compacted earth channel begins at the CCF, traveling southward through the Skinner Fish Facility before passing under the former Mococo Line tracks and Byron Highway. From the south side of the highway, the canal flows southwest for a mile, before changing its course slightly northward. It then continues for another mile, before terminating at the Banks Pumping Plant. Between the highway and the pumping plant, the canal cuts between low hills that rise gradually in elevation. Two asphalt access roads flank the canal segment. The intake channel is of varied width and depth. It generally narrows and deepens as it approaches the pumping plant, although the canal widens to create a forebay where it meets the pump (DWR 1974c, 130-131).

At its southern end, the canal meets the Banks Pumping Plant building (Photo 17). Operational by 1967 and completed in 1969, the pumping plant sits at the end of an artificial ravine excavated from the Diablo Foothills. Aerial photographs show that the excavated bowl in which the pump station sits is roughly octagonal in shape, with an opening at its northeast to accommodate the intake channel. The steep, terraced walls of the bowl descend to a level base, on which the pump facility sits. The pump plant is composed of two principal parts: a reinforced concrete substructure and a steel-framed, concrete-walled superstructure that houses the pumps and other associated equipment. The superstructure sits near the intake channel water level and includes a multi-panel trash gate on its face and steel intake gates and suction elbows built within to manage water flow into the pumps (DWR 1974c, 194, 196). Secured to this base is the superstructure. A rectangular, flat-roofed, modern-style building houses the pumps and sits above a system of intake gates along the base of the building’s long side. Supported by a steel frame, the building measures approximately 500 feet by 60 feet and appears to reach the equivalent of two stories high (Google Earth 2013; Aquafornia 2008). A mostly featureless main elevation faces the canal. The façade is divided into 24 precast concrete wall panels of nearly uniform size (DWR 1974c, 192-193). Only the segments at the ends of the façade break the pattern, each measuring approximately half the width of the others. Near either end of the front of the building, large bays with what appear to be metal roll-up doors punctuate the façade (Aquafornia 2008). Between 1987 and 1993, DWR completed an addition at the western end of the building that housed four new pumps (DWR 1996; NETR Online). This addition maintains the appearance of the original building and is only apparent in the seam between the old and new section of the roof. A projection standing half the height of the rest of the building extends to the east (Aquafornia 2008). Eleven centrifugal pumps are housed within the superstructure, situated in concrete casings formed in the floor of the concrete substructure (DWR 1974c., 198). These pumps ultimately feed water into 11 corresponding primary discharge lines measuring 13.5 and 15 feet in diameter. The discharge pipelines transfer water 244 vertical feet into the neighboring hillside and empty their contents into the California Aqueduct. From there, the water flows to Bethany Reservoir and beyond (DWR 1974c, 196).

To the south and southeast of the Banks Pumping Plant in the hills above the facility sits an associated Delta Field Division building complex at 5280 Bruns Road in Byron. Due to the inaccessibility of the complex, several of the descriptions below are limited and based mostly on aerial photography available online. Building 1 is located between the southern edge of the ravine and a large parking lot. Built in circa 1966, it sits on an irregular ground plan and is oriented roughly east-west. Buildings 2, 3, 4, 5, and 6 are grouped to the northeast of Building 1 and are arranged around a relatively small parking area. All of these buildings were constructed between 1963 and 1966 (DWR 1988; NETR Online). Each of these has a narrow, rectangular ground plan, and Buildings 2, 3, 4, and 5 are oriented roughly east-to-west. The long side of Building 6 runs perpendicular to the long sides of the other four buildings in the group. Arranged in an L shape to the northeast and northwest of this group of buildings, there are at least nine small outbuildings or other minor structures. Historic aerial photos show that these were installed or erected sometime between 1987 and 2005, with the first of these buildings in place by 1987 (NETR Online). (Please see Figure 3 for the layout of the buildings at the Banks Pumping Plant facility).
South of Buildings 4 and 5 is Building 7 (Photo 18), erected as part of the original 1963-1969 complex (NETR Online). Building 7 is a split-level, shed-roofed building with two stories erected on an irregular ground plan. Partially visible from the public right-of-way, the modernistic, utilitarian building includes concrete exterior walls punctuated by a ribbon of fixed-pane windows that nearly meet the west elevation’s roofline. The visible portion of the south elevation is an uninterrupted concrete wall. To the south of Building 7 is Building 8. Aerial photographs show that the rectangular building is part of the original 1963-1969 complex. Its materials and architectural style are similar to the original 1968 Skinner Fish Facility buildings and Banks Pumping Plant Building 11 (see below). Building 9 (Photo 18) sits east of Building 7. It is a modern, metal-clad, gable warehouse dating to sometime between 1987 and 1993 (NETR Online). Building 10 is set far apart from the rest of the complex, sitting in the southwestern corner of the site. Aerial photos show that it was built by 1966. The gable-roofed building includes two flat-roofed extensions—one at the north, the other at the east. To its west is a large, cylindrical tank. Building 11 is a security booth at the complex’s Kelso Road entrance (Photo 20). Likely completed with the Banks Pumping Plant’s original buildings, the booth bears a stylistic resemblance to Banks Pumping Plant Building 7 and Skinner Fish Facility Buildings 1 and 2. Built with elements of the International Style, the security booth includes a rectangular plan, a flat roof and rough-hewn brick walls. The window and door assembly on the south and east walls include two ribbons of three, vertically-oriented, metal-framed, fixed-pane windows that meet at the junction of the east and south walls. Built into the frames beneath each window are opaque metal, plastic or glass panels, much like those found elsewhere in this complex and at the Skinner fish facility. The south window frame extends to incorporate a standard entry door, above which is another opaque panel built into the frame. A metal security fence adjoins the east wall and extends eastward across the adjacent entry roadway.

North of Building 10 and south of the pumping plant is an electrical switchyard. Aerial photographs suggest that the substation was under construction in 1966 (NETR Online 1966, 1979). In 2010, DWR expanded the switchyard, doubling it to its current size (Google Earth 2010, 2013).

California’s era of comprehensive multi-purpose water systems was decades in the making. By the early twentieth century, a number of persistent, water-related problems convinced planners that statewide management was necessary to address growing urban and rural water needs and saltwater intrusion in the Delta, among other issues. Although state authorities began to consider the feasibility of statewide water projects by the 1870s, it was not until 1919 that USGS Chief Geographer Robert B. Marshall issued the “first substantive blueprint” for a statewide water system. The fundamental elements of Marshall’s proposal were a dam on the upper Sacramento River and a pair of north-south canals that flanked the Central Valley. Marshall believed the system could achieve four pressing goals that would remain among the primary concerns of state water planners for decades: irrigating arid sections of the San Joaquin Valley, delivering water to Bay Area cities, improving the navigability of the Sacramento River, and halting the salt water intrusion that plagued southern Delta users. Despite an apparent need for comprehensive water planning, California voters rejected Marshall’s proposal three times (Rice et al 1996, 581-583; JRP 2000, 72-73).

Following this political defeat, elements of Marshall’s plan reemerged in a series of reports that State Engineer Edward Hyatt issued between 1927 and 1931. By 1931, Hyatt envisioned a large system of dams, reservoirs and canals designed to “exchange” water between the northern and southern Central Valley, in addition to facilities for the transfer of Colorado River water to Southern California (JRP 2000, 73-74; DWR 1974a, 5). Two years later, the California State Legislature approved the Central Valley Project Act of 1933, subjecting a $170 million bond measure for the project to a public referendum that December. Although voters approved the measure, the state bonds proved too difficult to market in the early years of the Great Depression (DWR 1974a, 6).

In 1935, the federal government agreed to take on the Central Valley Project as a job-creating component of President Franklin Delano Roosevelt’s New Deal. Plans for construction began under the direction of the Bureau of Reclamation, Delta Division. The Bureau embraced Hyatt’s expansive vision of the CVP, but opted in the short term to complete a scaled-down first phase of the project that consisted primarily of five integrated components designed to deliver water to Contra Costa County and the San Joaquin Valley. Under the initial plan, Shasta Dam served to store Upper Sacramento River water while also offering flood control on the lower reaches of that waterway. Water released from Shasta Dam in dry months flowed south, via the Sacramento River, into the Delta before being pumped into the Delta-Mendota Canal (DMC) at the Tracy Pumping Station (now C.W. “Bill” Jones Pumping Plant). The DMC mostly conveyed water to the San
State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
CONTINUATION SHEET

Page 7 of 20

*Recorded by: Monte Kim and James Williams

*B10: Significance (Continued):
Joaquin Valley, although the Bureau diverted a minor portion of DMC water to the Contra Costa Canal. The majority of the DMC water found its way to the San Joaquin Valley where it replaced water transferred south from CVP’s Friant Dam via the Friant-Kern Canal. Wartime demands on resources postponed the completion of CVP until 1951, when the system made its first water deliveries. Subsequent additions would expand CVPs capacity and reach (JRP 2000, 74).

State Water Project
When CVP water diversions began in the early 1950s, many potential water users did not have access to CVP water (Rice et al 1996, 583; JRP 2000, 80). In the San Joaquin Valley many farmers remained outside CVP’s service area or, in some cases, their large land holdings of more than 160 acres exceeded the acreage limit federal law placed on parcels receiving water from the CVP (JRP 2000, 80). In addition, since Southern California voters had largely rejected the CVP, the federal project did not initially expand to that section of the state. Meanwhile, rapid postwar population growth stressed the existing water supply in Southern California, underlining the region’s need for expanded water service (Rice et al 1996, 583; JRP 2000, 80). Growing demand for water distribution paired with State Engineer A.D. Edmonston’s belief that freshwater flowing from Northern California rivers into the San Francisco Bay constituted a “maldistribution” of valuable water resources (Ambacher 2011, 4).

It was primarily to address these growing water needs in the San Joaquin Valley and Southern California that the State Legislature authorized the Water Resources Board and its successor, the Department of Water Resources (DWR), to conduct a series of three studies. Reports issued in 1951 and 1955 consisted of data collected on the state’s water supply and projected water needs (DWR 1974a, 7; DWR 1957, xxv). The series culminated in 1957 with DWR’s Bulletin No. 3: The State Water Plan (DWR 1974a, 7). Supervised by State Engineer A.D. Edmonston, Bulletin No. 3 outlined the elements of a state-operated multi-purpose water system that would, among other functions, control floodwaters, generate hydroelectric power, distribute drinking and irrigation water, maintain proper levels of salinity in the Delta, and maintain the navigability of major aquatic routes (DWR 1957, xxv). This network of dams, reservoirs, canals, and other facilities would operate across most of the state, serving the Sacramento and San Joaquin Valleys, the San Francisco Bay Area, and Southern California.

Initial efforts to secure legislative approval of for the State Water Plan fell short. However, with Edmund “Pat” Brown’s 1958 election to the governorship, proponents of Edmonston’s ambitious proposal gained new ground. Early in his first term, Brown and a Democratic legislative majority mended the divisions between several competing parties to build a coalition of interests willing to back the plan (Chall 1981, viii-ix; Schiesl 2003). Through the resulting bill, the Burns-Porter Act of 1959, the State Legislature authorized DWR to implement the 1957 plan. The department’s SWP-related mandate included flood control responsibilities, the distribution of water according to “local needs,” and “augment[ing]” Delta water levels (DWR 1974a, 8). To fund the massive project, the bill required that the State subject a $1.75 billion bond measure to approval by public vote. A December 1960 referendum narrowly achieved this, garnering much of its support in Southern California (Ambacher 2011, 4; JRP 2000, 82).

In 1961, the Legislature approved the Davis-Dolwig Act, expanding SWP’s objectives. The law required that state planners conceive SWP projects “in a manner consistent with the full utilization of their potential for the enhancement of fish and wildlife and to meet recreational needs” (Legislative Analyst’s Office 2009). Davis-Dolwig’s recreational use mandate coincided with a postwar expansion in Delta-region recreational uses of the area’s waterways for sport fishing and recreational boating.

Feather River Project
Edmonston intended the system outlined in 1957’s Bulletin No. 3 to supplement what became the first phase of the SWP. Six years before that report was issued, the Central Valley Act of 1951 authorized Edmonston’s Feather River Project (FRP), a plan designed largely to store Northern California water in the Delta and transfer it to other parts of the state. FRP included a dam, reservoir, and power plant on the Feather River near Oroville; a dam, afterbay, and electrical transmission system downstream at Thermalito; a Delta Cross-Channel to better manage the flow of water through the Delta; an aqueduct serving Alameda and Santa Clara counties; and another to deliver water to the San Joaquin Valley and Southern California, what would become the California Aqueduct (DWR 1974a, 7). In 1955, engineers modified the plan to add the San Luis Reservoir and extend the Alameda and Santa Clara County aqueduct to San Benito County in
B10: Significance (Continued):
Southern California (DWR 1974a, 7). Clifton Court Forebay was not originally part of this system, but rather was conceived as the endpoint and storage reservoir for the proposed, and ultimately never constructed, Peripheral Canal (Werner 1965, 4).

A devastating flood visited Northern California in 1956, bringing spectacular disaster to Yuba City on the Feather River. The event convinced state authorities of the pressing need for Feather River flood control. Construction began on the Oroville Dam the following year (DWR 1974a, 8). DWR began construction on downriver FRP facilities only after the Burns-Porter bonds met voter approval in 1960 (Schieles 2003). The South Bay Aqueduct was completed quickly between 1960 and 1962. The state began construction of the project-area portions of the Feather River Project, as well as many elements of the wider SWP in the 1960s. DWR began building the Banks Pumping Plant in 1963. The plant’s operation began in 1967, two years before the facility was complete. Skinner Fish Facility opened in 1968, while the Clifton Court Forebay first came into use in 1969. (For a more complete discussion of these resources, please see below.)

Most of the initial phase of SWP construction, including that of the subject resources, came between 1961 and 1972 (JRP 2000, 82). The South Bay Aqueduct was the first component to reach completion, delivering water to Alameda County users in 1962 (JRP 2000, 82; DWR 2001). In 1968, the California Aqueduct began serving irrigators in the San Joaquin Valley. The 1971 opening of A.D. Edmonston Pumping Plant north of Los Angeles allowed for the 444-mile aqueduct’s first deliveries south of the Tehachapi Mountains by 1972 (DWR 2013; JRP 2000, 82-83). In all, SWP operates 34 reservoirs, 20 pumping stations, 5 hydro-electric plants, and a 700-mile-long network of canals (Ambacher 2011, 5). Agreements with CVP have instituted a degree of integration between the two major water distribution systems (JRP 2000, 83). By 2011, SWP reached 25 million users and irrigated about 7,500,000 acres of crop land (Ambacher 2011, 5).

Harvey O. Banks Delta Pumping Plant
Completed in 1969, the Harvey O. Banks Delta Pumping Plant (Banks Pumping Plant) sits approximately 4.5 miles south of Byron at the head of the California Aqueduct. The DWR facility draws water from the Sacramento-San Joaquin Delta, by way of Clifton Court Forebay, lifting it via pipeline 244 feet up the Mount Diablo Foothills into the California Aqueduct. Water discharged from the Banks Pumping Plant is mostly destined for use in the southern San Joaquin Valley and Southern California, although a portion of it is distributed to Alameda and Santa Clara counties through the South Bay Aqueduct.

Construction on the Banks Pumping Plant, its intake channel, and the associated John E. Skinner Delta Fish Protective Facility (Skinner Fish Facility) began in 1963. By 1966, the pumping facility and four associated buildings were nearly complete and the plant’s intake channel was largely excavated. The facility was SWP’s first major pumping plant. DWR used its “architectural motif” as the model for several subsequent SWP pumping plants (DWR 1974c, 194) Banks Pumping Plant began pumping water in 1967, two years before DWR completed Clifton Court Forebay (Lodi Sentinel-News). In its first years of operation, the pumping facility drew water through its 3-mile-long intake channel from a direct connection to Italian Slough. Seven massive centrifugal pumps with a collective maximum capacity of 4.1 billion gallons per day drew water from the slough. The 1969 completion of CCF allowed for a better-managed intake of water (Werner 1965, 2; DWR 1974b, 201). By storing water collected from the Old River in the forebay, DWR could effectively manage water flows to and from the pumps and limit pumping to the off-peak electrical hours between 10:00 PM and 8:00 AM, saving on the plant’s operating costs (Werner 1965, 2).

DWR expanded the Banks Pumping Plant in 1991, adding four pumps and increasing the plant’s capacity to 6.7 billion gallons per day (DWR 1988). The original incarnation of the plant included space within the facility for the addition of new pumps. The agency expanded the pump building at its northwest end sometime between 1987 and 1993 (DRW 1988; Historicaerials.com). Subsequent expansion efforts bought the current number of total pumps at the facility to 11 (DWR 1996). Banks Pumping Plant’s current capacity is approximately 6.9 billion gallons per day (U.S. Bureau of Reclamation 2011, 23-5).

The Banks Pumping Plant appears to be a contributor to the study-area subsection of the Delta Field Division of the California State Water Project, which appears eligible at the state level of significance under NRHP Criteria A and C, and
B10: Significance (Continued):

In addition, available sources do not suggest that the Skinner Fish Facility is individually significant as an engineering complex on the channel, the construction of buildings and structures at the site was limited to the west side of the channel until the late 1980s or early 1990s. Expansion on the eastern side of complex continued until about 2008 and included the addition of 12 buildings and additional equipment (NETR Online 1987, 1993; Google Earth 1993, 2002, 2004, 2006, 2008).

The Skinner Fish Facility appears to be a contributor to the study-area subsection of the Delta Field Division of the California State Water Project, which appears eligible at the state level of significance under NRHP Criteria A and C, and CRHR Criteria 1 and 3. It also appears eligible as a contributor to a potential California State Water Project Historic District. Although the fish facility has incurred several alterations since DWR completed it in the late 1960s, it retains sufficient integrity to convey its historical identity as a fish protection complex. Buildings and structures built subsequent to the original facility are not considered contributors at this time. The original facility, as a component of the Delta Field Division, appears to meet Criterion A/1 because of its association with the SWP’s primary role of storing Northern California water and distributing it to urban and rural agricultural areas of need elsewhere in the state, which allowed the region to sustain the marked population growth and economic development during the early postwar period. The facility also appears to meet Criterion C/3 because of its engineering value as an important component of an expansive, multi-purpose water conveyance system, which was designed to exacting standards to achieve a coordinated flow of water. It also appears eligible because of the important role it has played as a critical component of the SWP, which is significant for its scale and complexity as a water conveyance system and its impact on increasing California’s population and expanding its economy.

John E. Skinner Delta Fish Protective Facility

Situated on relatively high land on the former Clifton Court Tract, the Skinner Fish Facility site was in agricultural production as early as the turn of the twentieth century and remained in use as farmland until at least 1959 (NETR Online). In 1968 DWR opened Skinner Fish Facility southwest of the CCF on the Banks Pumping Plant intake channel. A product of the Davis-Dolwig Act’s requirement that SWP facilities planning take into account “the enhancement of fish and wildlife,” the plant initially was jointly operated by DWR and the Department of Fish and Game (Legislative Analyst’s Office 2009; Bay-Delta Fishery 1981, 1). By DWR’s account, the Skinner Fish Facility diverts 15 million fish per year from the Banks Pumping Plant downstream. The facility serves a secondary role as a data collection operation. DWR technicians count and measure fish from dozens of species in twice-daily sample collections (DWR 2011).

Construction began on the intake channel by 1963, and the fish protection mechanism and the first buildings associated with the resource appeared between then and the facility’s 1968 opening (DWR, 1974c,195; NETR Online). DWR added a new secondary fish diversion louver and a new collection tank in 1980 (Bay-Delta Fishery 1981, 1). Other than the mechanism on the channel, the construction of buildings and structures at the site was limited to the west side of the channel until the late 1980s or early 1990s. Expansion on the eastern side of complex continued until about 2008 and included the addition of 12 buildings and additional equipment (NETR Online 1987, 1993; Google Earth 1993, 2002, 2004, 2006, 2008).

The Skinner Fish Facility appears to be a contributor to the study-area subsection of the Delta Field Division of the California State Water Project, which appears eligible at the state level of significance under NRHP Criteria A and C, and CRHR Criteria 1 and 3. It also appears eligible as a contributor to a potential California State Water Project Historic District. Although the fish facility has incurred several alterations since DWR completed it in the late 1960s, it retains sufficient integrity to convey its historical identity as a fish protection complex. Buildings and structures built subsequent to the original facility are not considered contributors at this time. The original facility, as a component of the Delta Field Division, appears to meet Criterion A/1 because of its association with the SWP’s primary role of storing Northern California water and distributing it to urban and rural agricultural areas of need elsewhere in the state, which allowed the region to sustain the marked population growth and economic development during the early postwar period. The facility also appears to meet Criterion C/3 because of its engineering value as an important component of an expansive, multi-purpose water conveyance system, which was designed to exacting standards to achieve a coordinated flow of water. The facility does not appear to be eligible in its own right under Criterion C/3, however. Preceded by 17 years by the nearby and similarly-designed Tracy Fish Collection Facility, the Skinner Fish Facility is not novel within the Delta region. In addition, available sources do not suggest that the Skinner Fish Facility is individually significant as an engineering structure. However, the Skinner Fish Facility is a critical component of the SWP, which is significant for its scale and complexity as a water conveyance system and its impact on increasing California’s population and expanding its economy.

Clifton Court Forebay

DWR created the CCF as part of the SWP in 1969 by inundating the agricultural fields of what had been the Clifton Court Tract. Owing to its relatively soft organic soils, the mostly marshy Clifton Court Tract was reclaimed relatively late in the process of California Delta reclamation. In the late nineteenth century the introduction of powerful mechanical dredging equipment allowed southern and western Delta landowners to construct levees and subsequently drain water from their
marshy land holdings. Settlers erected levees on the tract by 1901 (San Francisco Call 25 Feb 1901), and the land was in agricultural production by 1906 (San Francisco Call 18 Jan 1907). In 1916 there was at least one cattle ranch on the tract, operated by Martin Lund (Pacific Rural Press 1916, 336). Aerial photographs of the tract suggest that the land remained divided into crop fields as late as 1966 (NETR Online 1966), when the primary crop there was asparagus (Bauer 1965, 1).

Two levees protect the CCF from uncontrolled inundation. On the north, northwest, and east, turn-on-the-twentieth-century levees hold back the waters of the Italian Slough, Old River, and West Canal. United States Geological Survey Maps indicate that this barrier was in place by 1914, though it likely dated to the tract’s earliest reclamation (NETR Online). Around 1969, construction crews began work on the forebay, erecting a new levee on the south and southwest end that roughly paralleled the existing levees on the north, northwest, and the east. In 1969, after completing the intake system, crews intentionally breached the original West Canal levee, allowing Delta waters to fill the tract (DWR 1974c, 213). Although engineers intended the CCF to regulate flows from the SWP’s planned Peripheral Canal, DWR completed the canal before the final approval of the canal. Planners believed that the CCF’s premature completion in 1969 would allow the department to save on construction costs and eliminate the need to enlarge the Italian Slough for the Banks Pumping Plant intake (Werner 1965, 4-5).

While state water resource engineers conceived the forebay primarily as part of the SWP water conveyance system, the reservoir served a secondary function as a recreation facility. To fulfill the recreational use mandate of the Davis-Dolwig Act, the State Division of Parks and Beaches (DPB) proposed facilities at the CCF to accommodate fishing and other recreational activities. In 1966 DPB issued a report outlining the forebay’s potential extensive recreational use, with “water-associated recreation as its central theme” (Bauer 1966, 25). More expansive than the CCF’s current recreational function, the 1966 conception of the facility included a variety of options ranging from “beaches, boat ramps, picnic and camp areas to recreational innovations, such as mechanical water-ski tows, a giant slide and fishing villages” (Bauer 1966, 25). DPB believed that such a facility would have drawn urban users from the East Bay, Sacramento, Stockton, Fairfield, and Davis areas (Bauer 1966, 25). Current recreation uses are modest compared to early plans for the forebay and are limited mostly to fishing from the banks and bicycling or hiking along the levee-top service roadway.

The CCF appears to be a contributor to the study-area subsection of the Delta Field Division of the California State Water Project, which appears to be eligible at the state level of significance under NRHP Criteria A and C, and CRHR Criteria 1 and 3. It also appears eligible as a contributing element to a potential California State Water Project Historic District. The facility, as a component of the Delta Field Division of the SWP, appears to meet Criterion A/1 because of its association with the SWP and its role of storing Northern California water and distributing it to urban and rural agricultural areas of need elsewhere in the state, which allowed the region to sustain the marked population growth and economic development during the early postwar period. The facility also appears to meet Criterion C/3 because of its engineering value as an important component of an expansive, multi-purpose water conveyance system, which was designed to exacting standards to achieve a coordinated flow of water. It is a critical component of the SWP, which is significant for its scale and complexity as a water conveyance system and its impact on increasing California’s population and expanding its economy.

Although the portion of the Delta Field Division within the Bay-Delta Conservation Plan Project Area of Potential Effect is currently less than 50 years of age, most of it was initially constructed prior to 1969, falling within the period for which built resources are considered for historic significance for the purposes of the Bay Delta Conservation Plan Project. In conclusion, the components of the Delta Field Division presently under evaluation—the Clifton Court Forebay, the John E. Skinner Delta Fish Protective Facility, and the Harvey O. Banks Delta Pumping Plant—appear to be eligible at the state level of significance for listing in the National Register of Historic Places and the California Register of Historical Resources under NRHP Criteria A and C, and CRHR Criteria 1 and 3. These three components of the Delta Field Division also appear to be contributing elements to a potential California State Water Project Historic District. None of these components of the Delta Field Division appear to be significant under NRHP Criterion B or CRHR Criterion 2. Although former California Governor Edmund Brown was a well-known proponent of the SWP, he was only one of many individuals who worked to complete the project. Ultimately, his efforts, as well as those of other individuals with an association with the SWP, lack the level of singular importance and direct association necessary for listing in the NRHP under Criterion B and the CRHR under Criterion 2. The Delta Field Division facilities addressed in this evaluation also do...
B10: Significance (Continued):

not appear to be significant under NRHP Criterion D or CRHR Criterion 4 as a source or likely source of important historical information, nor do they appear likely to yield important information about historic construction methods, materials, or technologies. Additionally, these Delta Field Division facilities were evaluated in accordance with Section 15064.5(a) (2)-(3) of the California Environmental Quality Act (CEQA) Guidelines using the criteria outlined in Section 5024.1 of the California Resources Code, and they do not appear to be historical resources for the purposes of CEQA.

*References (continued):

Ambacher, Patricia

Bauer, Otton F.

Bay-Delta Fishery Project

California Department of Water Resources (DWR)


1988 “Harvey O. Banks Delta Pumping Plant.” Sacramento.

1996 “Harvey O. Banks Delta Pumping Plant.” Sacramento.


Chall, Malca

Hayes, Daryl
n.d “SWP and CVP Fish Protective Facilities.” California Bay-Delta Authority.

JRP Historical Consulting Services and California Department of Transportation (JRP)

Legislative Analyst’s Office
*B12. References (continued):

_Lodi Sentinel-News_

_NETR Online_

_Pacific Rural Press_

_Rice, Richard B., William A. Bullough, Richard J. Orsi, and Mary Ann Irwin_

_San Francisco Call_
1901 “Hundreds of Acres are Under Water.” Vol. 87 No. 87, February 25, 1901.


_Schiesl, Martin_

_Werner, Carl A._
Figures:

Figure 1. Aerial view of John E. Skinner Delta Fish Protective Facility. Source: Google Earth Pro, 2013.

Figure 2. Skinner Fish Facility protective mechanism schematic. Source: Daryl Hayes.
Figure 3. Aerial view of Harvey O. Banks Delta Pumping Plant. Source: Google Earth Pro, 2013.

*P5a. Photographs (continued):

Photograph 2. Representative mechanical pump at Clifton Court Forebay. View to northwest.

Photograph 3. Drainage ditch, retaining pool, ad pump outside Clifton Court Forebay. View to northeast.

Photograph 4. Representative boat ramp at Clifton Court Forebay. View to north.

Photograph 4. Outside view of Clifton Court Forebay intake gate. View to west.

Photograph 7. Overview of public access peninsula and discharge channel on west side of Clifton Court Forebay. View to south.

Photograph 8. Overview of Skinner Fish Facility. View to north.

Photograph 9. Overview of fish protection mechanism. View to north.


Photograph 15. Skinner Facility buildings with Building 12 at the far right.

Photograph 16. Banks Plant intake channel. View to west.


Resource Name or #: MPTO_002_001
see also P-01-011649 CA-ALA-000683H

L1. Historic and/or Common Name: Clifton Court Forebay Levees

L2a. Portion Described:
   - Entire Resource
   - Segment
   - Point Observation

Designation:

b. Location of point or segment:
   (Provide UTM coordinates, legal description, and any other useful locational data. Show the area that has been field inspected on a Location Map) North, east, west levees, between forebay intake gate and discharge channel.

L3. Description:
   (Describe construction details, materials, and artifacts found at this segment/point. Provide plans/sections as appropriate.)
   See section P3a.

L4. Dimensions:
   (In feet for historic features and meters for prehistoric features)
   a. Top Width: 20 feet
   b. Bottom Width: 145 feet
   c. Height or Depth: 30 feet
   d. Length of Segment: 5.5 miles

L5. Associated Resources:
   Clifton Court Forebay, intake gate

L6. Setting:
   (Describe natural features, landscape characteristics, slope, etc., as appropriate.)
   The resource is in the rural, agricultural western Delta region, with Delta waterways to the north and east and agricultural land and a DWR fish protection to the south and west.

L7. Integrity Considerations:
   There are no significant alterations.

L8a. Photograph, Map or Drawing

L8b. Description of Photo, Map, or Drawing
   (View, scale, etc.)
   Clifton Court Forebay levee, view to north from near public parking area. Taken July 29, 2013.

L9. Remarks:

L10. Form Prepared by:
   James Williams and Monte Kim,
   ICF International, 630 K Street, Suite 400
   Sacramento, CA 95814

L11. Date: August 2, 2013

DPR 523E (1/95)
Resource Name or #: MPTO_002_001

L1. Historic and/or Common Name: Harvey O. Banks Delta Pumping Plant Intake Channel

L2a. Portion Described: □ Entire Resource □ Segment □ Point Observation
Designation:

b. Location of point or segment: (Provide UTM coordinates, legal description, and any other useful locational data. Show the area that has been field inspected on a Location Map) Observed from Byron Highway crossing.

L3. Description: (Describe construction details, materials, and artifacts found at this segment/point. Provide plans/sections as appropriate.)
See section P3a.

L4. Dimensions: (In feet for historic features and meters for prehistoric features)
a. Top Width: 300 feet
b. Bottom Width: Not available
c. Height or Depth: Not available
d. Length of Segment: 2.5 miles

L5. Associated Resources:
Harvey O. Banks Delta Pumping Plant, John E. Skinner Delta Fish Protective Facility, Clifton Court Forebay

L6. Setting: (Describe natural features, landscape characteristics, slope, etc., as appropriate.)
The channel begins near Clifton Court Forebay in rural Contra Costa County, flowing southwest toward the Diablo Foothills. Its southern portion passes through an artificial ravine excavated from the foothills.

L7. Integrity Considerations:
There are no apparent significant alterations.

L8a. Photograph, Map or Drawing

L8b. Description of Photo, Map, or Drawing
(View, scale, etc.)
Intake channel, view to southwest. Taken from just east of the Byron Highway on July 29, 2013.

L9. Remarks:

L10. Form Prepared by:
James Williams and Monte Kim
ICF International, 630 K Street, Suite 400
Sacramento, CA 95814

L11. Date: August 2, 2013
Appendix B
Interested Party Correspondence
Dear Alameda Architectural Preservation Society,

I am reaching out today on behalf of Dudek and the California Department of Water Resources (DWR) to provide you with some information about the Delta Dams Rodent Burrow Remediation Project at Clifton Court Forebay, in Contra Costa County and Alameda County and the Dyer and Patterson Reservoirs in Alameda County. As part of the cultural resources study for the proposed project, Dudek is consulting all regional historical organizations to determine if there are any known historic or cultural resources that may be within the proposed project areas. Please see the attached letters and maps for more information about the nature and location of the project, and please feel free to contact me should you have questions or information regarding cultural or historical resources in this area.

Kate G. Kaiser, MSHP
Architectural Historian
DUDEK
O: 626.204.9815  C: 760.814.4664
www.dudek.com
May 12, 2021

Alameda Architectural Preservation Society
P.O. Box 1677
Alameda, CA 94501
aaps@alameda-preservation.org

Subject: Delta Dams Rodent Burrow Remediation Project at Clifton Court Forebay

To the Alameda Architectural Preservation Society:

Dudek has been retained by the Department of Water Resources (DWR) to complete a cultural resources inventory evaluation and finding of effect report for the Delta Dams Rodent Burrow Remediation Project at Clifton Court Forebay (Proposed Project). Clifton Court Forebay is located at the southwestern edge of the Sacramento–San Joaquin River Delta, approximately 10 miles northwest of the City of Tracy and adjacent to Byron Road. The Proposed Project is located along the 8-mile dam embankment (see Figure 1, enclosed).

Clifton Court Forebay has been subject to ongoing rodent burrowing throughout its service life. Rodent burrows are a recognized hazard to dams and levees as they can be associated with potential failure modes for dams by promoting piping and internal erosion that can ultimately lead to dam failure. The Project proposes rodent burrow repairs and restoration measures, as well as permanent measures to prevent future burrowing. DWR also proposes to repair shallow ruts and near-surface deformations by filling these areas with native soil and compacting it.

As part of our study, we are consulting all regional historical organizations to determine if there are any known historic or cultural resources that may be affected by the Proposed Project. Your efforts in this process will provide invaluable information for the proper identification and treatment of such resources.

If you have any questions or comments regarding cultural resources in the proposed project area, please direct your response to:

Dudek
Attn: Kate Kaiser
Phone: 626-204-9815
Email: kkaiser@dudek.com

All comments, emails, or letters received will be included in the reports generated by this study. Thank you very much for your time regarding our request.

Sincerely,

____________________________
Kate Kaiser, MSHP
Architectural Historian

Enclosures: Figure 1. Clifton Court Forebay Project Location
FIGURE 1

Project Location - Clifton Court Forebay
Delta Dams Rodent Burrow Remediation Project
May 12, 2021

Alameda Architectural Preservation Society
P.O. Box 1677
Alameda, CA 94501
aaps@alameda-preservation.org

Subject: Delta Dams Rodent Burrow Remediation Project at Dyer Reservoir and Dam and Patterson Reservoir and Dam

To the Alameda Architectural Preservation Society:

Dudek has been retained by the Department of Water Resources (DWR) to complete a cultural resources inventory evaluation and finding of effect report for the Delta Dams Rodent Burrow Remediation Project at Dyer Reservoir and Patterson Reservoir (Proposed Project). Dyer Reservoir is located in the Altamont Hills, approximately 7 miles northeast of the City of Livermore in Alameda County; and Patterson Reservoir is approximately 1 mile east of the City of Livermore (see Map Figures 1 and 2, enclosed).

Both the Dyer Dam (2012) and Patterson Dam (1962) embankments have been subject to ongoing rodent burrowing throughout their service life. Rodent burrows are a recognized hazard to dams and levees as they can be associated with potential failure modes for dams by promoting piping and internal erosion that can ultimately lead to dam failure. The Project proposes rodent burrow repairs and restoration measures, as well as permanent measures to prevent future burrowing. DWR also proposes to repair shallow ruts and near-surface deformations by filling these areas with native soil and compacting it.

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Dudek
Attn: Kate Kaiser
Phone: 626-204-9815
Email: kkaiser@dudek.com

All comments, emails, or letters received will be included in the reports generated by this study. Thank you very much for your time regarding our request.

Sincerely,

Kate Kaiser, MSHP
Architectural Historian

Enclosures: Figure 1. Dyer Dam Project Location and Figure 2. Patterson Dam Project Location
Hello Alameda County Historical Society,

I am reaching out today on behalf of Dudek and the California Department of Water Resources (DWR) to provide you with some information about the Delta Dams Rodent Burrow Remediation Project at Clifton Court Forebay, in Contra Costa County and Alameda County and the Dyer and Patterson Reservoirs in Alameda County. As part of the cultural resources study for the proposed project, Dudek is consulting all regional historical organizations to determine if there are any known historic or cultural resources that may be within the proposed project areas. Please see the attached letters and maps for more information about the nature and location of the project, and please feel free to contact me should you have questions or information regarding cultural or historical resources in this area.

Kate G. Kaiser, MSHP
Architectural Historian

DUDEK
O: 626.204.9815  C: 760.814.4664
www.dudek.com
May 12, 2021

Alameda County Historical Society
P.O. Box 13145
Oakland, CA 94661
info@AlamedaCountyHistory.org

Subject: Delta Dams Rodent Burrow Remediation Project at Clifton Court Forebay

To the Alameda County Historical Society:

Dudek has been retained by the Department of Water Resources (DWR) to complete a cultural resources inventory evaluation and finding of effect report for the Delta Dams Rodent Burrow Remediation Project at Clifton Court Forebay (Proposed Project). Clifton Court Forebay is located at the southwestern edge of the Sacramento–San Joaquin River Delta, approximately 10 miles northwest of the City of Tracy and adjacent to Byron Road. The Proposed Project is located along the 8-mile dam embankment (see Figure 1, enclosed).

Clifton Court Forebay has been subject to ongoing rodent burrowing throughout its service life. Rodent burrows are a recognized hazard to dams and levees as they can be associated with potential failure modes for dams by promoting piping and internal erosion that can ultimately lead to dam failure. The Project proposes rodent burrow repairs and restoration measures, as well as permanent measures to prevent future burrowing. DWR also proposes to repair shallow ruts and near-surface deformations by filling these areas with native soil and compacting it.

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If you have any questions or comments regarding cultural resources in the proposed project area, please direct your response to:

Dudek
Attn: Kate Kaiser
Phone: 626-204-9815
Email: kkaiser@dudek.com

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Sincerely,

Kate Kaiser, MSHP
Architectural Historian

Enclosures: Figure 1. Clifton Court Forebay Project Location
May 12, 2021

Alameda County Historical Society
P.O. Box 13145
Oakland, CA 94661
info@AlamedaCountyHistory.org

Subject: Delta Dams Rodent Burrow Remediation Project at Dyer Reservoir and Dam and Patterson Reservoir and Dam

To the Alameda County Historical Society:

Dudek has been retained by the Department of Water Resources (DWR) to complete a cultural resources inventory evaluation and finding of effect report for the Delta Dams Rodent Burrow Remediation Project at Dyer Reservoir and Patterson Reservoir (Proposed Project). Dyer Reservoir is located in the Altamont Hills, approximately 7 miles northeast of the City of Livermore in Alameda County; and Patterson Reservoir is approximately 1 mile east of the City of Livermore (see Map Figures 1 and 2, enclosed).

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Dudek
Attn: Kate Kaiser
Phone: 626-204-9815
Email: kkaiser@dudek.com

All comments, emails, or letters received will be included in the reports generated by this study. Thank you very much for your time regarding our request.

Sincerely,

Kate Kaiser, MSHP
Architectural Historian

Enclosures: Figure 1. Dyer Dam Project Location and Figure 2. Patterson Dam Project Location
Project Location - Dyer Reservoir

Delta Dams Rodent Burrow Remediation Project

BASEMAP SOURCE: DWR 12/28/2020; USGS 7.5-Minute Series Byron Hot Springs Quadrangle

FIGURE 1

Project Location - Dyer Reservoir
Delta Dams Rodent Burrow Remediation Project
FIGURE 2
Project Location - Patterson Reservoir
Delta Dams Rodent Burrow Remediation Project

BASEMAP SOURCE: DWR 12/11/2020, USGS 7.5-Minute Series Altamont Quadrangle
Dear Contra Costa Historical Society Staff,

I am reaching out today on behalf of Dudek and the California Department of Water Resources (DWR) to provide you with some information about the Delta Dams Rodent Burrow Remediation Project at Clifton Court Forebay, in Contra Costa County. As part of the cultural resources study for the proposed project, Dudek is consulting all regional historical organizations to determine if there are any known historic or cultural resources that may be within the proposed project area. Please see the attached letter and map for more information about the nature and location of the project, and please feel free to contact me should you have questions or information regarding cultural or historical resources in this area.

Kate G. Kaiser, MSHP
Architectural Historian

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O: 626.204.9815  C: 760.814.4664
www.dudek.com
May 12, 2021

Contra Costa Historical Society
724 Escobar Street
Martinez, CA 94553
info@cocohistory.org

Subject: Delta Dams Rodent Burrow Remediation Project at Clifton Court Forebay

To the Contra Costa Historical Society staff:

Dudek has been retained by the California Department of Water Resources (DWR) to complete a cultural resources inventory evaluation and finding of effect report for the Delta Dams Rodent Burrow Remediation Project at Clifton Court Forebay (Proposed Project). Clifton Court Forebay is located at the southwestern edge of the Sacramento–San Joaquin River Delta, approximately 10 miles northwest of the City of Tracy and adjacent to Byron Road. The Proposed Project is located along the 8-mile dam embankment (see Figure 1, enclosed).

Clifton Court Forebay has been subject to ongoing rodent burrowing throughout its service life. Rodent burrows are a recognized hazard to dams and levees as they can be associated with potential failure modes for dams by promoting piping and internal erosion that can ultimately lead to dam failure. The Project proposes rodent burrow repairs and restoration measures, as well as permanent measures to prevent future burrowing. DWR also proposes to repair shallow ruts and near-surface deformations by filling these areas with native soil and compacting it.

As part of our study, we are consulting all regional historical organizations to determine if there are any known historic or cultural resources that may be affected by the Proposed Project. Your efforts in this process will provide invaluable information for the proper identification and treatment of such resources.

If you have any questions or comments regarding cultural resources in the proposed project area, please direct your response to:

Dudek
Attn: Kate Kaiser
Phone: 626-204-9815
Email: kkaiser@dudek.com

All comments, emails, or letters received will be included in the reports generated by this study. Thank you very much for your time regarding our request.

Sincerely,

Kate Kaiser, MSHP
Architectural Historian

Enclosures: Figure 1. Clifton Court Forebay Project Location
FIGURE 1

Project Location - Clifton Court Forebay
Delta Dams Rodent Burrow Remediation Project
Hi Mr. McCarron,

Thank you for your response to our letter. Apologies if the intent of our outreach letter led you to assume that we wanted your organization to assess potential project impacts and/or conduct research on our behalf. The intent of this correspondence was to just reach out to your organization as a notification about this proposed project, and inquire they if you were aware of any immediate concerns regarding cultural resources in the proposed project area. This type of notification letter is sent as part of the process for conducting cultural resources investigations under Section 106 Historic Preservation Act, specifically 36 CFR Part 800.4 (3) Identification of historic properties.

Thanks for letting us know about the research options available through the historical society.

Best Regards,

Katie

Kathryn Haley, MA
Historic Built Environment Lead
C: 916.539.2202
www.dudek.com
Dear Contra Costa Historical Society Staff,

I am reaching out today on behalf of Dudek and the California Department of Water Resources (DWR) to provide you with some information about the Delta Dams Rodent Burrow Remediation Project at Clifton Court Forebay, in Contra Costa County. As part of the cultural resources study for the proposed project, Dudek is consulting all regional historical organizations to determine if there are any known historic or cultural resources that may be within the proposed project area. Please see the attached letter and map for more information about the nature and location of the project, and please feel free to contact me should you have questions or information regarding cultural or historical resources in this area.

Kate G. Kaiser, MSHP
Architectural Historian

O: 626.204.9815  C: 760.814.4664
www.dudek.com
May 25, 2021

Kate Kaiser
Dudek
1102 R Street
Sacramento, California 95811

Re: Delta Dams Rodent Burrow Remediation Project at Clifton Court Forebay

Dear Ms. Kaiser:

We have received your request for information and comments on the area to be impacted by the subject project. Though there may well be impacts to cultural resources in the area, the Contra Costa Historical Society is not able to say at this time, due to the fact that actual research time is involved in any response to such a request.

I understand that many of the agencies from which such commentary is solicited are public agencies whose mission it is to do such work. The Contra Costa County Historical Society is a private, non-profit organization founded in 1951 for the discovery, preservation, and dissemination of knowledge about the history of Contra Costa County and the State of California. Unfortunately, it does not have the wherewithal to provide such information without compensation for our research time.

That said, the Society’s History Center is certainly a resource open to your own researchers or able to provide research on a fee basis. The Society operates the largest archive of historical documents and artifacts in Contra Costa County, with a primary field of study encompassing the entire geography and history of the County. Our staff and volunteers frequently assist land-use professionals in using our archival materials to prepare environmental assessments of projects within the boundaries of the County.

Our fee structure for such research is as follows:

- For members (annual corporate membership $500.00), there is no charge.
- For non-member professionals conducting research on behalf of your company - $75 per year or $35 per hour
- For research conducted by our staff on your behalf - $50 per hour.

I am sure you will appreciate our situation. In order to gather the information you would like or even verifying that we have no such information, we must expend research time and energy. Please let me know how you would like us to proceed.

Sincerely,

Michael C McCarron
Executive Director

Web site: http://www.cocohistory.com email: info@cocohistory.com
Dear East Contra Costa Historical Society,

I am reaching out today on behalf of Dudek and the California Department of Water Resources (DWR) to provide you with some information about the Delta Dams Rodent Burrow Remediation Project at Clifton Court Forebay, in Contra Costa County. As part of the cultural resources study for the proposed project, Dudek is consulting all regional historical organizations to determine if there are any known historic or cultural resources that may be within the proposed project area. Please see the attached letter and map for more information about the nature and location of the project, and please feel free to contact me should you have questions or information regarding cultural or historical resources in this area.

Kate G. Kaiser, MSHP
Architectural Historian
DUDEK
O: 626.204.9815  C: 760.814.4664
www.dudek.com
May 12, 2021

Ms. Kathy Leighton  
East Contra Costa Historical Society  
3890 Sellers Avenue  
Brentwood, CA 94513  
resourceroom@eastconstracostahistory.org

Subject: Delta Dams Rodent Burrow Remediation Project at Clifton Court Forebay

To Ms. Kathy Leighton:

Dudek has been retained by the Department of Water Resources (DWR) to complete a cultural resources inventory evaluation and finding of effect report for the Delta Dams Rodent Burrow Remediation Project at Clifton Court Forebay (Proposed Project). Clifton Court Forebay is located at the southwestern edge of the Sacramento–San Joaquin River Delta, approximately 10 miles northwest of the City of Tracy and adjacent to Byron Road. The Proposed Project is located along the 8-mile dam embankment (see Figure 1, enclosed).

Clifton Court Forebay has been subject to ongoing rodent burrowing throughout its service life. Rodent burrows are a recognized hazard to dams and levees as they can be associated with potential failure modes for dams by promoting piping and internal erosion that can ultimately lead to dam failure. The Project proposes rodent burrow repairs and restoration measures, as well as permanent measures to prevent future burrowing. DWR also proposes to repair shallow ruts and near-surface deformations by filling these areas with native soil and compacting it.

As part of our study, we are consulting all regional historical organizations to determine if there are any known historic or cultural resources that may be affected by the Proposed Project. Your efforts in this process will provide invaluable information for the proper identification and treatment of such resources.

If you have any questions or comments regarding cultural resources in the proposed project area, please direct your response to:

Dudek  
Attn: Kate Kaiser  
Phone: 626-204-9815  
Email: kkaiser@dudek.com

All comments, emails, or letters received will be included in the reports generated by this study. Thank you very much for your time regarding our request.

Sincerely,

Kate Kaiser, MSHP  
Architectural Historian

Enclosures: Figure 1. Clifton Court Forebay Project Location
FIGURE 1

Project Location - Clifton Court Forebay

Delta Dams Rodent Burrow Remediation Project
Dear Mr. MacLennan,

I am reaching out today on behalf of Dudek and the California Department of Water Resources (DWR) to provide you with some information about the Delta Dams Rodent Burrow Remediation Project at Clifton Court Forebay, in Contra Costa County and Alameda County and the Dyer and Patterson Reservoirs in Alameda County. As part of the cultural resources study for the proposed project, Dudek is consulting all regional historical organizations to determine if there are any known historic or cultural resources that may be within the proposed project areas. Please see the attached letters and maps for more information about the nature and location of the project, and please feel free to contact me should you have questions or information regarding cultural or historical resources in this area.

Kate G. Kaiser, MSHP
Architectural Historian

DUDEK
O: 626.204.9815  C: 760.814.4664
www.dudek.com
May 12, 2021

Mr. Ken MacLennan
Museum on Main
603 Main Street
Pleasanton, CA 94566
curator@museumonmain.org

Subject: Delta Dams Rodent Burrow Remediation Project at Clifton Court Forebay

To Mr. MacLennan:

Dudek has been retained by the Department of Water Resources (DWR) to complete a cultural resources inventory evaluation and finding of effect report for the Delta Dams Rodent Burrow Remediation Project at Clifton Court Forebay (Proposed Project). Clifton Court Forebay is located at the southwestern edge of the Sacramento–San Joaquin River Delta, approximately 10 miles northwest of the City of Tracy and adjacent to Byron Road. The Proposed Project is located along the 8-mile dam embankment (see Figure 1, enclosed).

Clifton Court Forebay has been subject to ongoing rodent burrowing throughout its service life. Rodent burrows are a recognized hazard to dams and levees as they can be associated with potential failure modes for dams by promoting piping and internal erosion that can ultimately lead to dam failure. The Project proposes rodent burrow repairs and restoration measures, as well as permanent measures to prevent future burrowing. DWR also proposes to repair shallow ruts and near-surface deformations by filling these areas with native soil and compacting it.

As part of our study, we are consulting all regional historical organizations to determine if there are any known historic or cultural resources that may be affected by the Proposed Project. Your efforts in this process will provide invaluable information for the proper identification and treatment of such resources.

If you have any questions or comments regarding cultural resources in the proposed project area, please direct your response to:

Dudek
Attn: Kate Kaiser
Phone: 626-204-9815
Email: kkaiser@dudek.com

All comments, emails, or letters received will be included in the reports generated by this study. Thank you very much for your time regarding our request.

Sincerely,

Kate Kaiser, MSHP
Architectural Historian

Enclosures: Figure 1. Clifton Court Forebay Project Location
FIGURE 1
Project Location - Clifton Court Forebay
Delta Dams Rodent Burrow Remediation Project
May 12, 2021

Mr. Ken MacLennan  
Museum on Main  
603 Main Street  
Pleasanton, CA 94566  
curator@museumonmain.org

Subject: Delta Dams Rodent Burrow Remediation Project at Dyer Reservoir and Dam and Patterson Reservoir and Dam

To Mr. MacLennan:

Dudek has been retained by the Department of Water Resources (DWR) to complete a cultural resources inventory evaluation and finding of effect report for the Delta Dams Rodent Burrow Remediation Project at Dyer Reservoir and Patterson Reservoir (Proposed Project). Dyer Reservoir is located in the Altamont Hills, approximately 7 miles northeast of the City of Livermore in Alameda County; and Patterson Reservoir is approximately 1 mile east of the City of Livermore (see Map Figures 1 and 2, enclosed).

Both the Dyer Dam (2012) and Patterson Dam (1962) embankments have been subject to ongoing rodent burrowing throughout their service life. Rodent burrows are a recognized hazard to dams and levees as they can be associated with potential failure modes for dams by promoting piping and internal erosion that can ultimately lead to dam failure. The Project proposes rodent burrow repairs and restoration measures, as well as permanent measures to prevent future burrowing. DWR also proposes to repair shallow ruts and near-surface deformations by filling these areas with native soil and compacting it.

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Sincerely,

Kate Kaiser, MSHP  
Architectural Historian

Enclosures: Figure 1. Dyer Dam Project Location and Figure 2. Patterson Dam Project Location
Dear Museum of the San Ramon Valley Staff,

I am reaching out today on behalf of Dudek and the California Department of Water Resources (DWR) to provide you with some information about the Delta Dams Rodent Burrow Remediation Project at Clifton Court Forebay, in Contra Costa County. As part of the cultural resources study for the proposed project, Dudek is consulting all regional historical organizations to determine if there are any known historic or cultural resources that may be within the proposed project area. Please see the attached letter and map for more information about the nature and location of the project, and please feel free to contact me should you have questions or information regarding cultural or historical resources in this area.

Kate G. Kaiser, MSHP
Architectural Historian

DUDEK
O: 626.204.9815  C: 760.814.4664
www.dudek.com
May 12, 2021

Museum of the San Ramon Valley
P.O. Box 39
Danville, CA 94526
info@museumsrv.org

Subject: Delta Dams Rodent Burrow Remediation Project at Clifton Court Forebay

To the Museum of the San Ramon Valley Staff:

Dudek has been retained by the Department of Water Resources (DWR) to complete a cultural resources inventory evaluation and finding of effect report for the Delta Dams Rodent Burrow Remediation Project at Clifton Court Forebay (Proposed Project). Clifton Court Forebay is located at the southwestern edge of the Sacramento–San Joaquin River Delta, approximately 10 miles northwest of the City of Tracy and adjacent to Byron Road. The Proposed Project is located along the 8-mile dam embankment (see Figure 1, enclosed).

Clifton Court Forebay has been subject to ongoing rodent burrowing throughout its service life. Rodent burrows are a recognized hazard to dams and levees as they can be associated with potential failure modes for dams by promoting piping and internal erosion that can ultimately lead to dam failure. The Project proposes rodent burrow repairs and restoration measures, as well as permanent measures to prevent future burrowing. DWR also proposes to repair shallow ruts and near-surface deformations by filling these areas with native soil and compacting it.

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If you have any questions or comments regarding cultural resources in the proposed project area, please direct your response to:

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Attn: Kate Kaiser
Phone: 626-204-9815
Email: kkaiser@dudek.com

All comments, emails, or letters received will be included in the reports generated by this study. Thank you very much for your time regarding our request.

Sincerely,

____________________________
Kate Kaiser, MSHP
Architectural Historian

Enclosures: Figure 1. Clifton Court Forebay Project Location
Appendix D2

Built Environment Inventory and Evaluation Report
Dyer Reservoir and Dam and Patterson Reservoir and Dam
# Table of Contents

<table>
<thead>
<tr>
<th>SECTION</th>
<th>PAGE NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACRONYMS AND ABBREVIATIONS</td>
<td>V</td>
</tr>
<tr>
<td>1 EXECUTIVE SUMMARY</td>
<td>1</td>
</tr>
<tr>
<td>2 INTRODUCTION</td>
<td>3</td>
</tr>
<tr>
<td>2.1 Project Description and Location</td>
<td>3</td>
</tr>
<tr>
<td>2.1.1 Dyer Reservoir and Dam</td>
<td>3</td>
</tr>
<tr>
<td>2.1.2 Patterson Reservoir and Dam</td>
<td>4</td>
</tr>
<tr>
<td>2.1.3 Access, Staging, and Project Equipment</td>
<td>6</td>
</tr>
<tr>
<td>2.2 Regulatory Setting</td>
<td>7</td>
</tr>
<tr>
<td>2.2.1 Federal</td>
<td>7</td>
</tr>
<tr>
<td>2.2.2 State</td>
<td>9</td>
</tr>
<tr>
<td>2.3 Area of Potential Effect</td>
<td>11</td>
</tr>
<tr>
<td>3 RESEARCH AND FIELD METHODS</td>
<td>13</td>
</tr>
<tr>
<td>3.1 Literature Review</td>
<td>13</td>
</tr>
<tr>
<td>3.1.1 California Historical Resources Information System Record Search</td>
<td>13</td>
</tr>
<tr>
<td>3.2 Other Relevant Studies</td>
<td>20</td>
</tr>
<tr>
<td>3.3 Archival Research</td>
<td>20</td>
</tr>
<tr>
<td>3.4 Field Survey</td>
<td>22</td>
</tr>
<tr>
<td>3.4.1 Methods</td>
<td>22</td>
</tr>
<tr>
<td>3.4.2 Results</td>
<td>22</td>
</tr>
<tr>
<td>3.5 Interested Party Correspondence</td>
<td>23</td>
</tr>
<tr>
<td>4 HISTORIC SETTING</td>
<td>25</td>
</tr>
<tr>
<td>4.1 Regional Historic Overview</td>
<td>25</td>
</tr>
<tr>
<td>4.2 Water Management in California – Development of the State Water Project</td>
<td>26</td>
</tr>
<tr>
<td>4.2.1 Early Water Development</td>
<td>26</td>
</tr>
<tr>
<td>4.2.2 Twentieth Century Water Management Planning</td>
<td>27</td>
</tr>
<tr>
<td>4.2.3 Construction and Implementation of the State Water Project</td>
<td>29</td>
</tr>
<tr>
<td>4.2.4 The State Water Project After 1974: Realization and Expansion</td>
<td>33</td>
</tr>
<tr>
<td>4.3 Historical Development of South Bay Aqueduct and Patterson Reservoir</td>
<td>34</td>
</tr>
<tr>
<td>4.3.1 Planning the South Bay Aqueduct and Related Facilities</td>
<td>34</td>
</tr>
<tr>
<td>4.3.2 Construction of Patterson Reservoir</td>
<td>36</td>
</tr>
<tr>
<td>4.3.3 Finishing the South Bay Aqueduct</td>
<td>38</td>
</tr>
<tr>
<td>4.3.4 South Bay Aqueduct Post-Construction and Expansion: 1969–2021</td>
<td>39</td>
</tr>
<tr>
<td>5 RESULTS OF IDENTIFICATION AND EVALUATION EFFORTS</td>
<td>41</td>
</tr>
<tr>
<td>5.1 South Bay Aqueduct</td>
<td>41</td>
</tr>
</tbody>
</table>
EXHIBITS

A  SWP components and their dates of completion (DWR 1974g, p. 13). .............................................................. 32
B  Major units of state plan for development of water resources in California: Contra Costa Conduit
(DPW 1930, Plate VII). ........................................................................................................................................... 35
C  The South Bay Aqueduct location map (DWR 1974b, p. 40). ............................................................................. 36
D  Patterson Reservoir as-built sheets (DWR 1974b, p. 78). ..................................................................................... 37
E  Dedication ceremony at Patterson Reservoir, South Bay Aqueduct, 1962 (the Bancroft Library,
University of California Berkeley). .......................................................................................................................... 38
F  Dyer Reservoir under construction, 2011 (DWR n.d.) .......................................................................................... 39

FIGURES

1  Project Location – Dyer Reservoir .......................................................................................................................... 63
2  Project Location – Patterson Reservoir .................................................................................................................. 65
3  Proposed Activities at Dyer Dam .......................................................................................................................... 67
4  Proposed Activities at Patterson Dam ................................................................................................................ 69
5  Dyer Reservoir Cultural Resources – Built Environment – Area of Potential Effect ......................................... 71
6  Patterson Reservoir Cultural Resources – Built Environment – Area of Potential Effect ............................. 73

APPENDICES

A  DPR Forms
B  Interested Party Correspondence
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>APE</td>
<td>area of potential effect</td>
</tr>
<tr>
<td>CEQA</td>
<td>California Environmental Quality Act</td>
</tr>
<tr>
<td>CRHR</td>
<td>California Register of Historical Resources</td>
</tr>
<tr>
<td>CVP</td>
<td>Central Valley Project</td>
</tr>
<tr>
<td>Delta</td>
<td>Sacramento–San Joaquin River Delta</td>
</tr>
<tr>
<td>DWR</td>
<td>California Department of Water Resources</td>
</tr>
<tr>
<td>NHPA</td>
<td>National Historic Preservation Act</td>
</tr>
<tr>
<td>NRHP</td>
<td>National Register of Historic Places</td>
</tr>
<tr>
<td>NWIC</td>
<td>Northwest Information Center</td>
</tr>
<tr>
<td>Project</td>
<td>Delta Dams Rodent Burrow Remediation Project</td>
</tr>
<tr>
<td>SWP</td>
<td>California State Water Project</td>
</tr>
</tbody>
</table>
1 Executive Summary

This built environment inventory and evaluation report documents the historical resources inventory efforts conducted by Dudek for the Delta Dams Rodent Burrow Remediation Project (Project) at Dyer Reservoir and Dam and Patterson Reservoir and Dam located east of Livermore, in Alameda County. The Project would involve rodent burrow remediation (burrow collapse, excavation, compaction, and backfilling), erosion prevention measures, ongoing monitoring, and permanent measures to prevent future burrowing where warranted at both Dyer Dam and Patterson Dam, as well as address other issues including erosion control, drainage channel improvements, and vegetation control. The Project’s area of potential effect (APE) falls within Public Lands Survey System Section 17 of Township 2 South, Range 3 East of the Byron Hot Springs U.S. Geological Survey 7.5-minute quadrangle for Dyer Reservoir and Section 6 of Township 3 South, Range 3 East of the Altamont U.S. Geological Survey 7.5-minute quadrangle for Patterson Reservoir. This built environment inventory and evaluation report was conducted in compliance with the California Environmental Quality Act (CEQA) and National Historic Preservation Act Section 106.

A records search of the Project site and surrounding 1 mile was completed by Northwest Information Center staff on December 23, 2020, and Dudek conducted an intensive, pedestrian-level cultural survey of the APE on January 5, 2021. One previously recorded resource, the South Bay Aqueduct (P-01-011603), was identified within the Project APE. The South Bay Aqueduct’s record was from 1994 and updated in 2004; however, the evaluation within the record was out of date and has been updated to reflect the findings in this report. Patterson Reservoir had not been previously recorded or evaluated. Dyer Reservoir is located in the APE, but did not require formal recordation or significance evaluation as it was added to the existing California State Water Project (SWP) system between 2009 and 2012, and is not yet 45 years of age.

Two built environment historical resources required documentation as part of this study: (1) the South Bay Aqueduct (P-01-011603), constructed between 1958 and 1969, and (2) Patterson Reservoir, constructed between 1960 and 1962. The South Bay Aqueduct (P-01-011603) was re-evaluated and is eligible under Criterion A/1 for its connection and role within the larger SWP system and its association with the historical event of the first water delivery in the SWP. The South Bay Aqueduct is also eligible under Criterion C/3 for its role in the testing and application of conveyance system technology for the SWP before it was standardized and implemented elsewhere. The period of significance for the South Bay Aqueduct is its period of construction, 1958–1969. Patterson Reservoir is eligible under Criterion A/1 as a component of the South Bay Aqueduct. Patterson Reservoir shares the period of significance for the South Bay Aqueduct, 1958–1969.

This report includes a summary of the results of the California Historical Resources Information System record search, archival research efforts, historical context development, survey inventory, and previous findings, and provides an analysis and discussion of potential adverse effects. This report concludes that the South Bay Aqueduct and Patterson Reservoir are considered historic properties under Section 106 of the National Historic Preservation Act and historical resources under CEQA. Preparation of a detailed effects assessment concludes that the proposed Project would have a less-than-significant impact on historical resources under CEQA and no adverse effect on historic properties in the APE under Section 106.
2 Introduction

2.1 Project Description and Location

The California Department of Water Resources (DWR) Delta Dams Rodent Burrow Remediation Project (Project) would involve rodent burrow remediation (burrow collapse, excavation, compaction, and backfilling), erosion prevention measures, ongoing monitoring, and permanent measures to prevent future burrowing where warranted. These measures are described in DWR’s proposed Rodent Burrow Maintenance and Monitoring Plan. Initial remediation actions would be taken in 2021 and 2022. Ongoing monitoring would continue in future years, and additional remediation and restoration measures may be warranted.

Dyer Reservoir is located in the Altamont Hills, approximately 7 miles northeast of Livermore in Alameda County; and Patterson Reservoir is approximately 1 mile east of Livermore. Dyer Dam and Patterson Dam are earthen dams that are subject to rodent burrowing that leads to piping and internal erosion. A burrow that intercepts the phreatic surface (water level) within a dam can cause erodible material from the dam embankment to migrate and be carried away. This “piping” action progresses upstream, elongating the pipe, until it reaches the reservoir. Once connection is made to the reservoir, the piping can cause a catastrophic breaching of the dam, ultimately leading to dam failure.

2.1.1 Dyer Reservoir and Dam

Location

Dyer Reservoir is located in the Altamont Hills in Alameda County, approximately 7 miles northeast of Livermore in Alameda County (Figure 1, Project Location – Dyer Reservoir; all map figures are located at the end of this report). It is located in Section 17 of Township 2 South, Range 3 East of the Byron Hot Springs U.S. Geological Survey 7.5-minute quadrangle. Dyer Reservoir is an approximately 525-acre-foot “on-peak” storage facility along the Dyer Canal segment of the South Bay Aqueduct. Dyer Reservoir and Dam can be accessed from Dyer Road via the existing entrance road serving the reservoir facility. Within the larger California State Water Project (SWP) system, Dyer Reservoir receives water from Bethany Reservoir via the South Bay Aqueduct and the Brushy Creek Pipeline and discharges water back to the South Bay Aqueduct via Dyer Canal. The South Bay Aqueduct conveys water to Alameda and Santa Clara Counties. Water from the South Bay Aqueduct flows into Dyer Reservoir via a 78-inch-diameter steel pipe at the northwest corner. This intake is the terminus of the Brushy Creek Pipeline that extends from the South Bay Pumping Plant to Dyer Reservoir. Water from Dyer Reservoir is discharged to the Dyer Canal segment of the South Bay Aqueduct through a reinforced concrete outlet control structure at the southern end of the reservoir and flows by gravity from the reservoir into the South Bay Aqueduct to provide water supply for Bay Area communities. The spillway is located on the southeast end of the reservoir.

Project Description

Dyer Dam is a relatively small dam, and rodent burrowing within its downstream embankment is relatively dense. DWR’s Division of Safety of Dams classifies Dyer Dam as high hazard, indicating that its failure is likely to result in the loss of at least one human life. These factors make Dyer Dam a candidate for excavation, recompaction, and permanent armoring with wire mesh and rock. Burrowing occurs on all sides of Dyer Dam, with the west side categorized as high priority and the north, east, and south sides categorized as medium priority. This includes significant burrowing that has been observed along the east side of the dam in a slope above the crest roadway.
While this area is not within the dam prism, repairs are warranted to remediate burrowing activity that could ultimately result in instability, potential embankment failure, and increased annual maintenance. Remediation is expected to be required on approximately 5.54 acres of the dam.

Where shallow ruts and near-surface deformations occur, these areas would be filled with native soil of similar type to that of the downstream dam embankment slope and this soil would be compacted. Depending on location, size, burrow cluster density, and depths, burrow holes may alternatively be excavated and backfilled. Then native soil, cementitious-soil slurry, low pressure grout, and/or similar embankment material would be used to backfill holes and would be compacted level with the surrounding ground. For zones where heavy construction equipment cannot be used, burrows may be filled by hand and/or lightweight equipment. Permanent armoring with wire mesh and rock would be placed on the dam embankment to deter future rodent burrowing. Equipment for these activities would include lightweight and heavy equipment such as skid-steer, grader, dozer, backhoe, skip-loader, soil compactor, excavator, and water trucks. Some fill material would be needed to offset shrinkage of the excavated and recompacted material. Imported fill materials would be delivered to the site using dump trucks or light-duty trucks.

Surface runoff is collected by a V-shaped ditch and stormwater control feature that runs parallel to the north access road west of Dyer Reservoir. Segments of the existing V-shaped ditch are unlined, while others are concrete lined. These stormwater control features have been subject to ongoing failure that can be attributed to high drainage velocities focused on the unlined segments of the V-shaped ditch design, poor foundation/embankment material, and rodent burrowing along this reach. Approximately 1,300 linear feet of the existing V-shaped ditch and stormwater control features are proposed for improvements that include regrading and concrete lining to improve drainage and reduce erosion. Remediation of the existing embankment slope includes limited excavation, backfilling and compaction, and concrete lining. Minor imported backfill, grouting, or soil-cement slurry may be used to backfill cavities, cracks, or holes. The embankment slope would be restored where it shows signs of instability and where recent internal erosion occurred during the V-shaped ditch and stormwater control feature failures.

Directly south of these ditch and stormwater control features, ongoing erosion is also occurring along a portion of the south side of Entrance Road, which intersects with the South Bay Aqueduct. At this location, erosion along Entrance Road is evident from deep furrows developing within interspersed areas of riprap. Similar to the original stabilization methods, the bank slope along the southern side of Entrance Road will be stabilized using riprap. Fill and riprap material would be delivered using dump trucks or light-duty trucks staged in staging areas or access roads. A combination of soil fill and riprap will be placed in between the existing riprap at this location to repair and stabilize the eroding slope. Additionally, accumulated sediment downstream of the culvert pipes under the road will be excavated and removed to an upland disposal location.

2.1.2 Patterson Reservoir and Dam

Location

Patterson Dam and Reservoir is located about 1 mile east of Livermore, California, on the east side of Livermore Valley (Figure 2, Project Location – Patterson Reservoir). It is located in Section 6 of Township 3 South, Range 3 East of the Altamont U.S. Geological Survey 7.5-minute quadrangle. Patterson Reservoir is a 104-acre-foot off-stream storage facility along the South Bay Aqueduct at the terminus of the Livermore Valley Canal. This reservoir, which was constructed between 1960 and 1962, provides off-line storage for the Alameda County Flood Control and Water Conservation District’s Zone 7 Treatment Plant (Zone 7 Water Treatment Plant). Water enters the reservoir by flowing over a 175-foot-long reinforced concrete ogee-crest weir from the adjoining South Bay Aqueduct. Flow is controlled by regulation of the canal water surface elevation with Check Structure No. 3. Typically,
water is delivered from the reservoir to the Zone 7 Water Treatment Plant through a 42-inch-diameter outlet pipe located at the southern corner of the reservoir. Additionally, water may be delivered through a 30-inch-diameter reinforced concrete bypass pipeline directly from the canal to the treatment plant. The Patterson Dam and Reservoir facility also includes a settling basin located east of the reservoir. Downstream of Patterson Reservoir, the South Bay Aqueduct continues to deliver water to Lake Del Valle and to its terminus at the Santa Clara Terminal Reservoir in San Jose. Patterson Dam has compacted earth embankment on three sides; the fourth side is formed by the adjacent South Bay Aqueduct. The reservoir invert and interior slopes are lined with a 3-inch layer of permeable asphalt concrete. The reservoir can be drained via a 12-inch-diameter reinforced concrete drain line that is controlled with a 12-inch butterfly valve.

**Project Description**

Patterson Dam is a relatively small dam with relatively dense rodent burrowing within its downstream embankment. DWR’s Division of Safety of Dams classifies Patterson Dam as high hazard, indicating that its failure is likely to result in the loss of at least one human life. These factors make Patterson Dam a candidate for excavation, recompaction, and permanent armoring with wire mesh and rock. All areas of Patterson Dam are subject to high-severity burrow damage. Remediation is expected to be required for the downstream dam face and the ascending slope in the east side of the facility, adjacent to the crest road access ramp. The proposed Project would entail filling shallow ruts and near-surface deformations near the ground surface with native soil of similar type to that of the downstream dam embankment slope and compacting the fill material. Depending on location, size, burrow cluster density, and depths, burrow holes may alternatively be excavated and backfilled. Then native soil, cementitious-soil slurry, low pressure grout, and/or similar embankment material would be used to backfill holes and would be compacted level with the surrounding ground. For zones where heavy construction equipment cannot be used, burrows may be filled by hand and/or lightweight equipment. Permanent armoring with wire mesh and rock would be placed on the dam embankment to deter future rodent burrowing. Due to steep downstream slope (1.5:1 to 2:1), other suitable materials may be employed for permanent armoring. The permanent armoring area may include a buffer area, as well as a cut-off trench wall that uses controlled low-strength material beyond the dam toe. Equipment for this activity would include lightweight and heavy equipment such as skid-steer, dozer, backhoe, skip-loader, soil compactor, and excavator. If needed, fill material would be delivered to the site from a stockpile location using dump trucks and/or concrete trucks.

In order to comply with a DWR Division of Safety of Dams recommendation, the proposed Project also includes improvements to the low-level outlet drainage channel. These improvements consist of vegetation removal, minor regrading of channel invert slope, and placement of permanent vegetation and erosion control. Permanent vegetation control (e.g., rock and geofabric) is proposed for approximately 180 linear feet of the trapezoidal channel downstream of the concrete outfall structure. A one-time vegetation clearing and removal is proposed for approximately 500 linear feet of the downstream drainage channel beyond the permanent drainage channel improvements within DWR’s right-of-way. Minor concrete repairs are also proposed for spalled concrete and exposed rebar at the wingwall outfall structure. A permanent maintenance road would be constructed adjacent to the permanently improved drainage channel to provide better access for annual maintenance. The maintenance road would include a vehicle turnaround area and would have a gravel surface.

The proposed Project includes minor modifications and improvements to drainage features in upland areas in the northwest of Patterson Reservoir currently experiencing sheet flow. A damaged 18-inch-diameter corrugated metal pipe culvert crossing near the toe access road and a second 12-inch-diameter corrugated metal pipe culvert crossing near the maintenance building would both be replaced with improved high-density polyethylene culverts. Existing drainage features upstream and downstream of the culverts would be modified to convey water more efficiently.
efficiently to the main western drainage channel. The improvements may include excavating, regrading, and/or lining of the drainage features and culverts.

2.1.3 Access, Staging, and Project Equipment

Dyer Reservoir and Dam

Dyer Dam can be accessed from Dyer Road via the existing entrance road serving the reservoir facility. Access to the entire toe of the dam and the dam facility is provided by an existing gravel road, which provides access to a paved roadway atop the crest of the dam via ramps on the north and south side of the reservoir. Existing gravel access roads and the paved crest road would provide access to the western embankment slope, while the eastern embankment slope would be accessed from the paved crest road and from the upper settling pond maintenance road.

DWR has identified three staging areas for remediation activities at Dyer Reservoir and Dam. The staging areas would be located on both existing improved areas and undisturbed areas and would total approximately 5.11 acres. Staging Area 1 is a rectangular area along the western side of the South Bay Aqueduct; Staging Area 2 is a roughly triangular area south of the southeast corner of the dam; and Staging Area 3 is a roughly triangular area east of the settling pond.

Patterson Reservoir and Dam

Patterson Dam can be accessed from Patterson Pass Road. Approximately 1 mile to the west, Patterson Pass Road intersects with Greenville Road, which then provides access to Interstate 580. Existing paved and gravel access roads within the Patterson Reservoir facility would provide access to most of the construction areas within this site. A temporary construction access area would be constructed north of the proposed staging area and existing settling pond on the east side of the reservoir, and a second temporary construction access area would be provided through the existing maintenance yard.

DWR has identified four staging areas for remediation activities at Patterson Dam and Reservoir, including an area at the existing maintenance yard south of the reservoir, a staging area on currently undisturbed land surrounding the existing settling pond east of the reservoir, and an area east of the temporary construction access area. These staging areas have a combined acreage of approximately 4.63 acres. Access to the staging areas would be from Patterson Pass Road on the existing paved and gravel access roads and from a new temporary construction access area. The paved toe and crest roads may be used to repair the downstream dam embankment slope; however, the crest road is narrow and would only be accessible to smaller vehicles and equipment. As noted previously, if this limitation of the crest road prevents use of heavy construction equipment in certain areas, burrows may be filled by hand and/or lightweight equipment.

Construction Equipment for Dyer and Patterson Dams

The following construction equipment would be used at each of the dams to implement the proposed dam remediation efforts:

- skid-steer
- dozer
- backhoe
- grader
- skip-loader
- soil compactor
- excavator
- scraper
- water truck
- dump trucks
- flatbed trucks
- concrete truck
- mobile grout mixing plant
- concrete pump truck
2.2 Regulatory Setting

This built environment inventory and evaluation report was completed in compliance with State of California and federal cultural resources laws and regulations, including Section 106 of the National Historic Preservation Act (NHPA). Under Section 106, historic and archaeological districts, sites, buildings, structures, and objects are assigned significance based on their exceptional value or quality in illustrating or interpreting history, architecture, archaeology, engineering, and culture. A number of criteria are used in demonstrating resource importance and are described below.

2.2.1 Federal

The NHPA established the National Register of Historic Places (NRHP) and the President’s Advisory Council on Historic Preservation, and provided that states may establish State Historic Preservation Officers to carry out some of the functions of the NHPA. Most significantly for federal agencies responsible for managing cultural resources, Section 106 of the NHPA directs that “[t]he head of any Federal agency having direct or indirect jurisdiction over a proposed Federal or federally assisted undertaking in any State and the head of any Federal department or independent agency having authority to license any undertaking shall, prior to the approval of the expenditure of any Federal funds on the undertaking or prior to the issuance of any license, as the case may be, take into account the effect of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the NRHP.” Section 106 also affords the President’s Advisory Council on Historic Preservation a reasonable opportunity to comment on the undertaking (16 U.S. Code 470[f]).

The content of Title 36 Code of Federal Regulations, Part 800, implements Section 106 of the NHPA. Specifically, it defines the steps necessary to identify historic properties (those cultural resources listed in or eligible for listing in the NRHP), including consultation with federally recognized Native American tribes to identify resources with important cultural values; to determine whether they may be adversely affected by a proposed undertaking; and to outline the process for eliminating, reducing, or mitigating the adverse effects.

The President’s Advisory Council on Historic Preservation provides methodological and conceptual guidance for identifying historic properties. In Title 36 Code of Federal Regulations, Part 800.4, the steps necessary for identifying historic properties are as follows:

- Determine and document the area of potential effect (APE) (36 CFR 800.16[d]).
- Review existing information on historic properties within the APE, including preliminary data.
- Confer with consulting parties to obtain additional information on historic properties or concerns about effects to these.
- Consult with Native American tribes (36 CFR 800.3[f]) to obtain knowledge on resources that are identified with places where they attach cultural or religious significance.
- Perform appropriate fieldwork (including phased identification and evaluation).
- Apply NRHP criteria to determine resource eligibility for NRHP listing.

Fulfilling these steps is generally thought to constitute a reasonable effort to identify historic properties within the APE for an undertaking. The obligations of a federal agency must also assess whether an undertaking will have an adverse effect on cultural resources. An undertaking will have an adverse effect when:
an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property’s location, design, setting, materials, workmanship, feeling, or association. Consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property’s eligibility for the National Register. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative (36 CFR Part 800.5[1]).

The process of determining whether an undertaking may have an adverse effect requires the federal agency to confer with consulting parties to appropriately consider all relevant stakeholder concerns and values. Consultation regarding the treatment of a historic property may result in a Programmatic Agreement and/or Memorandum of Agreement between consulting parties that typically include the lead federal agency, State Historic Preservation Officer, and other applicable parties if they agree to be signatories to these documents. Treatment documents—whether resource-specific or generalized—provide guidance for resolving potential or realized adverse effects to known historic properties or to those that may be discovered during implementation of an undertaking. In all cases, avoidance of adverse effects to historic properties is the preferred treatment measure, and it is generally the burden of the federal agency to demonstrate why avoidance may not be feasible.

National Register of Historic Places

The resources identified within the Project APE were evaluated in consideration of NRHP designation criteria. The NRHP is the United States’ official list of districts, sites, buildings, structures, and objects worthy of preservation. Overseen by the National Park Service, under the U.S. Department of the Interior, the NRHP was authorized under the NHPA, as amended. Its listings encompass all National Historic Landmarks, as well as historic areas administered by the National Park Service.

NRHP guidelines for the evaluation of historic significance were developed to be flexible and to recognize the accomplishments of all who have made significant contributions to the nation’s history and heritage. Its criteria are designed to guide state and local governments, federal agencies, and others in evaluating potential entries in the NRHP. For a property to be listed in or determined eligible for listing, it must be demonstrated to possess integrity and to meet at least one of the following criteria:

The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:

A. That are associated with events that have made a significant contribution to the broad patterns of our history; or
B. That are associated with the lives of persons significant in our past; or
C. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
D. That have yielded, or may be likely to yield, information important in prehistory or history.
Integrity is defined in NRHP guidance, How to Apply the National Register Criteria, as “the ability of a property to convey its significance. To be listed in the NRHP, a property must not only be shown to be significant under the NRHP criteria, but it also must have integrity” (Andrus and Shrimpton 2002). NRHP guidance further asserts that properties be completed at least 50 years ago to be considered for eligibility. Properties completed fewer than 50 years before evaluation must be proven to be “exceptionally important” (criteria consideration) to be considered for listing.

2.2.2 State

California Register of Historical Resources

In California, the term “historical resource” includes but is not limited to “any object, building, structure, site, area, place, record, or manuscript which is historically or archaeologically significant, or is significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California” (California Public Resources Code, Section 5020.1[j]). In 1992, the California legislature established the California Register of Historical Resources (CRHR) “to be used by state and local agencies, private groups, and citizens to identify the state’s historical resources and to indicate what properties are to be protected, to the extent prudent and feasible, from substantial adverse change” (California Public Resources Code Section 5024.1[a]). The criteria for listing resources on the CRHR were expressly developed to be in accordance with previously established criteria developed for listing in the NRHP, enumerated below. According to California Public Resources Code Section 5024.1(c)(1–4), a resource is considered historically significant if it (i) retains “substantial integrity,” and (ii) meets at least one of the following criteria:

1. Is associated with events that have made a significant contribution to the broad patterns of California’s history and cultural heritage.
2. Is associated with the lives of persons important in our past.
3. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values.
4. Has yielded, or may be likely to yield, information important in prehistory or history.

In order to understand the historic importance of a resource, sufficient time must have passed to obtain a scholarly perspective on the events or individuals associated with the resource. A resource less than 50 years old may be considered for listing in the CRHR if it can be demonstrated that sufficient time has passed to understand its historical importance (see 14 CCR 4852[d][2]).

The CRHR protects cultural resources by requiring evaluations of the significance of prehistoric and historic resources. The criteria for the CRHR are nearly identical to those for the NRHP, and properties listed or formally designated as eligible for listing in the NRHP are automatically listed in the CRHR, as are the state landmarks and points of interest. The CRHR also includes properties designated under local ordinances or identified through local historical resource surveys.

California Environmental Quality Act

As described further below, the following California Environmental Quality Act (CEQA) statutes and State of California CEQA Guidelines (CEQA Guidelines) are of relevance to the analysis of archaeological, historic, and tribal cultural resources:
California Public Resources Code Section 21083.2(g) defines “unique archaeological resource.”

California Public Resources Code Section 21084.1 and CEQA Guidelines Section 15064.5(a) define “historical resources.” In addition, CEQA Guidelines Section 15064.5(b) defines the phrase “substantial adverse change in the significance of an historical resource.” It also defines the circumstances when a project would materially impair the significance of an historical resource.

California Public Resources Code Section 21074(a) defines “tribal cultural resources.”

California Public Resources Code Section 5097.98 and CEQA Guidelines Section 15064.5(e) set forth standards and steps to be employed following the accidental discovery of human remains in any location other than a dedicated cemetery.

California Public Resources Code Sections 21083.2(b–c) and CEQA Guidelines Section 15126.4 provide information regarding the mitigation framework for archaeological and historic resources, including examples of preservation-in-place mitigation measures; preservation-in-place is the preferred manner of mitigating impacts to significant archaeological sites because it maintains the relationship between artifacts and the archaeological context and may also help avoid conflict with religious or cultural values of groups associated with the archaeological site(s).

More specifically, under CEQA, a project may have a significant effect on the environment if it may cause “a substantial adverse change in the significance of an historical resource” (California Public Resources Code Section 21084.1; CEQA Guidelines Section 15064.5[b]). If a site is either listed or eligible for listing in the CRHR, or if it is included in a local register of historic resources or identified as significant in a historical resources survey (meeting the requirements of California Public Resources Code, Section 5024.1[q]), it is a historical resource and is presumed to be historically or culturally significant for purposes of CEQA (California Public Resources Code Section 21084.1; CEQA Guidelines Section 15064.5[a]). The lead agency is not precluded from determining that a resource is a historical resource even if it does not fall within this presumption (California Public Resources Code Section 21084.1; CEQA Guidelines Section 15064.5[a]).

A “substantial adverse change in the significance of an historical resource” reflecting a significant effect under CEQA means “physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of an historical resource would be materially impaired” (CEQA Guidelines Section 15064.5[b][1]; California Public Resources Code Section 5020.1[q]). In turn, CEQA Guidelines Section 15064.5(b)(2) states the significance of an historical resource is materially impaired when a project:

1. Demolishes or materially alters in an adverse manner those physical characteristics of an historical resource that convey its historical significance and that justify its inclusion in, or eligibility for, inclusion in the California Register of Historical Resources; or

2. Demolishes or materially alters in an adverse manner those physical characteristics that account for its inclusion in a local register of historical resources pursuant to Section 5020.1(k) of the Public Resources Code or its identification in an historical resources survey meeting the requirements of Section 5024.1(g) of the Public Resources Code, unless the public agency reviewing the effects of the project establishes by a preponderance of evidence that the resource is not historically or culturally significant; or

3. Demolishes or materially alters in an adverse manner those physical characteristics of a historical resource that convey its historical significance and that justify its eligibility for inclusion in the California Register of Historical Resources as determined by a lead agency for purposes of CEQA.
Pursuant to these sections, the CEQA inquiry begins with evaluating whether a project site contains any “historical resources,” then evaluates whether that project will cause a substantial adverse change in the significance of a historical resource such that the resource’s historical significance is materially impaired.

If it can be demonstrated that a project will cause damage to a unique archaeological resource, the lead agency may require reasonable efforts be made to permit any or all of these resources to be preserved in place or left in an undisturbed state. To the extent that they cannot be left undisturbed, mitigation measures are required (California Public Resources Code Section 21083.2[a], [b], and [c]).

California Public Resources Code Section 21083.2(g) defines a unique archaeological resource as an archaeological artifact, object, or site about which it can be clearly demonstrated that without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:

1. Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information.
2. Has a special and particular quality such as being the oldest of its type or the best available example of its type.
3. Is directly associated with a scientifically recognized important prehistoric or historic event or person.

Impacts to non-unique archaeological resources are generally not considered a significant environmental impact (California Public Resources Code Section 21083.2[a]; CEQA Guidelines Section 15064.5[c][4]). However, if a non-unique archaeological resource qualifies as tribal cultural resource (California Public Resources Code Sections 21074[c], 21083.2[h]), further consideration of significant impacts is required. CEQA Guidelines Section 15064.5 assigns special importance to human remains and specifies procedures to be used when Native American remains are discovered.

2.3 Area of Potential Effect

The APE is the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties. Determination of the APE is influenced by a project’s setting, the scale and nature of the undertaking, and the different kinds of effects that may result from the undertaking (36 CFR 800.16[d]).

The built environment APE for a project’s extent includes all legal parcels within or intersected by the extent of the proposed project and construction staging areas. The built environment APE can be larger than a project’s footprint. It is delineated to take into consideration potential direct and indirect effects, such as visual, audible, or atmospheric intrusions to a property, the potential for vibration-induced damage, or isolation of a property from its setting. Visual and audible changes have the potential to adversely affect character-defining features of some built environment properties, in cases where visual context or auditory setting are important characteristics that convey the resource’s historical significance.

The built environment APE for the Project is shown in Figures 5 and 6 for the Dyer Reservoir and Patterson Reservoir, respectively. The APE for this Project follows the maximum possible area of potential impacts resulting from the proposed Project (see Figure 3, Proposed Activities at Dyer Dam, and Figure 4, Proposed Activities at Patterson Dam), including all construction, repairs, easements, and staging areas located in the Project area. Based on the
construction proposed for this Project, the APE encompassed the extent of the two historic era–built environment structures located in the Project area of direct impact—the South Bay Aqueduct and Patterson Reservoir. Dyer Reservoir is located in the APE, but did not require formal recordation or significance evaluation as it was added to the existing SWP system between 2009 and 2012, and as such is not yet 45 years of age. The South Bay Aqueduct and Patterson Reservoir are over the age of 45 and are discussed in detail in this report.
3 Research and Field Methods

3.1 Literature Review

In preparation of the historical context, significance evaluation, integrity discussion, and application of criteria of adverse effect sections of this report, Dudek first conducted extensive archival research on the Project areas, DWR, and the SWP. These research efforts are summarized below.

3.1.1 California Historical Resources Information System Record Search

A records search of the APE, including a 1-mile buffer, was completed by Northwest Information Center (NWIC) staff on December 23, 2020. This records search included their collection of mapped prehistoric, historical, and built-environment resources; California Department of Parks and Recreation Site Records; technical reports; archival resources; and ethnographic references. Additional consulted sources included the NRHP, California Inventory of Historical Resources/CRHR and listed Office of Historic Preservation Archaeological Determinations of Eligibility, California Points of Historical Interest, California Historical Landmarks, and California Department of Transportation Bridge Survey information. Dudek’s record search can be found in the Archaeological Resources Inventory Report for the Delta Dams Rodent Burrow Remediation Project at Dyer Reservoir and Dam and Patterson Reservoir and Dam Alameda County, California, prepared by Dudek for DWR (Giacinto et al., forthcoming).

3.1.1.1 Previously Conducted Cultural Resources Studies

Dyer Reservoir and Dam

NWIC records indicate that 25 previous cultural resources technical investigations have been conducted within a 1-mile radius of the Project site at Dyer Reservoir and Dam. Of these, 8 studies intersect the current Project site at Dyer Reservoir and Dam (Table 1).

Table 1. Dyer Reservoir and Dam – Previously Conducted Technical Studies

<table>
<thead>
<tr>
<th>Report ID</th>
<th>Authors</th>
<th>Year</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-001519</td>
<td>Francis Riddell</td>
<td>1960</td>
<td>Archaeological Reconnaissance of Interim Intake Canal to Forebay Pumping Plant, Bethany Forebay Dam and Reservoir, and South Bay Pumping Plant, Alameda County, California</td>
</tr>
<tr>
<td>S-010458</td>
<td>Miley Paul Holman</td>
<td>1988</td>
<td>Archaeological Field Reconnaissance of Section 17, Oakland Scavengers Property, Altamont Pass, Alameda County, California (letter report)</td>
</tr>
<tr>
<td>S-012800</td>
<td>Allan Bramlette, Mary Praetzellis, Adrian Praetzellis, Margaret Purser, and David A. Fredrickson</td>
<td>1990</td>
<td>Archaeological and Historical Resources Inventory for the Vasco Road and Utility Relocation Project, Contra Costa and Alameda Counties</td>
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</table>
Table 1. Dyer Reservoir and Dam – Previously Conducted Technical Studies

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<tbody>
<tr>
<td>S-029590</td>
<td>Kyle Brown, Adam Marlow, Thomas Young, James Allan, and William Self</td>
<td>2004</td>
<td>Cultural Resource Assessment of the South Bay Aqueduct Improvement and Enlargement Project, Alameda County, California.</td>
</tr>
<tr>
<td>S-029590a</td>
<td>Kyle Brown, Adam Marlow, Thomas Young, James Allan, and William Self</td>
<td>2006</td>
<td>Final Cultural Resource Assessment of the South Bay Aqueduct Improvement and Enlargement Project, Alameda County, California.</td>
</tr>
<tr>
<td>S-029590c</td>
<td>Milford W. Donaldson</td>
<td>2007</td>
<td>Proposed Dyer Dam and Reservoir Geoarchaeological Report, File No. COE 60508A; Regulatory Branch (200400765) Section 106 Consultation (Rnd.03) on the Proposed South Bay Aqueduct Improvement, Alameda County, California</td>
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Previous Technical Studies within 1 Mile of the Project Site at Dyer Reservoir and Dam

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<tr>
<th>Report ID</th>
<th>Authors</th>
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<th>Title</th>
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<tbody>
<tr>
<td>S-000121</td>
<td>David A. Frederickson and Peter M. Banks</td>
<td>1975</td>
<td>An Archaeological Reconnaissance of the Proposed Altamont Landfill Site, Alameda County, California</td>
</tr>
<tr>
<td>S-002625</td>
<td>Miley Paul Holman</td>
<td>1981</td>
<td>An Archaeological Reconnaissance of the proposed U.S. Windpower Inc., windfarm at Altamont Pass, Alameda County, California</td>
</tr>
<tr>
<td>S-005659</td>
<td>Miley Paul Holman</td>
<td>1982</td>
<td>An archaeological field reconnaissance of properties being considered for windfarm development (letter report)</td>
</tr>
<tr>
<td>S-006491</td>
<td>Matthew R. Clark</td>
<td>1983</td>
<td>Archaeological Reconnaissance of the Valhalla Parcel, Alameda County, California.</td>
</tr>
<tr>
<td>S-006702</td>
<td>Miley Paul Holman</td>
<td>1984</td>
<td>Archaeological Reconnaissance of the Egan-Elliot Proposed Windfarm, Alameda County, California (letter report)</td>
</tr>
<tr>
<td>S-006782</td>
<td>Donna M. Garaventa, Rebecca L. Anastasio, Robert M. Harmon, Stuart A. Guedon, and Melody E. Tannam</td>
<td>1984</td>
<td>Cultural Resources Survey Report: Proposed Replacement of the Carrol Overhead Bridge (33 C-06, Post-Mile 1.6) and East Altamont Overhead Bridge (33 C-15, Post-Mile 3.4) Located on Altamont Pass Road, County of Alameda, California</td>
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<tr>
<td>S-006782a</td>
<td>Stuart Guedon and Donna M. Garaventa</td>
<td>1984</td>
<td>An Evaluation of Two Bridges: Carrol Overhead (33C-06) and East Altamont (33C-15), Located on Altamont Pass Road, County of Alameda, California</td>
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<tr>
<td>S-006782b</td>
<td>Stuart A. Guedon</td>
<td>1984</td>
<td>Altamont Pass Road - Carrol Overhead Bridge Replacement Project (letter report)</td>
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<tr>
<td>S-006824</td>
<td>Colin I. Busby, Donna M. Garaventa, Rebecca L. Anastasio, Robert M. Harmon, and Stuart A. Guedon</td>
<td>1984</td>
<td>Cultural Resources Survey Report for Resurfacing and Roadway Improvement of Altamont Pass Road Between Greenville Road and the Sanitary Landfill, County of Alameda, California</td>
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<tr>
<td>S-012137</td>
<td>Jefferson Haney</td>
<td>1990</td>
<td>An Archaeological Study of the Altamont Sanitary Landfill Expansion Project in Sections 15 and 16, Alameda County, California</td>
</tr>
<tr>
<td>S-024011</td>
<td>Randy Wiberg, Alisa Reynolds, and Brett Rushing</td>
<td>2001</td>
<td>Prehistoric Cultural Resources Reconnaissance of Brushy Peak Regional Preserve, Alameda County, California</td>
</tr>
<tr>
<td>S-034316</td>
<td>James M. Allan and Leigh Martin</td>
<td>2007</td>
<td>Archaeological Monitoring Report, Brushy Creek Area, South Bay Aqueduct Improvement and Enlargement Project, Alameda County, California</td>
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<tr>
<td>S-043685</td>
<td>Barb Siskin, Cassidy DeBaker, Thomas Martin, Beatrice Cox, and Jennifer Lang</td>
<td>2010</td>
<td>Cultural Resources Inventory for the San Joaquin Valley Right-of-Way Maintenance Environmental Assessment Project</td>
</tr>
<tr>
<td>S-048591</td>
<td>Gloriella Cardenas and Lindsay Kiel</td>
<td>2016</td>
<td>Cultural Resources Inventory Report for the Summit Wind Repower Project</td>
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</table>

Source: California Historical Resources Information System Record search at NWIC, December 23, 2020.

Patterson Reservoir and Dam

NWIC records indicate that 31 previous cultural resources technical investigations have been conducted within a 1-mile radius of the Project site at Patterson Reservoir and Dam. Of these, 1 study intersects the current Project site at Patterson Reservoir and Dam (Table 2).

Table 2. Patterson Reservoir and Dam – Previously Conducted Technical Studies

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<tr>
<td>S-022989</td>
<td>William Self</td>
<td>2000</td>
<td>Archaeological Assessment of City of Livermore Zone 3 Water System Improvement, Alameda County, California (letter report)</td>
</tr>
<tr>
<td>S-005006</td>
<td>Miley Paul Holman</td>
<td>1982</td>
<td>An archaeological field reconnaissance of property at the corner of Greenville Road and Patterson Pass Road east of Livermore, California (letter report)</td>
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<td>S-015762</td>
<td>Colin I. Busby</td>
<td>1993</td>
<td>Greenville Road Intersection Widening, City of Livermore, Alameda County, California (letter report)</td>
</tr>
<tr>
<td>S-015763</td>
<td>Donna M. Garaventa, Angela M. Banet, and Stuart A. Guedon</td>
<td>1993</td>
<td>Limited Project Study Report, Greenville Road/Union Pacific Railroad Bridge, City of Livermore, Alameda County, California</td>
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<tr>
<td>S-017515</td>
<td>—</td>
<td>1974</td>
<td>Archaeological Reconnaissance: Lawrence Livermore Laboratory, Livermore, California</td>
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<tr>
<td>S-017993</td>
<td>Brian Hatoff, Barb Voss, Sharon Waechter, Stephen Wee, and Vance Bente</td>
<td>1995</td>
<td>Cultural Resources Inventory Report for the Proposed Mojave Northward Expansion Project</td>
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<td>S-017993a</td>
<td>—</td>
<td>1995</td>
<td>Proposed Mojave Northward Expansion Project: Appendix A - Native American Consultation</td>
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<td>S-017993b</td>
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<td>1995</td>
<td>Proposed Mojave Northward Expansion Project: Appendix B - Looping Segments - Class 1</td>
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<td>S-017993c</td>
<td>—</td>
<td>1995</td>
<td>Proposed Mojave Northward Expansion Project: Appendix C - Monitoring and Emergency Discovery Plan</td>
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<td>S-017993d</td>
<td>—</td>
<td>1995</td>
<td>Proposed Mojave Northward Expansion Project: Appendix D - General Construction Information</td>
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<td>S-017993l</td>
<td>—</td>
<td>1995</td>
<td>Proposed Mojave Northward Expansion Project: Appendix L - Photo-documentation</td>
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<td>S-017993m</td>
<td>—</td>
<td>1995</td>
<td>Proposed Mojave Northward Expansion Project: Appendix M - Curricula Vitae of Key Preparers</td>
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<tr>
<td>S-022923</td>
<td>William Self</td>
<td>2000</td>
<td>Archaeological Assessment of City of Livermore Zone 7 Water System Improvement, Alameda County, California (letter report)</td>
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<td>S-022990</td>
<td>William Self and Carrie Wills</td>
<td>2000</td>
<td>Archaeological Assessment of Zone 7 Water Agency, Patterson Pass Water Treatment Plant Ultrafiltration Facility Expansion, Alameda County, California (letter report)</td>
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<td>S-027378</td>
<td>Carolyn Losee</td>
<td>2003</td>
<td>Cultural Resources Analysis for Cingular Wireless Site No. PL-932-21 &quot;Tesla Road&quot; (letter report)</td>
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<td>S-027640</td>
<td>William Self</td>
<td>2003</td>
<td>Archaeological Survey and Assessment Report, Livermore Valley Canal Bridge Improvement Project, Alameda County, California (letter report)</td>
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<td>S-032985</td>
<td>Colin I. Busby</td>
<td>2004</td>
<td>Cultural Resources Assessment (Archaeology), Greenville Road Property, North of Patterson Pass Road, Livermore Vicinity, Alameda County, California (letter report)</td>
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<td>S-039956</td>
<td>David Brunzell</td>
<td>2011</td>
<td>Cultural Resources Assessment of E &amp; B Natural Resources Management Corporation Lupin 4R Oil and Gas Exploration Project, Alameda County, California (BCR Consulting Project Number SYN1119). (Letter Report)</td>
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<td>S-042519</td>
<td>Ling He</td>
<td>2010</td>
<td>Field Office Report of Cultural Resources Ground Survey Findings, 10366 Flynn Road, South Livermore, California</td>
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<td>Cultural Resources Inventory for the San Joaquin Valley Right-of-Way Maintenance Environmental Assessment Project</td>
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<td>S-051231</td>
<td>—</td>
<td>2018</td>
<td>Cultural Resources Technical Memorandum, Cultural Resources Study - DGN Ranch Project, Alameda County, California (letter report)</td>
</tr>
</tbody>
</table>

Source: California Historical Resources Information System Record search at NWIC, December 23, 2020.

### 3.1.1.2 Previously Recorded Cultural Resources

#### Dyer Reservoir and Dam

The NWIC records search identified no previously recorded cultural resources within the Project site at Dyer Reservoir and Dam or surrounding vicinity. There are 20 cultural resources within a 1-mile radius of the Project site at Dyer Reservoir and Dam (Table 3).

#### Patterson Reservoir and Dam

The NWIC records search identified no previously recorded cultural resources within the Project site at Patterson Reservoir and Dam. There are 6 cultural resources within a 1-mile radius of the Project site at Patterson Reservoir and Dam (Table 4).
Table 3. Dyer Reservoir and Dam – Previously Recorded Resources

<table>
<thead>
<tr>
<th>Primary ID</th>
<th>Trinomial</th>
<th>Name</th>
<th>Type</th>
<th>Age</th>
<th>Attributes</th>
<th>CHRS Code</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><strong>Previously Recorded Resources Intersecting the Project Site at Dyer Reservoir and Dam</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>None</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Previously Recorded Resources within 1 Mile of the Project Site at Dyer Reservoir and Dam</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P-01-000050</td>
<td>CA-ALA-000030</td>
<td>Altamont 1</td>
<td>Site</td>
<td>Prehistoric</td>
<td>Bedrock milling feature; rock shelter; habitation debris</td>
<td>Not assigned</td>
</tr>
<tr>
<td>P-01-000051</td>
<td>CA-ALA-000031</td>
<td>Altamont 2, Murietta Caves</td>
<td>Site</td>
<td>Prehistoric</td>
<td>Bedrock milling feature; rock shelter; habitation debris</td>
<td>Not assigned</td>
</tr>
<tr>
<td>P-01-000052</td>
<td>CA-ALA-000032</td>
<td>Altamont 3, Murietta Caves</td>
<td>Site</td>
<td>Prehistoric</td>
<td>Bedrock milling feature; rock shelter</td>
<td>Not assigned</td>
</tr>
<tr>
<td>P-01-000053</td>
<td>CA-ALA-000033</td>
<td>Altamont 4, Murietta Caves</td>
<td>Site</td>
<td>Prehistoric</td>
<td>Rock shelter</td>
<td>Not assigned</td>
</tr>
<tr>
<td>P-01-000054</td>
<td>CA-ALA-000034</td>
<td>Altamont 5, Murietta Caves</td>
<td>Site</td>
<td>Prehistoric</td>
<td>Rock shelter</td>
<td>Not assigned</td>
</tr>
<tr>
<td>P-002128</td>
<td>CA-ALA-000522H</td>
<td>The Crack House</td>
<td>Site</td>
<td>Historic</td>
<td>Standing structures; refuse scatter</td>
<td>Not assigned</td>
</tr>
<tr>
<td>P-002129</td>
<td>CA-ALA-000523H</td>
<td>WW II Cabin</td>
<td>Site</td>
<td>Historic</td>
<td>Foundations; trash scatter</td>
<td>Not assigned</td>
</tr>
<tr>
<td>P-002130</td>
<td>CA-ALA-000524H</td>
<td>Field Site #8</td>
<td>Site</td>
<td>Historic</td>
<td>Trash scatter</td>
<td>Not assigned</td>
</tr>
<tr>
<td>P-002131</td>
<td>CA-ALA-000525H</td>
<td>[none]</td>
<td>Site</td>
<td>Historic</td>
<td>Foundation; trash scatter</td>
<td>Not assigned</td>
</tr>
<tr>
<td>P-01-010704</td>
<td></td>
<td>Brushy Creek Cattle Corral</td>
<td>Structure</td>
<td>Historic</td>
<td>Ranch; fence</td>
<td>Not assigned</td>
</tr>
<tr>
<td>P-01-011510</td>
<td></td>
<td>ISO-509-10H</td>
<td>Other</td>
<td>Historic</td>
<td>Glass bottle fragment</td>
<td>Not assigned</td>
</tr>
<tr>
<td>P-01-011511</td>
<td></td>
<td>ISO-509-11H</td>
<td>Other</td>
<td>Historic</td>
<td>Historic ceramic isolate</td>
<td>Not assigned</td>
</tr>
<tr>
<td>P-01-011778</td>
<td></td>
<td>CH-IF-02</td>
<td>Other</td>
<td>Historic</td>
<td>Historic trailer</td>
<td>Not assigned</td>
</tr>
<tr>
<td>P-01-011779</td>
<td></td>
<td>CH-IF-03</td>
<td>Other</td>
<td>Historic</td>
<td>Modified iron tank</td>
<td>Not assigned</td>
</tr>
<tr>
<td>P-01-011780</td>
<td></td>
<td>CH-IF-04</td>
<td>Other</td>
<td>Historic</td>
<td>1957–1960 Ford 600 truck</td>
<td>Not assigned</td>
</tr>
<tr>
<td>P-01-011781</td>
<td></td>
<td>CH-S-01</td>
<td>Other</td>
<td>Prehistoric, historic</td>
<td>Historic glass scatter; lithic scatter</td>
<td>Not assigned</td>
</tr>
<tr>
<td>P-01-011782</td>
<td></td>
<td>CH-S-02</td>
<td>Site</td>
<td>Prehistoric</td>
<td>Bedrock milling feature</td>
<td>Not assigned</td>
</tr>
<tr>
<td>P-01-011783</td>
<td>CA-ALA-000686</td>
<td>CH-S-03</td>
<td>Site</td>
<td>Prehistoric</td>
<td>Bedrock milling feature; rock shelter</td>
<td>Not assigned</td>
</tr>
<tr>
<td>P-01-011784</td>
<td>CA-ALA-000687/H</td>
<td>CH-S-04</td>
<td>Site</td>
<td>Prehistoric, historic</td>
<td>Rock wall; standing structures; bedrock milling feature; petroglyphs; rock shelter</td>
<td>Not assigned</td>
</tr>
<tr>
<td>P-01-011785</td>
<td>CA-ALA-000688/H</td>
<td>CH-S-05</td>
<td>Site</td>
<td>Prehistoric, historic</td>
<td>Foundation; refuse scatter; bedrock milling feature; rock shelter</td>
<td>Not assigned</td>
</tr>
</tbody>
</table>

Source: California Historical Resources Information System Record search at Northwest Information Center, December 23, 2020.
### Table 4. Patterson Reservoir and Dam – Previously Recorded Resources

<table>
<thead>
<tr>
<th>Primary ID</th>
<th>Trinomial</th>
<th>Name</th>
<th>Type</th>
<th>Age</th>
<th>Attributes</th>
<th>CHRS Status Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>P-01-002190</td>
<td>CA-ALA-000582H</td>
<td>Western Pacific Railroad</td>
<td>Structure</td>
<td>Historic</td>
<td>Foundations/Structure pads; Railroad grade; Power line; Engineering structure; Bridge; Tunnel; Railroad Row</td>
<td>7: Not Evaluated for National Register (NR) or California Register (CR) or Needs Revaluation</td>
</tr>
<tr>
<td>P-01-010629</td>
<td>—</td>
<td>Livermore Valley Canal Bridge</td>
<td>Structure</td>
<td>Historic</td>
<td>Bridge</td>
<td>Not assigned</td>
</tr>
<tr>
<td>P-01-011507</td>
<td>—</td>
<td>GandA-509-12H</td>
<td>Site</td>
<td>Historic</td>
<td>AH16</td>
<td>Not assigned</td>
</tr>
<tr>
<td>P-01-011508</td>
<td>CA-ALA-000676H</td>
<td>GandA-509-14H</td>
<td>Site</td>
<td>Historic</td>
<td>AH04</td>
<td>Not assigned</td>
</tr>
<tr>
<td>P-01-011512</td>
<td>—</td>
<td>ISO-509-13</td>
<td>Other</td>
<td>Prehistoric</td>
<td>AH16</td>
<td>Not assigned</td>
</tr>
<tr>
<td>P-01-011603</td>
<td>—</td>
<td>South Bay Aqueduct</td>
<td>Structure</td>
<td>Historic</td>
<td>Aqueduct</td>
<td>Not assigned</td>
</tr>
</tbody>
</table>

**Previously Recorded Resources Intersecting the Project Site at Patterson Reservoir and Dam**

None

**Previously Recorded Resources within 1 Mile of the Project Site at Patterson Reservoir and Dam**

The table above includes previously recorded resources that intersect the project site and those within 1 mile of the project site at Patterson Reservoir and Dam. The resources include structures like bridges, engineering structures, power lines, and railroad tracks. The CHRS Status Code indicates whether the resource has been evaluated for the National Register (NR) or California Register (CR) or if it needs revaluation. The source of the information is the California Historical Resources Information System Record search at Northwest Information Center, December 23, 2020.
3.2 Other Relevant Studies

After the initial record search results were returned on December 23, 2020, adjustments were made to the built environment APE for both Dyer Reservoir and Patterson Reservoir, so that the APE included the South Bay Aqueduct (P-01-011603). A summary of this record is included below.

**P-01-011603, South Bay Aqueduct**

Though not listed in Table 4, the South Bay Aqueduct is within the Patterson Reservoir APE and the aqueduct shares the side-wall of the reservoir itself. The South Bay Aqueduct has been recorded in segments instead of as a complete resource, which may account for the lack of a recorded segment within the Patterson Reservoir APE. According to the site record, the aboveground components, called Dyer Canal, Livermore Canal, and Alameda Canal, were initially recorded in 1993 and 1994 for the Mojave Natural Gas Pipeline, Northern Extension Project (JRP 1993). It was erroneously rerecorded in 2004 by William Self Associates Inc. as part of a cultural resource assessment study in advance of the South Bay Aqueduct Improvement and Enlargement Project. The survey was conducted from a car in a windshield survey and was primarily focused on recording seven bridges that crossed the open canal segments of the South Bay Aqueduct, rather than the aqueduct itself. In 2015, the NWIC reassigned separate designations for the bridges (P-01-010629) and the South Bay Aqueduct (P-01-011603).

The record summarizes the significance of the South Bay Aqueduct as “a conduit of considerable importance to the local economies of Alameda and Santa Clara Counties,” and the first completed component of the SWP, which “represents one of the most ambitious public works projects undertaken by the State of California and rivals the CVP [Central Valley Project] in its role in the state water delivery system.” However, because the South Bay Aqueduct was constructed between 1961 and 1965,1 it did not meet the 50-year age threshold in 2004 and was recommended ineligible by the recorders. Despite the ineligible recommendation, the authors wrote that “in absence of the 50 year exclusion, the South Bay Aqueduct would seem to be an obvious candidate for National Register Listing, on the basis of its part in a system using bold engineering solutions and its role in the state’s economy and society.” The authors offered a rubric for consideration under Criterion Consideration G, which allows the listing of a resource less than 50 years in age if the significance of the building or structure meets a high threshold, but argued successfully that the South Bay Aqueduct alone did not meet that high threshold for Criterion Consideration G.

Because of the age of this evaluation and because the South Bay Aqueduct has achieved the necessary 45- and 50-year age thresholds, Dudek has re-evaluated the South Bay Aqueduct in Section 5.1 of this report.

3.3 Archival Research

**California Department of Water Resources**

In preparation of this report, DWR shared Bulletin 200, as well as multiple internal documents, PowerPoint presentations, maps, fact sheets, and department learning tools with the built environment staff at Dudek. The Bulletin 200 series is a comprehensive, six-volume bulletin that recounts the conceptualization, history, planning,

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1 Dudek has found through extensive archival research and communication with DWR that the actual construction dates for the South Bay Aqueduct are 1958 to 1969. However, the aboveground canal portions of the South Bay Aqueduct, including Dyer Canal, Livermore Canal, and Alameda Canal, were complete by 1965.
design, operation, customers and users, and planned future expansion for the SWP. It was completed and published in 1974, the same year the SWP was deemed complete. Each volume discusses a different subject pertaining to the larger SWP system, and are listed as follows:

- Volume I, “History, Planning, and Early Progress” (DWR 1974a)
- Volume II, “Conveyance Facilities” (DWR 1974b)
- Volume III, “Storage Facilities” (DWR 1974c)
- Volume IV, “Power and Pumping Facilities” (DWR 1974d)
- Volume V, “Control Facilities” (DWR 1974e)
- Volume VI, “Project Supplements” (DWR 1974f)

Bulletin 200 and the various other bulletins and reports shared by DWR were used in the preparation of the general DWR historical context statement, as well as the resource-specific historical context, both of which are in Section 4, Historic Setting, of this report.

**California Water Libraries Collection, University of California Davis Library**

Many DWR, Department of Public Works, and Bureau of Reclamation reports, bulletins, and manuals were available through University of California Davis’ California Water Libraries collection, available as digitized PDFs through the Internet Archive (archive.org) website. Any bulletin or report not provided by DWR was found through this library collection. Historical information obtained from this collection was used in the preparation of the general DWR historical context statement, as well as the dam and reservoir-specific historical context, both of which are in Section 4 of this report.

**California State Archives**

Background information about DWR and primary sources, reports, maps, and photographs related to the history of water management and infrastructure in California were gathered from several collections at the California State Archives. Though some digitized items were available, the California State Archives restricted in-person visits for researchers due to COVID-19 closures and, as such, the archives were not fully available to Dudek staff for research. Dudek recommends future study of the California State Archives holdings when they open to the public.

**Water Resources Collections & Archives, Special Collections and Archives, University of California Riverside Orbach Science Library**

General background information and primary sources, reports, maps, and photographs related to the history of water management and infrastructure in California are held by the Water Resources Collections & Archives. Though a digital collection was available, neither the Orbach Science Library nor the Special Collections and Archives at University of California Riverside were open to researchers due to COVID-19 closures and in-person visit restrictions, and, as such, this collection was not fully available to Dudek staff for research. Digital collections were used in the preparation of the general DWR historical context statement in Section 4 of this report. Dudek recommends future study of this collection when it becomes available to the public.
California Water Library

The California Water Library is a digital repository that provides public access to reports, articles, essays, research, white papers, and other materials published by the State of California, federal agencies, and environmental stakeholders. Dudek used this repository to find state-published water bulletins that were otherwise unavailable from the collections listed above. Digital collections were used in the preparation of the general DWR historical context statement in Section 4 of this report.

Los Angeles County Library

Dudek utilized a local county library in order to gain access to physical books and newspaper articles not provided through other venues. These items were used in the preparation of the general DWR historical context statement in Section 4 of this report.

3.4 Field Survey

3.4.1 Methods

During the surface reconnaissance for archaeological resources, William Burns, MA, and Nicholas Hanten, MA, also completed a thorough photo documentation of Patterson Reservoir and the South Bay Aqueduct in the Project APE on January 5, 2021. All field reconnaissance took place from within the DWR-owned properties at Patterson Reservoir and Dyer Reservoir, with DWR permission and staff escort. Dudek Architectural Historians Kathryn Haley, MA, and Kate Kaiser, MSHP, conducted an in-depth review of the photo documentation. The photo documentation was adequate to show specific structural details and to contextualize Patterson Reservoir and the South Bay Aqueduct within the land surrounding the APE. Ms. Haley and Ms. Kaiser were able to view the character-defining features, spatial relationships, observed alterations, and historic landscape features via the photo documentation. All field notes, photographs, and records related to the current study are on file at the Dudek office in Auburn, California.

3.4.2 Results

During the course of the pedestrian survey, Dudek identified two structures over 45 years old—the South Bay Aqueduct (1959–1969) and Patterson Reservoir (1960–1962). Segments of the South Bay Aqueduct have been previously recorded as P-01-010629; however, the portion of the South Bay Aqueduct within the Project APE has not been recorded and Patterson Reservoir has never been recorded. Fieldwork photographs are not included in this report and may be found in Appendix A, DPR Forms. All evaluated components of the Project site are indicated in the APE maps included as Figures 5 and 6. Section 6 of this report includes a detailed physical description for the segment of Patterson Reservoir and the South Bay Aqueduct within the Project APE and the associated significance evaluation for each under all applicable NRHP and CRHR criteria and integrity requirements. Photographs of Patterson Reservoir and the South Bay Aqueduct from Dudek’s December 2020 site visit may be found in Appendix A.
3.5 Interested Party Correspondence

On May 12, 2021, Dudek Architectural Historian Kate Kaiser sent electronic contact letters to the Alameda Architectural Preservation Society, the Museum on Main in Pleasanton, and the Alameda County Historical Society. The letters briefly described the proposed Project and requested information about cultural resources near the Project area. No responses have been received to date. Copies of all correspondence to and from interested parties are located in Appendix B.
4 Historic Setting

The following historic context provides an overview of the history of the Project area, development summary of the APE, and specific relevant information on built environment resources in the APE.

4.1 Regional Historic Overview

The Alameda County region northeast of Livermore, where both Dyer and Patterson Reservoirs are located today, was never visited explicitly by Spanish Period (ca. 1769–1823) missionaries or the military, and the region did not fall within the boundaries of any established Mexican Period (ca. 1823–1848) ranchos. However, Alameda Creek, for which the county is named, and the contra costa or coast opposite of San Francisco, were discovered by a search party headed by Jose Francisco de Ortega, part of Gaspar de Portola’s party, and recorded by Father Juan Crespi in 1769. Alameda Creek was visited again by Pedro Fages in 1770 and 1772. European settlers have been in the general area since the establishment of Mission San Jose and an accompanying pueblo in 1797, some 20 miles distant, but the region where the Dyer and Patterson Reservoirs are located today remained unclaimed until well into the American Period (1848–present) (ASC 1997, pp. 20, 25–27; Brown et al. 2004, pp. 7–8; Kyle 2002, pp. 4–5).

After the State of California was established in 1849, the entire Project region was part of Contra Costa County until Alameda County split away in 1853. Around the same time, Robert Livermore established a post office at his Livermore Ranch (formerly Rancho Las Positas) in Livermore-Amador Valley, but the official Livermore Post Office was established in 1869. The region where Dyer and Patterson Reservoirs are located today, as well as the entirety of the Livermore-Amador Valley region, was agricultural from the outset. In the 1860s, dry-farmed wheat was dominant, while a few vineyards were established in the late 1860s. In 1869, the Western Pacific Railroad connected Sacramento and the transcontinental railroad to the Alameda Terminal, skirting to the south of the future location of Patterson Reservoir and driving the settlement of the newly founded town of Livermore. Outside of the town, however, the region continued to be used for agriculture and viticulture until the 1910s (Brown et al. 2004, p. 8; Corbett 2005, p. 2; Kyle 2002, pp. 12–13).

Growth in northeastern Alameda County was slow during the early twentieth century. In 1913, the Lincoln Highway, one of the earliest transcontinental highways, was completed over Altamont Pass (south of Dyer Reservoir) and passed through Livermore, southwest of the reservoirs. World War II also had a significant effect on population growth in Livermore Valley. In 1942, the Livermore Naval Air Station was established northeast of Livermore. In 1951, the Navy transferred control of the air station and it became the Lawrence Livermore National Laboratory the next year. Another laboratory, Sandia National Laboratories, opened in 1956 as part of a Cold War–era expansion of defense manufacturing activity in California. The population near Livermore quadrupled as a result, ballooning to over 16,000 residents, and housing and services for laboratory workers had to be built. The Bay Area Regional Transit system reached the Tri-Valley area, including Livermore and Dublin, in the late 1960s. The population doubled again to over 37,000 in the 1970s and 1980s with the expansion of the Bay Area cities and Silicon Valley and the increasing popularity of Livermore as a commuter suburb. In the 1970s, Interstate 580 and Interstate 680 were also completed, accelerating transit into Oakland and San Francisco (Brown et al. 2004, p. 8; Corbett 2005, pp. 4–6; Ullrich 2003, pp. 14–15).
4.2 Water Management in California
– Development of the State Water Project

The history associated with water management facilities in California is as vast and complex as the systems themselves. To best understand the development of DWR and the SWP, it is important first to understand the context of water management policy and construction in California. The SWP was shaped by the successes and shortfalls of numerous water management policies and projects at the local, state, and national level over many decades. The following sections are intended to give a broad context of water development in California from the Spanish and Mexican periods, to the mining and agriculturally dominated water needs in the nineteenth century, to the engineered water reclamation solutions of the early twentieth century, and finally to the events and planning that led to the founding of DWR and implementation of the SWP.

4.2.1 Early Water Development

Beginning in the Spanish era (ca. 1769–1823), the larger missions and pueblos established by the Spanish were located along rivers or coastal creeks. Various missions used neophyte laborers to exploit local water supplies, dig wells, divert streams, and dam reservoirs for irrigation and livestock uses. Spanish law granted missions a right to adequate water supply for their residents and irrigation, and the result was often a collection of small-scale earthen dams and stone- or wood-lined zanjas (canals or ditches) associated with each mission. After Mexico gained independence in 1823, little changed with respect to water rights and supply, as the rights afforded to secular ranchos were derived from those used by the missions, presidios, and pueblos of Spanish and Mexican settlements. The cattle hide and tallow trade in Alta California rose as a major industry because cattle could graze on the unimproved, arid lands of the vast rancho holdings, and although ranchos typically had small, irrigated gardens, most never built substantial irrigation systems (Hanak et al. 2011, pp. 21–22; JRP and Caltrans 2000, p. 11).

New water demands and uses emerged with the onset of the Gold Rush. First, the population of California exploded during this period, quadrupling from roughly 92,000 before 1849, to 380,000 by 1860. Second, water was a key tool in a type of industrial-scale gold mining called hydraulicking. Hydraulic miners in the Sierra Nevada foothills diverted water from high-elevation streams through flumes and penstocks to create hydraulic pressure, then used that pressurized water to blast hillsides to expose gold. Hydraulic mining also generated competition for water resources that ultimately led to disputes like Irwin v. Phillips (1855), in which the California Supreme Court sided with appropriation rights used by most miners, rather than riparian rights (Cooper 1968, p. 36; Hanak et al. 2011, pp. 22–23; JRP and Caltrans 2000, p. 11–12).

Hydraulic mining created environmental problems because mining debris floated downstream, which caused waterways to build up with debris and then overflow their banks and flood adjacent land. Some private landowners along rivers running through valley lands built their own flood protection levees, but these early efforts were small scale and failed during seasonal floods made worse by hydraulic mining debris. Major flooding in 1862 and again in 1865–1866 inundated farmland and pasture with mining waste–laden water. In 1868, the California legislature approved local reclamation districts so that landowners could fund flood control projects, one of the first water

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2 Appropriation rights or the rule of prior appropriation held that the right to water is “based on actual use, not ownership of land, and there are no place-of-use restrictions. Moreover, in times of shortage, water is apportioned on the basis of first-in-time, first-in-right” (Hanak et al. 2011, p. 23). Riparian rights in California were derived from English common law, guaranteeing the rights of any landowner to surface water sources within or adjacent to their lands (Hanak et al. 2011, p. 23; Pisani 1984, pp. 34, 218, 246).
management strategies enacted at the state level. This new policy, however, was ultimately ineffectual because it was still more economical to push floodwaters to neighboring land than to build a system of soundly engineered levees (Hanak et al. 2011, pp. 23–25; JRP and Caltrans 2000, p. 12).

After the 1865–1866 floods, and other factors such as wheat market volatility and extended droughts, irrigated agriculture started to replace cattle raising and dry-farmed crops in the San Joaquin and Sacramento Valleys. As early as 1873, President Ulysses S. Grant directed the U.S. Army Corps of Engineers to study San Joaquin Valley and Sierra Nevada water resources for their potential as irrigation sources. The study concluded that a system of canals that could transport water from the Sacramento Valley to the San Joaquin Valley for irrigation was warranted. A few years later, newly appointed State Engineer William Hammond Hall started California’s first comprehensive study of water resources by launching a 5-year study of Sacramento Valley rivers in 1878, the results of which led to the first flood control plan for the Sacramento Valley in the 1880s (Cooper 1968, pp. 42–43; JRP and Caltrans 2000, pp. 12–13; USACE 1990, pp. 4–5).

California cities continued to grow, using surface water and groundwater as sources for municipal water supply as the nineteenth century drew to a close. Some cities contracted with private water companies to provide water to their citizens, while other communities and some agricultural landowners formed mutual water companies to serve their needs. Larger cities like Los Angeles and San Francisco initially depended on private water companies as well, but by the end of the century both were developing plans and acquiring reservoir sites and water rights for what would become massive, municipally owned, inter-basin water supply systems. The population of California continued to increase exponentially in the late 1880s and 1890s, in both urban and rural areas, as more rail lines connected to the state to other parts of the nation and West Coast agriculture and industry grew. With the passage of the Wright Irrigation Act in 1887, local irrigation districts finally had the legal toolkit to fund, build, and operate conveyance systems for themselves. Some of these districts were formed and built as wholly new systems under the act and others took over and expanded upon earlier irrigation schemes and networks (DWR 1957, p. 24; Hanak et al. 2011, pp. 30–31; JRP and Caltrans 2000, p. 14, 21–23).

4.2.2 Twentieth Century Water Management Planning

At the turn of the twentieth century, California cities started to recognize their water needs were outpacing what was readily available. The state and federal government also began making efforts to ensure water supplies, as well as regulate water rights. The U.S. Congress passed the Reclamation Act in 1902, beginning large-scale federal investment in dams and reservoir projects for irrigation in the American West. With this, the “federal government promoted occupation of undeveloped land with construction of irrigation systems and their fair distribution of water through reclamation” and established the Bureau of Reclamation (Reclamation) (Herbert et al. 2004, p. 2-3). A year later, the California Supreme Court struck down the historical rule of absolute ownership of groundwater and modified groundwater rights to “safe yield” water extraction that did not affect other users in Katz v. Walkinshaw. The California legislature also took steps toward state-sponsored flood control when it created the State Reclamation Board in 1911 to assist in management of the San Joaquin and Sacramento Rivers. Lawmakers continued to refine state water policy, this time revising water rights laws by passing the Water Commission Act in

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3 “Safe yield,” also called sustainable yield, is defined in DWR Bulletin 118 as “the amount of groundwater that can be continuously withdrawn from a basin without adverse impact” (DWR 2003, p. 99). Bulletin 118 also further describes the 1903 Katz v. Walkinshaw decision as a rejection of English Common Law doctrine of groundwater rights and adoption of the Doctrine of Correlative Rights. The decision reflected that the Common Law approach was unsuitable for the natural water conditions in California and that overlaying rights holders or appropriative rights holders should not be able to pump water in excess of what a groundwater basin could sustain on a yearly basis.
1914, and the following year creating the State Water Commission (later the State Water Resources Control Board) to oversee permits and diversion claims for surface water throughout the state (Cooper 1968, p. 50; Hanak et al. 2011, pp. 32, 38; Herbert et al. 2004, p. 2-4).

As the new state water regulations were enacted, several California cities had already begun to turn to imported water by the early decades of the twentieth century. San Diego was among several cities that started purchasing privately developed reservoirs outside of city boundaries to supplement water supplies and provide for projected growth. Others, like Los Angeles and San Francisco, embarked on large-scale engineered water projects that would bring water from more distant sources, like the 233-mile-long (later extended to 419 miles) Los Angeles Aqueduct, the initial phase of which was built between 1908 and 1913. The U.S. Congress passed the Raker Act in 1913, which allowed San Francisco to dam the Tuolumne River into the Hetch Hetchy Reservoir and transport water 167 miles to the Bay Area (1914–1934). In 1922, California entered the Colorado River Compact to supply several Southern California cities with water from the Colorado River. The Metropolitan Water District of Southern California (Metropolitan Water District) was formed in 1927 to bring Colorado River water to Los Angeles, as well as to suburbs not serviced by the Los Angeles Department of Water and Power. Oakland and the East Bay cities formed the East Bay Municipal Utility District in 1923 to supply the nine member cities with water from the Mokelumne River (Cooper 1968, pp. 52, 59–68; DWR 1957, pp. 24–26; Hanak et al. 2011, pp. 33–36; Herbert et al. 2004, p. 2-3).

Meanwhile, a major drought struck the state in 1917 that left San Joaquin Valley farmers who relied on surface water for irrigation at a disadvantage compared with cities, especially those served by new large, inter-basin systems. In 1919, Colonel Robert B. Marshall of the U.S. Geological Survey published a study that was the first to propose moving water from the northern Sacramento Valley to the southern San Joaquin Valley by way of an integrated system of reservoirs and canals. The state legislature created the Department of Public Works in 1921 and authorized a series of studies that incorporated elements of Marshall’s proposal in developing the first comprehensive plans for redistributing water from more abundant sources in Northern California watersheds to agricultural areas farther south. Ultimately, a lack of state funding led Reclamation to implement this concept as the Central Valley Project (CVP) more than a decade later. Meanwhile, multiple federal and state agencies produced a series of reports on various watersheds capabilities, and, in 1930, State Engineer Edward Hyatt proposed the first State Water Plan. The State Water Plan proposed seven management units based upon the geographic regions of the state (e.g., Great Central Valley, San Francisco Bay Basin), and which units to address first because of the acute water needs of those regions. The plan also proposed 24 reservoirs, 13 of which would have hydroelectric power features. The State Water Plan stressed immediate development for certain plan features, including the Kennett Reservoir (Shasta Dam), Contra Costa Conduit, San Joaquin River-Kern County Canal, Madera Canal, Magunden-Edison Pumping System, San Joaquin River Pumping System, the Sacramento–San Joaquin River Delta (Delta) Cross Channel, and Friant Reservoir. Other plan components, like Oroville Reservoir, would be included in the Feather River Project, within the larger program ultimately known as the State Water Project. For Southern California, Hyatt recommended importing Colorado River Water, leaving Northern and Central California water for irrigation purposes (Cooper 1968, pp. 60–68; DPW 1930, pp. 37, 44–45; DWR 1974a, p. 11; Hanak et al. 2011, pp. 33–36; Herbert et al. 2004, p. 2-6).

Hyatt’s State Water Plan was approved by the state legislature and authorized as the CVP in 1933. It passed voter referendum by a slim margin as it was opposed by major energy companies, area-of-origin advocates, conservationists, and senior water-rights holders. Although voters approved $170,000,000 in bonds to pay for the initial project components, California was in the middle of a multi-year drought and the Great Depression and bonds did not sell. The Roosevelt administration responded by funding the CVP as a New Deal federal reclamation project to be implemented by Reclamation. Congressional approval of the CVP allowed construction to begin in 1937 and
Reclamation moved forward with five elements of Hyatt’s plan for initial construction, including Kennett Dam (now Shasta Dam), the Contra Costa Conduit, Friant Dam, the Madera Canal, and the Friant-Kern Canal, with the expectation that more units that could be added over time. The project was hampered by diversion of resources to the war effort and did not make its first water deliveries until 1944, but progress continued until Northern California water made it to the southern San Joaquin Valley end of the system in 1951. Reclamation’s administration of the CVP brought certain acreage and water user limitations, intended to support small farmers. This policy had worked well for small farms in the East and Midwest, but it was problematic in California where much of the CVP service area was held in established large land holdings and corporate ranches. Also, as California’s population boomed during and after World War II, municipal and industrial users, who had been largely excluded in favor of agricultural interests in the CVP, began to chafe against the acreage limitations (Cooper 1968, pp. 149, 152–153; DWR 1957, p. 26; DWR 1974a, p. 6; Hanak et al. 2011, pp. 45, 47–48; Herbert et al. 2004, p. 2-9; JRP and Caltrans 2000, p. 74).

4.2.3 Construction and Implementation of the State Water Project

Planning for a state water delivery system to complement the CVP and address some of its shortfalls began in 1945 with the State Water Resources Act. This authorized the State Water Resource Control Board, formerly the State Water Resource Board, to conduct investigations of the water resources of California, including 1951 Bulletin No. 1, Water Resources of California (SWRCB 1951), and 1955 Bulletin No. 2, Water Utilization and Requirements of California. These two studies formed the basis for 1957 Bulletin No. 3, The California Water Plan, which presented a plan for the “practical development of California’s water resources, both by local projects and a major State project to meet the State’s ultimate needs” (DWR 2006, p. 11). As the statewide investigations progressed, State Engineer A.D. Edmonston began planning for their implementation and in 1951 he presented the state legislature with the Feather River Project that had its origins as part of Hyatt’s State Water Plan. The Feather River Project included a dam on the river near Oroville, two powerplants, a Delta cross-channel, an electric transmission system, an aqueduct between the Delta and Santa Clara and Alameda Counties, and an aqueduct “to transport water from the Delta to the San Joaquin Valley and Southern California” (DWR 1974a, p. 7). That year the state legislature authorized the “Feather River and Sacramento–San Joaquin Delta Diversion Projects” using the State Central Valley Project Act (DWR 1974a, p. 7). The Feather River Project was revised and resubmitted in 1955 and in 1957. After the 1955 revision, the California legislature referred the Feather River Project report to engineering contractors, the Bechtel Corporation, for independent review. The Bechtel Corporation issued their own report that agreed the engineered elements were sound. Modifications proposed by the Bechtel Corporation were incorporated in the 1957 plan, shortly after California created a new state agency, DWR, to manage the project (Cooper 1968, pp. 190–193; DWR 1974a, p. 7; DWR 2006, pp. 11–12; Hanak et al. 2011, p. 49; Herbert et al. 2004, pp. 2-12, 2-13).

Political groups in both Northern and Southern California began to voice opposition to the massive water project during this period as well. State Assemblywoman Pauline Davis, representing seven Northern California counties, rallied behind inclusion of county-of-origin rights in state law (Water Code Sections 10500–10506). In Southern California, the Metropolitan Water District opposed any project that would not guarantee water deliveries and requested a constitutional amendment to that effect. The City of San Francisco and Bay Area cities also perceived the project as a threat to expanding their municipal water supply systems. The project’s biggest and most vocal proponents, however, were farmers from San Joaquin Valley and Santa Clara County. The most high-profile and influential supporter was Edmund G. “Pat” Brown, then the state’s attorney general, who believed a statewide water system was essential for the state’s future and pushed for its approval. His support for the SWP helped him win election as California governor in 1958 and the project would ultimately be one of his proudest legacies. (Cooper 1968, p. 209; Herbert et al. 2004, p. 2-14).
As both the political battle and SWP project planning continued, winter storms in 1955 caused flooding throughout Northern and Central California. Major rainfalls on December 18 and 19 flooded the Eel River, Russian River, and San Lorenzo River near the coast. On December 21 and 22, an intense rainfall period raised water levels in watersheds north of San Francisco and caused flooding throughout the Bay Area, as well as the northern and coastal communities of Klamath, Orick, Pepperwood, Weott, Myers Flat, Shively, Healdsburg, Cloverdale, Guerneville, Santa Cruz, Ben Lomond, and Soquel. Continuous rainfall not only caused flooding directly, rising river levels caused other flood control measures to fail. On Christmas Eve night, the Gum Tree Levee on the Feather River broke, sending a 21-foot wave into Yuba City, killing 38 people and inundating Yuba City in 8 feet of water. Flood damages reached more than $200 million in direct losses alone. The floods were declared a national emergency and the California legislature responded by making emergency appropriation funding available to the newly created DWR to start components of the Feather River Project, touting the flood control aspects of the project. Construction began on Oroville facilities in May 1957 (DWR 1974a, p. 8; Herbert et al. 2004, p. 2-13; JRP and Caltrans 2000, p. 82; USACE 1956, p. 11).

With site preparation work at Oroville underway, negotiations to resolve conflicts over water law in the state legislature using a constitutional amendment fell short. By the end of 1958, discussions had reached a stalemate as amendment proponents were unable to satisfy the various factions in the state legislature, and unable to get the two-thirds majority vote. SWP proponents then discovered an alternate solution that required only a majority vote while still offering Southern Californians the assurance they needed that the system would be constructed as planned. The state would issue bonds to fund the SWP that specified in its financial language every major storage and conveyance facility to be constructed. Because the state constitution prohibited the legislature from amending bond terms while the debt remained to be paid, this, effectively guaranteed the system's construction. With this in mind, state legislators pushed forward a more bipartisan solution—the California Water Resources Development Bond Act, called the Burns-Porter Act (Cooper 1968, pp. 221–223; Herbert et al. 2004, p. 2-16)

The Burns-Porter Act included $1.75 billion in general obligation bond funds for the first phase of construction of the SWP, to be paid by water and power users. It also included several additional acts, passed as a package, to assurances and concessions to Northern Californian opponents. These include, but were not limited to, the Davis-Grunsky Act, which made assurances to Northern Californians that water from their home areas would be available for future, local water projects; and the Davis-Dolwig Act, which provided for recreational facilities and fish and wildlife enhancement projects, such as fish hatcheries, as integral components of the SWP. These acts were passed in 1959 along with the Burns-Porter Act. In 1960, the Metropolitan Water District entered into negotiations with DWR for what would become the prototype water service contract. The SWP would go on to service 31 agencies under contracts for long-term water supplies, from Plumas County to the state’s southern border with Mexico. Just days after Metropolitan Water District signed its service contract, voters ratified the Burns-Porter Act by a margin of nearly 174,000 votes in the 1960 election. Southern California provided the critical support for the bond issue as every county in the north of the state voted against the measure, with the exception of Butte County where Oroville Dam was to be constructed (Cooper 1968, pp. 224, 241; DWR 1974a, pp. 8, 21; DWR 2006, pp. 16, 25; Hanak et al. 2011, p. 49; JRP and Caltrans 2000, p. 82).

Because the Burns-Porter Act served as a guarantee of construction for Southern Californians, it named specific facilities for development and their locations. Rather than a vague order for construction, DWR would be held to the SWP construction plans. The SWP called for construction of the Oroville and Upper Feather River dams and reservoir facilities; the California Aqueduct, as well as all associated infrastructure such as conduits, tunnels, pumping facilities, dams, and reservoirs, as needed; a few specifically defined branch aqueducts; levees and control structures; and water conservation and supply measures in the Delta. The San Luis Unit of the CVP was authorized.
by Congress in 1959, to be jointly operated by Reclamation and DWR. The constitutionality of the Burns-Porter Act was challenged in courts, but in the end, DWR’s authority to issue bonds and create water service contracts was affirmed. DWR went on to execute water supply contracts for a total of nearly 3.5 million acre-feet of the original 4 million acre-feet projected minimum project yield (DWR 1974a, pp. 9, 12–13; DWR 2006, p. 22; Water Code Sections 12934.d.1–7).

Construction had already begun on the Oroville facilities in 1957 under the emergency funding and a few select projects—such as the South Bay Aqueduct, Bethany Reservoir, and Frenchman Dam—were started before 1960. Construction on the remainder of the SWP system began after the Burns-Porter Act was passed in 1960. The work was staged from north to south, organized into regional divisions, and was completed in 1974. Exhibit A, below, shows the mapped locations of all the SWP components completed between 1959 and 1974, and their dates of completion (DWR 2006, p. 22; Herbert et al. 2004, p. 2-21).

The engineering involved in the construction of the SWP was unparalleled for its time and the project overall was exceptionally large in physical scale, as was the scale of planning and management required. For example, the Oroville Dam was 770 feet tall at the crest, and at 6,920 feet it was more than 1 mile long and required 80 million cubic yards of fill material (DWR 2006, p. 26). While earth-fill dam technology had been around for millennia, advancements in soil science and innovative engineering techniques allowed the height of Oroville Dam to be substantially taller and longer than ever before. Other aspects of the SWP’s engineering importance are reflected in the fact that the California Aqueduct measures 444 miles long, which rivals the length of the CVP canal system, but SWP designs also account for earthquake fault crossings, challenging terrain crossings, and subsidence and seismic issues, in addition to incorporating automation technology to operate all components. This fully automated remote monitoring and control system allowed DWR operators to control dozens of pumping plants and check structures and other miscellaneous facilities from five regional control centers and the Project Operations Control Center in Sacramento. DWR also borrowed the Project Management Information System used by Reclamation and other federal agencies to manage project components, plans and specifications, right-of-way acquisition, and construction activities, as well as to administer its 31 water supply contracts from one database application (DWR 1974e, pp. 1, 7; DWR 2006, p. 29; Herbert et al. 2004, pp. 2-21, 4-5–4-7).

As the initial phase of construction drew to a close in the 1970s, the SWP began to gain national recognition as a feat of modern engineering. In 1967, Oroville Dam was named one of the seven wonders of engineering in California by the California Society of Professional Engineers. The American Society of Civil Engineers gave Oroville Dam and the Hyatt Powerplant an award for outstanding engineering achievement in 1969 and the National Society of Professional Engineers named the SWP to its top 10 engineering achievements of 1971. The American Public Power Association gave the Delta Pumping Plant the First Honor Award and the Oroville-Thermalito hydroelectric powerplants the Honor Award that same year. The American Society of Civil Engineers not only gave SWP its Outstanding Civil Engineering Award for 1971, it later ranked the SWP in the top 100 Greatest Engineering Achievements of the twentieth century in 2000, and a Civil Engineering Monument of the Millennium in 2001 (DWR 2006, p. 29; Herbert et al. 2004, p. 2-27).
Exhibit A. SWP components and their dates of completion (DWR 1974g, p. 13).
4.2.4 The State Water Project After 1974: Realization and Expansion

Water from Northern California finally reached Southern California via the California Aqueduct after the Edmonston Pumping Plant was completed in 1971, and within 2 years, regular water deliveries were being made throughout the state. The initial construction phase concluded in 1974 and DWR made efforts to expand the SWP as planned in Phase II. However, with the advent of environmental regulation starting in the 1960s that gained substantial legislative traction in the early 1970s, the proposed expansion projects of SWP Phase II were analyzed and debated more intensely than projects completed during the first phase (DWR 1974a, pp. 78–83, 91; Hanak et al. 2011, p. 56).

As the environmental movement grew more powerful throughout California and the nation, the state and federal government enacted several laws aimed at environmental and natural resources protection, including the California Environmental Quality Act (1970), National Environmental Policy Act (1970), California Endangered Species Act (1970), California Wild and Scenic Rivers Act (1972), Clean Water Act (1972), and federal Endangered Species Act (1973). The outcome was that the SWP expansion projects had to meet new standards for environmental analysis and mitigation that delayed or in some cases limited the ability of DWR to expand the SWP in the late 1970s and 1980s. For example, some rivers in Northern California slated for SWP reservoirs were added to the Wild and Scenic Rivers list and had to remain undeveloped. Other projects, such as the Peripheral Canal, Sites Reservoir, and the Los Banos Grande Reservoir, also lacked public support for development because of their projected environmental impacts. This resulted in implementation of only a few SWP expansion projects after 1974, which led to a lower annual water yield than originally planned (DWR 2006, p. 34; Hanak et al. 2011, pp. 56–60).

Droughts in 1976–1977 and another between 1987 and 1994 forced DWR to curtail water deliveries to both urban and agricultural customers. In response, DWR purchased land in Kern County on the Kern Fan Element in 1988 to bank water for droughts, but development of this water bank was delayed by legal and environmental disputes. Starting in the mid-1990s, DWR worked with a select group of SWP water contractors to create the Monterey Amendment, which resulted in restructuring water supply contracts. The Monterey Amendment was a statement of principles that allowed water storage excess during wet years, established protection for water contractors against sudden rate increases during drought years, and allowed contractors to take more water from Castaic Lake and Lake Perris in Southern California. Another result of the Monterey Amendment was the development of the 1 million acre-foot Kern Water Bank and its subsequent transfer to the privately controlled Kern Water Bank Authority. Over the years, the Monterey Amendment faced several legal challenges by environmental groups, requiring revised environmental documentation as recently as 2016. Other successful SWP Phase II expansions to the system include the Coastal Branch Aqueduct (constructed 1993–1998) and the East Branch Aqueduct Extensions (constructed 1998–2003 and 2005–2018), and their associated pumping plants, dams, and reservoirs (DWR 2006, pp. 44–45; DWR 2019, pp. 10, 319; Folmer 2018; Hanak et al. 2011, p. 67; WEF 2021).

Today, the main components of the SWP system date to the Phase I (1959–1974) construction and the system operates as initially intended. The SWP provides flood control, power generation, recreation opportunities, and fish and wildlife habitat, as well as serving its primary purpose—providing agricultural and municipal water supply for California. In efforts to meet its mission “to sustainably manage the water resources of California, in cooperation with other agencies, to benefit the state’s people and protect, restore, and enhance the natural and human environments,” DWR continues to fulfill 29 water supply contracts for public agencies and local water districts across the state. With ever-increasing water demands, DWR remains charged with the challenge of planning for future SWP expansion and enhancement, while also continuing its operations, maintenance, and repair of the existing system (DWR 2019, pp. 3–6, 10, 236–237; DWR 2021).
4.3 Historical Development of South Bay Aqueduct and Patterson Reservoir

Patterson Reservoir is a component of the South Bay Aqueduct system in the SWP. Patterson Reservoir is a small, 100-acre-foot reservoir within the Livermore Valley Canal reach of the South Bay Aqueduct. Its planned purpose was to provide emergency water storage for the Zone 7 Water Treatment Plant and to help regulate water flowing through the South Bay Aqueduct. The Alameda County Flood Control and Water Conservation District is one of the SWP’s water contractors and is entitled to a maximum of 46,000 acre-feet of water per year. The reservoir does not provide any additional services such as recreation, power generation, or fish and wildlife habitat. Its context is linked to that of the South Bay Aqueduct, which serves the “water deficient” South Bay areas from the SWP (DWR 1974a, p. 46; 1974b, p. 77; 1974c, p. 5; 2006, p. 57).

4.3.1 Planning the South Bay Aqueduct and Related Facilities

San Francisco and the Bay Area cities were some of the first in the state to secure their own municipal water from non-local sources. In 1914, the City of San Francisco began construction on the Hetch Hetchy Aqueduct (1914–1934), which brought water from the Tuolumne River to the San Francisco Bay. In 1923, Oakland and nine other East Bay cities formed the East Bay Municipal Utility District and built the Mokelumne Aqueduct (1924–1928) from the Pardee Reservoir to the San Francisco Bay. However, the South Bay cities and agricultural producers in Alameda and Contra Costa Counties, near the Delta, were unaccounted for (EBMUD 1932, pp. 3–4; JRP and Caltrans 2000, p. 73).

Attempting to make up for the deficiencies in water distribution, State Engineer Edward Hyatt presented the State Water Plan to the California legislature in 1931. Hyatt’s plan called for aqueducts, canals, and conduits to transport water from Northern California to the Sacramento and San Joaquin Valleys, and included provision for the Contra Costa Conduit, which was one of the 1931 State Water Plan units proposed for immediate development and was to serve the industrial and agricultural areas along the south shore of Suisun Bay (Exhibit B) (DPW 1930, p. 44).

Hyatt’s State Water Plan was approved, but fell through due to the state’s inability to issue bonds during the Great Depression. It was revived in the CVP, one of President F.D. Roosevelt’s emergency infrastructure programs. In the CVP, the Contra Costa Canal was posed instead. This relatively small component of the CVP was to deliver water to industrial, agricultural, and residential properties in Contra Costa County and mitigate the effects of pumping water from the Delta. Construction on the 48-mile Contra Costa Canal began in 1937 but completion was delayed until 1948 (Herbert et al. 2004, pp. 2-10–2-12; JRP and Caltrans 2000, p. 74).
The South Bay counties, however, continued to fall short of meeting their water needs, and saltwater intrusion into their groundwater wells became a growing concern. The South Bay Aqueduct, conceptually, was proposed as part of A.D. Edmonston’s 1951 Feather River Project. As discussed in Section 4.2.3, the Feather River Project proposed a dam for the Feather River near Oroville, two powerplants, a Delta cross-channel, an electric transmission system, an aqueduct between the Delta and Santa Clara and Alameda Counties, and another aqueduct to Central and Southern California. The South Bay Aqueduct was included in the 1955 revisions to the Feather River Project and was authorized for construction in 1957 (DWR 1974a, pp. 7–8, 46; Oakland Tribune 1956, p. 1; Oakland Tribune 1957, pg. 8).

The route of the aqueduct was a point of some debate and was altered several times in the planning process. Nevertheless, design work and land acquisition for the South Bay Aqueduct began in 1958. Exploratory tests for the proposed tunnels began in summer 1958, officially kicking off construction for the South Bay Aqueduct. The project was briefly in danger in 1959, when the state legislature considered abandoning all work on the South Bay Aqueduct as a cost-saving measure; DWR, the South Bay cities, and Governor Edmund G. Brown continued to advocate for the South Bay Aqueduct, which was needed not only to serve growing South Bay cities, but also to combat saltwater intrusion into groundwater wells. The state legislature eventually funded the South Bay Aqueduct in fall 1959, and construction bids for the first reach of the aqueduct opened by October (Exhibit C). The initial project work would encompass a 2-mile-long canal segment, a pumping plant, and the Bethany Dam and Reservoir. On November 23, a groundbreaking ceremony for the South Bay Aqueduct was given by Governor Brown and DWR officials (DWR 1974b, pp. 41–44; LAT 1958, p. 31; Oakland Tribune 1958a, p. 11; 1958b, p. 19; 1959a, p. 11; 1959b p. 1; 1959c, p. 29; 1959d, p. 19; 1959e, p. 9).
The South Bay Aqueduct was already under construction, but it was also included in the SWP with the passage of the 1959 Burns-Porter Act, which specified it as “a South Bay aqueduct extending to terminal reservoirs in the Counties of Alameda and Santa Clara” (Water Code Section 12934.d.2). The Burns-Porter Act did not specifically provide for the construction of Patterson Reservoir or the pump stations and storage reservoirs along the South Bay Aqueduct that aid in its water delivery contracts and flow regulation. Still, as the South Bay Aqueduct was already underway, specifying it in the Burns-Porter Act had no effect on the progress of construction (DWR 1974a, p. 46; Oakland Tribune 1961, p. 12; Water Code Section 12934.d.2).

Because the South Bay Aqueduct was designed before the California Aqueduct, a variety of water conveyance types were piloted at the South Bay Aqueduct, before the open-air, trapezoidal, concrete-lined canal was adopted for the California Aqueduct.

### 4.3.2 Construction of Patterson Reservoir

The South Bay Aqueduct was completed in phases, reach by reach, starting from Bethany Reservoir. In 1960, DWR took bids for Patterson Reservoir, the 2.4-mile-long Brushy Creek First-Stage Pipeline, the 2-mile-long Dyer Canal, the 2.3-mile-long Altamont Pipeline, and a 1.8-mile portion of the Livermore Canal, constituting the first reach of the South Bay Aqueduct from the Surge Tank to Patterson Reservoir. Contractor Case-Hood (F.W. Case Corp., Hood Construction Co. Hood Northwest Pipeline Co., and Hood Flexible Pipe Cleaning Co.) from Chico won the contract for this reach and for the construction of Patterson Reservoir. The first reach contract included the construction of the Brushy Creek Pipeline, Dyer Canal, and Livermore Canal, and also included the construction of Patterson Reservoir (Exhibit D) (DWR 1974b, p. 68; Oakland Tribune 1960, p. 22; 1961, p. 12).
Patterson Reservoir was a rectangular-plan compacted earth embankment-bound reservoir immediately adjacent to the South Bay Aqueduct. The reservoir was designed with an asphaltic concrete lining atop a compacted soil layer atop a sand drain blanket. However, due to the intensive cracking of this lining material, it was topped with a 3-inch-thick layer of unreinforced concrete lining instead. Water entered Patterson Reservoir via a concrete-lined weir on the north side of the reservoir near the Livermore Canal and rejoined the South Bay Aqueduct via a short canal at the south end of the aqueduct. Water deliveries were made through the 42-inch-diameter outlet at the southerly corner, which transported water first to the Zone 7 Water Treatment Plant (DWR 1974b, p. 77).

When Case-Hood finished the work at Patterson Reservoir in 1962, the Surge Tank to Patterson Reservoir reach was complete. On May 10, 1962, Governor Brown came out to dedicate the South Bay Aqueduct and celebrate the first water delivery, which was made from Patterson Reservoir to water contractor Alameda County Flood Control and Water Conservation District (Exhibit E). This was the first water delivery completed for the SWP. Contracts were let immediately after the dedication ceremony for the next segment of the South Bay Aqueduct, from Patterson Reservoir to Lake Del Valle (DWR 1974b, p. 79; Oakland Tribune 1962, p. 1; OMR 1962, p. 7).
4.3.3 Finishing the South Bay Aqueduct

Success was short-lived, as Patterson Reservoir immediately began to leak. The repair work began in 1964 and was completed by the end of the year. During repair construction, temporary earthen dams had to be placed on the South Bay Aqueduct above and below Patterson Reservoir, and another 24-inch temporary pipeline was placed to make water deliveries in the meantime. Multiple repairs, additions, and secondary facilities, including a second-stage pipeline from South Bay Pumping Plant to the Dyer Canal, were completed by contractors while construction of the South Bay Aqueduct continued (DWR 1974b, p. 79; Oakland Tribune 1964, p. 8).

While repairs to Patterson Reservoir progressed, the next reach from Patterson Reservoir to Lake Del Valle was built in stages. The 6.9-mile-long Alameda Canal was constructed from August 1962 to August 1963 by contracting firm McGuire and Hester. The Alameda Canal was the last open-air trapezoidal canal in the South Bay Aqueduct; all facilities past the Alameda Canal were pipelines or tunnels. The next section before Lake Del Valle was the Del Valle Pipeline, which was completed along with the Sunol Pipeline in March 1965. These two pipelines, along with the La Costa and Mission Tunnel finished in 1964, form a pressure conveyance system to the Santa Clara Pipeline, the final segment before the Santa Clara Terminal Facilities. The Niles and Santa Clara Division Pipeline was complete by May 1965, concluding the aqueduct conveyance component construction. Just a month later, in June 1965, the South Bay Aqueduct Terminal Facilities were completed by the Kaiser Steel Corporation. At this point, even without the completion of Lake Del Valle, the South Bay Aqueduct was operational and could make water deliveries to its three water contractors. The South Bay Aqueduct was officially dedicated on July 1, 1965, by Governor Brown, DWR Director William E. Warne, and other state officials (DWR 1974b, pp. 68, 79–113; Oakland Tribune 1965, p. 19).

Construction still continued after the dedication. Lake Del Valle, a regulatory storage reservoir that also provided flood control, recreation, and fish and wildlife enhancement benefits, was still not complete. The final design of the Del Valle Dam was approved in 1964, and construction on the dam began in 1966, concluding in 1968. The Del Valle Branch Pipeline, which connected the reservoir storage and pumping plants to the larger aqueduct, was complete by spring 1969 (DWR 1974b, p. 68; 1974c, p. 242).

The South Bay Aqueduct required several repairs, corrections, and additions as construction went on because of economic factors and increasing water demands. As one of the first components of the SWP to make water deliveries, once water districts and municipalities saw the South Bay Aqueduct’s success, more groups wanted to secure their water contracts. Design changes to the South Bay Aqueduct included the two-stage construction of the Brushy Creek Pipeline, which added a second pipeline due to demand once the first South Bay Aqueduct reach became operational in 1962. Adjustments were also made to the Santa Clara Terminal Facilities, which were originally designed as a terminal dam and large reservoir, but had to be adjusted to a 2.5-million-gallon steel tank and water treatment plant after geologic and seismic conditions were deemed too unfavorable for a large reservoir. The Doolan Branch Pipeline
and Reservoir were also added in 1966 to make deliveries to southern Contra Costa County, and a tunnel extension under Highway 50 (now Interstate 580) was complete by 1966 to connect the Doolan Pipeline to the Altamont Pipeline. In addition, additional support structures like pumps and check structures had to be added at various points to the aqueduct as needed when repairs or additional construction took place. More modifications were completed after Lake Del Valle went into operation in 1968 and continued through 1969. Overall, the South Bay Aqueduct Project was completed in stages, but officially concluded in 1969 (DWR 1974b, pp. 44, 68, 79; Oakland Tribune 1964, p. 8).

The South Bay Aqueduct was constructed from 1958 to 1969 and was the first aqueduct delivery system to be completed in the SWP, predating the completion of the California Aqueduct or the Delta Pumping Plant. It was also the first SWP project to make water deliveries to contract holders, as early as 1962. Though all of the aqueducts in the SWP generally follow the same design concepts and principles, the South Bay Aqueduct was designed prior to DWR’s development of the general aqueduct design, and experiences from designing and constructing the South Bay Aqueduct were later applied to the larger California Aqueduct and the North Bay Aqueduct. Differences include experiments with various canal lining materials, various siphon and check structures, various pipeline materials and designs, and the placement and number of maintenance access roads (DWR 1974b, pp. 41, 46–48).

4.3.4 South Bay Aqueduct Post-Construction and Expansion: 1969–2021

Patterson Reservoir, as well as segments of the South Bay Aqueduct, have been affected by earthquakes along the Calaveras fault multiple times throughout their lifespan, resulting in repairs, including in 1980, 1997, and 2001. Other improvements were to individual features of the South Bay Aqueduct, including for the South Bay Aqueduct Improvement and Enlargement Project from 2006 to 2015. This project restored the first 16.38 miles of the South Bay Aqueduct to the originally designed flow rate of 300 cubic feet per second. Part of this enlargement was to add Dyer Reservoir, another regulating reservoir, to the South Bay Aqueduct. Construction of Dyer Reservoir was completed between 2008 and 2012 (Exhibit F). This project also enlarged the South Bay Pumping Plant, which concluded in 2014, and various modifications to Dyer Canal, Livermore Canal, Alameda Canal, and Del Valle Pipeline, such as linear raises and maintenance road repair. Notably, as part of this project, the lining and embankment for Patterson Dam was also raised and refurbished in 2015 (DWR 1974b, p. 79; 2019, p. 122; 2021; NETR 2021; Oakland Tribune 1964, p. 8).
5 Results of Identification and Evaluation Efforts

The South Bay Aqueduct (P-01-011603) was initially previously recorded in 1993 as the South Bay Aqueduct (JRP 1993) and was partially recorded in segments instead of as a complete resource. At the time of recording, the record called South Bay Aqueduct “a conduit of considerable importance” in local counties and stressed the importance of being the first completed component of the SWP. However, because the South Bay Aqueduct did not meet the 50-year age threshold in 1993, it was recommended ineligible by the recorders. Despite the ineligible recommendation, the authors wrote that “in absence of the 50 year exclusion, the South Bay Aqueduct would seem to be an obvious candidate for National Register Listing, on the basis of its part in a system using bold engineering solutions and its role in the state’s economy and society.” Because of the age of this evaluation and because the South Bay Aqueduct has achieved the necessary 45- and 50-year age thresholds, this report re-evaluates the South Bay Aqueduct (P-01-011603) both individually and as a component of the SWP. The new evaluation affirms that the South Bay Aqueduct is eligible for listing in the NRHP and CRHR under Criteria A/1 and C/3 independently and as a component of the SWP, as part of its original phase of construction, between 1959 and 1974. The South Bay Aqueduct is considered a historical resource for the purposes of CEQA.

Patterson Reservoir has never been previously recorded or evaluated using NRHP or CRHR criteria. This report provides new documentation for Patterson Reservoir, as it meets the necessary 45- and 50-year age thresholds for evaluation and is an operation and regulatory component of the South Bay Aqueduct. Because Patterson Reservoir cannot operate independently of the South Bay Aqueduct, it was not considered individually eligible. However, Patterson Reservoir is eligible as a component of the South Bay Aqueduct under NRHP Criterion A and CRHR Criterion 1 and is considered a historical resource for the purposes of CEQA.

This report evaluates only Patterson Reservoir (1960–1962) and the South Bay Aqueduct (1959–1969), both of which are over 45 years in age. Though Dyer Reservoir is also a built environment structure within the Project APE, it was built between 2009 and 2012, and thus does not meet the 45-year age requirement of CEQA or the 50-year age requirement of NHPA. Dyer Reservoir also lacks the important historical associations or engineering merit to be considered under NRHP Criterion Consideration G. Therefore, Dyer Reservoir is not included in the significance evaluation section and is not considered a historical resource for the purposes of CEQA.

Descriptions and significance statements for the two built environment resources are presented below. A DPR form update for the South Bay Aqueduct (P-01-011603) and a DPR form set for Patterson Reservoir are located in Appendix A.

5.1 South Bay Aqueduct

5.1.1 Site Description

The South Bay Aqueduct was constructed between 1958 and 1969, and the Project APE occurs within the first reach of the South Bay Aqueduct from Surge Tank to Patterson Reservoir, which was complete and operational by 1962. The South Bay Aqueduct is within the Project APE along the Dyer Canal segment, adjacent to Dyer Reservoir, and adjacent to the APE at Patterson Reservoir in the Livermore Canal segment. The South Bay Aqueduct, in its entirety, extends 121 miles from Bethany Reservoir to the Santa Clara Terminal Facilities.
The South Bay Aqueduct segment adjacent to the Dyer Reservoir APE is a trapezoidal shaped, open-air, concrete-lined canal. Because the South Bay Aqueduct segment adjacent to Dyer Reservoir is on flat terrain, it uses an all-cut style, meaning the canal is cut directly into and below the ground surface. The bottom of the canal is 8 feet wide and the sides are sloped at a 1.5:1 ratio. The average aqueduct depth is 10 feet with a 1.5-foot freeboard and the average top width of the canal from embankment crest to embankment crest is 30 to 32 feet. The lining material is unreinforced concrete, 3 inches thick. Within the Dyer Reservoir APE, the Entrance Road ports over the South Bay Aqueduct at a road that is situated atop Check 3, a check structure. Checks share a standardized design along the length of the South Bay Aqueduct. At the check structure inlet, the South Bay Aqueduct walls invert toward the check structure at an angle, narrowing the stream as it passes through the check gates, and flare on the outlet side as well returning to the aqueduct width. Checks in open-canal sections of the South Bay Aqueduct are equipped with two radial gates and stoplog slots. Downstream of Dyer Reservoir, and the Dyer Reservoir outlet canal, also within the Dyer Reservoir APE, there is a box overchute structure spanning the South Bay Aqueduct. Overchute structures also share a standardized design along the length of the South Bay Aqueduct. They are typically 6 feet wide and have 4-foot-tall sidewalls, with no roof or cover, and are supported by two reinforced concrete piers set into the sloping inner aqueduct wall, below the embankment crest.

The South Bay Aqueduct segment adjacent to the Patterson Reservoir APE is a trapezoidal shaped, open-air, concrete-lined canal. Along its length there are four styles of aqueduct canals, depending on where they sit in relation to the terrain: deep-cut, all-cut, all-fill, and cut-and-fill or hillside styles. Because the South Bay Aqueduct segment adjacent to Patterson Reservoir is on a hillslope terrain, it uses a cut-and-fill style, meaning the canal is banked into a hillside and the uphill side is cut directly into and below the ground surface and the downhill side is built up with fill, in this case forming and sharing the wall with Patterson Reservoir. The bottom width of the canal is 8 feet and the sides are sloped at a 1.5:1 ratio. The average aqueduct is 10 feet deep with a 1.5-foot freeboard and the average top width of the canal from embankment crest to embankment crest is 30 to 32 feet. The lining material is unreinforced concrete, 3 inches thick. Within the Patterson Reservoir APE, the South Bay Aqueduct briefly shares its southwest sidewall with Patterson Reservoir, but this does not affect the design, shape, or size of the aqueduct.

5.1.2 National Register of Historic Places/California Register of Historical Resources Statement of Significance

The South Bay Aqueduct falls within the Dyer Reservoir APE and the Patterson Reservoir APE, and has been partially previously recorded in 1993 and 1994 as the South Bay Aqueduct (JRP 1993). The initial evaluation, now 26 years old, summarizes the significance of the South Bay Aqueduct as “a conduit of considerable importance to the local economies of Alameda and Santa Clara Counties,” and the first completed component of the SWP, which “represents one of the most ambitious public works projects undertaken by the State of California and rivals the CVP in its role in the state water delivery system.” However, because the South Bay Aqueduct was constructed by 1965, it did not meet the 50-year age threshold in 1994 and was recommended ineligible by the recorders. It also did not reach a level of significance necessary to meet Criterion Consideration G. Because of the age of this evaluation and because the South Bay Aqueduct has achieved the necessary 50-year age threshold, Dudek has re-evaluated the South Bay Aqueduct.

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4 Dudek has found through extensive archival research and communication with DWR that the actual construction dates for the South Bay Aqueduct are 1958 to 1969. However, the aboveground canal portions of the South Bay Aqueduct, including Dyer Canal, Livermore Canal, and Alameda Canal, were complete by 1965.
National Register of Historic Places/California Register of Historical Resources Designation Criteria

The following statement of significance evaluates the South Bay Aqueduct in consideration of the NRHP and CRHR designation criteria, integrity requirements, and these guidelines.

Criterion A/1: That are associated with events that have made a significant contribution to the broad patterns of our history.

The South Bay Aqueduct is significant under Criterion A/1 for its association as an integral component of the SWP (1959–1974). The SWP is significant as a massive innovative public works program recognized nationally that substantially altered water distribution throughout the State of California. The SWP facilitated population increases and agricultural development in the San Joaquin Valley and Southern California. The South Bay Aqueduct, as a component of the larger SWP system, was the first completed facility to make water deliveries. It also provided acutely needed water infrastructure that was greatly important to the communities it served. The South Bay Aqueduct was initiated in 1958 and completed by 1969. The period of significance for the SWP is 1959 to 1974, the years of construction for the first phase.

As discussed in detail in Section 4.3, the South Bay Aqueduct is representative of two significant firsts within the SWP; it was the first completed component of the SWP, and the first SWP project to make water deliveries, providing acutely needed water infrastructure important to the communities it served. As such, the South Bay Aqueduct is individually eligible for its significance under NRHP/CRHR Criterion A/1 as a key component of the SWP system.

Criterion B/2: That are associated with the lives of persons significant in our past.

To be found eligible under B/2 the property has to be directly tied to an important person and the place where that individual conducted or produced the work for which he or she is known. While the South Bay Aqueduct is tangentially related to important figures such as Governor Edmund G. Brown and DWR Chief William E. Warne, it has no direct association to these figures and should not be considered the place where Brown or Warne produced the work they are known for. Archival research also failed to indicate direct association with any other individuals that are known to be historic figures at the national, state, or local level. As such, the South Bay Aqueduct is not known to have any historical associations with people important to the nation’s or state’s past. Due to a lack of identified significant associations with important persons in history, the South Bay Aqueduct is not eligible under NRHP/CRHR Criterion B/2.

Criterion C/3: That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.

The South Bay Aqueduct is important for its role within the SWP, one of the most ambitious and extensive engineering projects in the State of California. The SWP features 34 storage facilities, 20 pumping plants, 4 pumping-generating plants, 5 hydroelectric power plants, and over 700 miles of open canals and pipelines. The South Bay Aqueduct comprises 121 miles of SWP’s conveyance systems, as well as three of its storage facilities and two pumping plants. The South Bay Aqueduct is also important for its role as the conveyance system where designs were first tested; the results of these tests were later applied to the remainder of the SWP conveyance systems based on their engineering success and economic feasibility. Because construction of the South Bay Aqueduct was designed in 1958, partially complete by 1962, and effectively complete by 1965, design problems
were solved on the smaller South Bay Aqueduct before they were applied to the California Aqueduct. The South Bay Aqueduct is where the SWP tested the side wall-slope ratio, thickness of concrete lining, and material types for the fill structure beneath the aqueduct, based on material experiments and material failures (leaks) along the different reaches and canal segments of the aqueduct. The South Bay Aqueduct is also one of the only large-scale conveyance systems in the SWP that uses extensive pipelines and tunnels, which were later abandoned for the open-air, trapezoidal-shaped canals, as that design was more economical than tunnels or pipelines. Though open-air canals were the preferred design for larger SWP structures like the California Aqueduct, the South Bay Aqueduct embodies three types of water conveyance construction in the SWP with various open-air canals, concrete tunnels, and pipelines along its length.

Therefore, the South Bay Aqueduct is eligible as a component of the SWP for its significance under NRHP/CRHR Criterion C/3 for its innovative engineering and design values, as the pilot design for the SWP’s water conveyance systems, and for acting as the test laboratory for conveyance system designs, lining materials, and other design components before they were implemented across the entire SWP.

**Criterion D/4: That have yielded, or may be likely to yield, information important in prehistory or history.**

The South Bay Aqueduct is not significant as a source, or likely source, of important historical information and it is not likely to yield important information about historic construction methods, materials, or technologies. Therefore, the South Bay Aqueduct is not eligible under NRHP/CRHR Criterion D/4.

5.1.3 Integrity Discussion

The South Bay Aqueduct segments recorded for the Project retain sufficient integrity to convey their associative significance under Criterion A/1 and C/3. South Bay Aqueduct retains integrity of location and is in its original alignment, which is one of the critical aspects of integrity required to convey significance. The aqueduct also largely retains its integrity of setting. While some sections of the South Bay Aqueduct are underground as tunnels and pipelines, where visible as an aboveground canal, it was originally located outside of dense urban areas; and located among the rolling hills and suburban or agricultural settings it was originally developed in. Though there have been several repairs and an expansion project for the South Bay Aqueduct, it still retains the basic aspects of its original design. Of the two segments of the Aqueduct examined in this report, the Patterson Reservoir section of the Project APE retains the character-defining features of the original South Bay Aqueduct design. Integrity of design and setting are diminished by the presence of the newly constructed Dyer Reservoir and within the Dyer Reservoir APE. However, when understood that the aboveground canal sections are dozens of miles long and largely retain their integrity and that the entire resource is 121 miles long and largely retains its integrity, the impact to the setting and changes to the design of the aqueduct by Dyer Reservoir are contextualized as less impactful. Integrity of materials and workmanship are retained, as the original materials and construction techniques are still visible in this segment of the South Bay Aqueduct and any material replacement or repair has been done with in-kind materials and is indistinguishable from historic-age fabric. The South Bay Aqueduct is able to convey the feeling of a twentieth century public works project completed at a massive scale and can still convey a sense of the time and space in which it was constructed, especially within the both the Dyer Dam and Patterson Dam Project areas. Finally, the segment retains integrity of association as it retains its association with its role as the location of the first water deliveries to contractors in the SWP, association with the original DWR designers and operators, and historical associations with the SWP as a whole as a component of the first conveyance system in the SWP. The South Bay Aqueduct, therefore, retains the requisite level of integrity to convey significance under Criterion A/1 and C/3.
5.1.4 Character-Defining Features

The character-defining features of the South Bay Aqueduct are limited to the following:

- Continued function as a water management and delivery structure within the larger SWP system
- Original 1958–1969 alignment
- Variety of conveyance design types, including open-air, trapezoidal, concrete-lined canals; metal pipeline; and reinforced concrete tunnel segments
- Originally constructed ancillary features of the aqueduct such as overchutes, check structures, culverts, and ladder features constructed as part of the unifying design of the SWP (1959–1974)

5.2 Patterson Reservoir

5.2.1 Site Description

Patterson Reservoir was constructed between 1960 and 1962 as part of the first reach (Surge Tank to Patterson Reservoir) of the South Bay Aqueduct. Patterson Reservoir was designed by engineers at DWR and built by Case-Hood Company contractors. The reservoir is relatively small compared with others in the SWP system—with only 100-acre-feet of capacity—and serves as emergency storage, regulatory storage, and a water delivery point to SWP water contractor Alameda County Flood Control and Water Conservation District.

The reservoir embankment perimeter height is 712.50 feet above mean sea level and the canal-side embankment is 708.72 feet above mean sea level. The inboard side slopes are at a 2:1 ratio and the embankment crest is 15 feet wide around the entire perimeter. The reservoir basin is sloped from north to south to promote drainage through a 12-inch concrete drain line controlled by a 12-inch plug valve. Aqueduct water enters the reservoir on the north side through a 175-foot-long concrete-lined weir. The entire reservoir from embankment crest to embankment crest measures 500 feet northwest–southeast and 475 feet southwest–northeast. The average depth of the reservoir is 29 feet.

5.2.2 National Register of Historic Places/California Register of Historical Resources Statement of Significance

Patterson Reservoir is an operation and regulatory component of the South Bay Aqueduct and shares the same historical and design contexts. As a component of the South Bay Aqueduct, Patterson Reservoir cannot operate independently and should not be considered individually eligible or separate from the South Bay Aqueduct. Despite its age, Patterson Reservoir has never been evaluated. As with the South Bay Aqueduct, Dudek followed the evaluation guidelines established in Water Conveyance Systems in California: Historic Context Development and Evaluation Procedures, developed by JRP and the California Department of Transportation and published in December 2000 (JRP and Caltrans 2000, pp. 92–97). Dudek also researched other components of the SWP that have already been evaluated (Oroville Facilities, in Herbert et al. 2004) or determined significant (the California Aqueduct, in Donaldson 2012 and Ambacher 2011) to help craft the statement of significance. The following statement of significance evaluates Patterson Reservoir in consideration of NRHP and CRHR designation criteria, integrity requirements, and these guidelines.
National Register of Historic Places/California Register of Historical Resources Designation Criteria

The following provides an evaluation of Patterson Reservoir in consideration of NRHP and CRHR designation criteria and integrity requirements.

**Criterion A/1: That are associated with events that have made a significant contribution to the broad patterns of our history.**

As discussed in Section 4.3, Patterson Reservoir is a component of the South Bay Aqueduct (1958–1969), and as a component of the aqueduct, is associated with important, state-level events that have made a significant contribution to the broad patterns of our history—namely, the construction and implementation of the SWP (1959–1974). For a water conveyance system “to be eligible under Criterion A, it must be found to be associated with specific important events (e.g., first long-distance transmission of hydroelectric power) or important patterns of events (e.g., development of irrigated farming)” (JRP and Caltrans 2000, p. 93). The construction of Patterson Reservoir, in its capacity as a component of the South Bay Aqueduct, is a significant first event in SWP’s history: the first water delivery to a contractor. Because the SWP was meant to be self-sufficiently funded by its own water and power sales, the 1962 water deliveries made from Patterson Reservoir also represent a significant event within the larger SWP context. The SWP is eligible under Criterion A/1 within its own right, because it profoundly altered the distribution of water across California, facilitating population increases and agricultural development in the San Joaquin Valley and Southern California. Patterson Reservoir was notably refurbished and raised during the South Bay Aqueduct Improvement and Enlargement Project from 2006 through 2015, but the reservoir retains enough integrity to convey significance under Criterion A/1.

Because of the scale of Patterson Reservoir and its role in the South Bay Aqueduct as a water regulatory body, emergency storage, and water customer delivery point, its role in the greater system does not rise to the level of individual significance. Therefore, Patterson Reservoir is eligible under NRHP/CRHRCriterion A/1 as a component of the South Bay Aqueduct. The period of significance for the South Bay Aqueduct for NRHP/CRHR Criterion A/1 is its construction period, from 1958 to 1969.

**Criterion B/2: That are associated with the lives of persons significant in our past.**

To be found eligible under B/2 the property has to be directly tied to an important person and the place where that individual conducted or produced the work for which he or she is known. Archival research failed to indicate direct association with any individuals that are known to be historic figures at the national, state, or local level. As such, Patterson Reservoir is not known to have any historical associations with people important to the nation’s or state’s past. Due to a lack of identified significant associations with important persons in history, Patterson Reservoir is not eligible under NRHP/CRHR Criterion B/2.

**Criterion C/3: That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.**

Though the South Bay Aqueduct is important for its role within the SWP and is significant as one of the most ambitious and extensive engineering projects in the State of California, Patterson Reservoir’s design and role along the South Bay Aqueduct is unremarkable and does not rise to the same level of significance. Unlike the remainder
of the South Bay Aqueduct, no new technologies were tested at Patterson Reservoir and it does not add to the overall body of engineering in the South Bay Aqueduct or the larger SWP system.

Patterson Reservoir was also refurbished, and its lining was raised for the South Bay Aqueduct Improvement and Enlargement Project (2006–2015). These alterations to design, materials, and workmanship go beyond an acceptable threshold of alteration for a working structure and diminish the ability of Patterson Reservoir to convey significance under NRHP/CRHR Criterion C/3. Therefore, Patterson Reservoir is not eligible either at the individual level or as a component of the South Bay Aqueduct under NRHP/CRHR Criterion C/3.

**Criterion D/4: That have yielded, or may be likely to yield, information important in prehistory or history.**

Patterson Reservoir is not significant as a source, or likely source, of important historical information and it is not likely to yield important information about historic construction methods, materials, or technologies. Therefore, Patterson Reservoir is not eligible under NRHP/CRHR Criterion D/4.

5.2.3 Integrity Discussion

Patterson Reservoir retains sufficient integrity to convey significance under Criterion A/1, but lacks sufficient integrity to be considered under C/3 due to material replacements and minor design alterations. Patterson Reservoir retains its original location and position along the South Bay Aqueduct’s original alignment. It retains integrity of setting, retaining its rural setting among rolling hills east of Livermore, but safely outside of the boundary and setting of the urban area. There have been repairs to Patterson Reservoir since its construction, especially owing to an early grouting and leak issue that was resolved by 1964; however, major changes to the reservoir resulted from the South Bay Aqueduct Improvement and Enlargement Project (2006–2015), which impacted the integrity of design, materials, and workmanship by raising and refurbishing the reservoir. Because Patterson Reservoir is so small, these changes cannot be contextualized or reduced in importance. Despite these alterations, Patterson Reservoir is still able to convey the feeling of a twentieth century public works project and of its role within the larger South Bay Aqueduct system, and can still convey a sense of the time and space in which it was constructed. Finally, Patterson Reservoir retains integrity of association as it retains its association with the original DWR designers and operators, association with its original water supply contractors, and historical associations with the South Bay Aqueduct as the first water delivery location. Therefore, Patterson Reservoir retains the requisite level of integrity to convey significance under Criterion A/1 as a component of the South Bay Aqueduct, but lacks sufficient integrity to be considered under C/3.

5.2.4 Character-Defining Features

The character-defining features of Patterson Reservoir are limited to the following:

- Continued function as a water management and delivery structure within the larger SWP system
- The original 1960–1962 location and relationship to South Bay Aqueduct alignment
5.3 Identification and Evaluation Summary

The South Bay Aqueduct (P-01-011603) was re-evaluated and is eligible under Criterion A/1 for its connection and role within the larger SWP system and for its association with the historical event of the first water delivery in the SWP. The South Bay Aqueduct is also eligible under Criterion C/3 for its role in the testing and application of conveyance system technology for the SWP before it was standardized and implemented elsewhere. The period of significance for the South Bay Aqueduct is its period of construction, 1958 through 1969. Patterson Reservoir is eligible under Criterion A/1 as a component of the South Bay Aqueduct. Patterson Reservoir shares the period of significance for the South Bay Aqueduct, 1958 through 1969.
6 Application of Criteria of Adverse Effects

An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the NRHP in a manner that would diminish the integrity of the property’s location, design, setting, materials, workmanship, feeling, or association. Consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property’s eligibility for the NRHP (36 CFR Part 8005[a][1]).

Tables summarizing the analysis of potential adverse effects are included below for each resource: South Bay Aqueduct (Table 5) and Patterson Reservoir (Table 6).

6.1 Physical Effects of the Proposed Project

The Project would implement different remediation at the Dyer Dam site and Patterson Dam site. At Dyer Dam, the Project would involve rodent burrow and shallow rut remediation for the earthen embankments, improving the V-shaped ditch and stormwater control facility parallel to the north access road, burrow and rut repair to the unlined drainage ditch between South Bay Aqueduct and the west embankment of Dyer Reservoir, and erosion control on the south slope of the Entrance Road. These activities have the potential to affect the South Bay Aqueduct where the Entrance Road crosses the South Bay Aqueduct, and along the east wall of the South Bay Aqueduct. At Patterson Dam, the Project would involve rodent burrow and shallow rut remediation for the earthen embankments, and improvements to the low-level outlet drainage channel including vegetation removal and vegetation control.

The proposed Project has potential to affect two historic resources—the South Bay Aqueduct at both the Dyer Dam location (Refer to Figure 5. Dyer Reservoir Cultural Resources – Built Environment – Area of Potential Effect) and at the Patterson Dam location (Refer to Figure 6. Patterson Reservoir Cultural Resources – Built Environment – Area of Potential Effect), and the Patterson Reservoir only at the Patterson Dam location (Refer again to Figure 6).

6.2 South Bay Aqueduct

6.2.1 Summary of Resource Significance

The South Bay Aqueduct is eligible under NRHP/CRHR Criterion A/1 and C/3. The South Bay Aqueduct segment’s historical and architectural significance are expressed through the following major character-defining features:

- Continued function as a water management and delivery structure within the larger SWP system
- Original 1958–1969 alignment
- Variety of conveyance design types, including open-air, trapezoidal, concrete-lined canals; metal pipeline; and reinforced concrete tunnel segments
- Originally constructed ancillary features such as overchutes, culverts, check structures, and ladder features constructed as part of the unifying design of the initial SWP (1959–1974)
6.2.2 Analysis of Potential Adverse Impacts

The proposed Project activities were analyzed in consideration of the adverse effect examples provided in Title 36 Code of Federal Regulations, Part 800.5(a)(2). The Project will have no adverse effect on the South Bay Aqueduct segments within the APE. For a detailed assessment of potential adverse effects please refer to Table 5.

**Table 5. Application of Criteria of Adverse Effects for the South Bay Aqueduct**

<table>
<thead>
<tr>
<th>Examples of adverse effects. Adverse effects on historic properties include, but are not limited to:</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) Physical destruction of or damage to all or part of the property;</td>
<td>No Adverse Effect. Potential effects to the South Bay Aqueduct at the Dyer Dam site are limited to:</td>
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<td></td>
<td>• proposed burrow and shallow rut remediation for the earthen embankments;</td>
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<td></td>
<td>• improving the V-shaped ditch and stormwater control facility parallel to the north access road;</td>
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<tr>
<td></td>
<td>• burrow and rut repair to the unlined drainage ditch between the South Bay Aqueduct and the west embankment of Dyer Reservoir; and</td>
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<td></td>
<td>• erosion control along the Entrance Road, which intersects the South Bay Aqueduct and passes over a check structure.</td>
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<tr>
<td>At Dyer Dam, there are no proposed changes to the South Bay Aqueduct itself. Burrow and rut repairs and improvements to the unlined drainage ditch between South Bay Aqueduct and the west embankment of Dyer Reservoir do not include changes to the South Bay Aqueduct embankment and will not result in physical destruction or damage to the South Bay Aqueduct.</td>
<td></td>
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<tr>
<td>Additionally, the erosion control activities at the Entrance Road where it crosses the South Bay Aqueduct atop the check structure include sediment removal from the road slope and stabilization of the southern side of the entrance road using riprap. Sediment removal and road stabilization will not affect the South Bay Aqueduct, its embankments, or the check structure’s function.</td>
<td></td>
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<tr>
<td>Potential effects to the South Bay Aqueduct at the Patterson Dam site are like those at Dyer Dam. Proposed activities include burrow and shallow rut remediation, as well as vegetation removal, erosion control, and minor repairs to the low-level drainage channel. No changes proposed will result in physical destruction or damage to the South Bay Aqueduct.</td>
<td></td>
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<tr>
<td>(ii) Alteration of a property, including restoration, rehabilitation, repair, maintenance, stabilization, hazardous material remediation, and provision of handicapped access, that is not consistent with the Secretary’s standards</td>
<td>No Adverse Effect. At Dyer Dam, there are no proposed changes to the South Bay Aqueduct, thus Project activities will not result in the alteration of the South Bay Aqueduct. Drainage improvements only include minor regrading of channel invert slope, erosion control, and minor</td>
</tr>
</tbody>
</table>
Table 5. Application of Criteria of Adverse Effects for the South Bay Aqueduct

<table>
<thead>
<tr>
<th>Examples of adverse effects. Adverse effects on historic properties include, but are not limited to:</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>for the treatment of historic properties (36 CFR part 68) and applicable guidelines;</td>
<td>concrete repairs including grouting and soil-cement slurry used as backfill. The concrete repairs are proposed for spalled concrete and exposed rebar at the wingwall outfall structure. Stabilization improvements to the Entrance Road are expected to have no impact that would result in alterations to the South Bay Aqueduct structure, function, sidewalls, or check structure. At Patterson Dam, no changes are proposed for the South Bay Aqueduct segment that shares a sidewall with Patterson Reservoir, or to the sections of the aqueduct upstream and downstream of Patterson Reservoir. At Patterson Reservoir, therefore, Project activities will not result in the alteration of the South Bay Aqueduct.</td>
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<tr>
<td>(iii) Removal of the property from its historic location;</td>
<td>No Adverse Effect. No changes in location are proposed the South Bay Aqueduct and any contributing structures at either Dyer Dam or Patterson Dam, as part of this Project.</td>
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<tr>
<td>(iv) Change of the character of the property’s use or of physical features within the property’s setting that contribute to its historic significance;</td>
<td>No Adverse Effect. No changes to the use of the South Bay Aqueduct are proposed at either Dyer Dam or Patterson Dam. No changes to the physical features of the South Bay Aqueduct’s setting, which contribute to its historic setting, are proposed.</td>
</tr>
<tr>
<td>(v) Introduction of visual, atmospheric or audible elements that diminish the integrity of the property’s significant historic features;</td>
<td>No Adverse Effect. The introduction of visual, atmospheric, or audible elements is not proposed at either Dyer Dam or Patterson Dam. Therefore, the South Bay Aqueduct’s historic integrity would not be diminished by the introduction of visual, atmospheric, or audible elements.</td>
</tr>
<tr>
<td>(vi) Neglect of a property which causes its deterioration, except where such neglect and deterioration are recognized qualities of a property of religious and cultural significance to an Indian tribe or Native Hawaiian organization; and</td>
<td>No Potential to Effect. Not applicable.</td>
</tr>
<tr>
<td>(vii) Transfer, lease, or sale of property out of Federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property’s historic significance.</td>
<td>No Potential to Effect. No portion of the South Bay Aqueduct, which is not owned by a federal agency, will be transferred out of DWR’s ownership at either Dyer Dam or Patterson Dam as part of the proposed Project.</td>
</tr>
</tbody>
</table>
6.3 Patterson Reservoir

6.3.1 Summary of Resource Significance

Patterson Reservoir was found eligible as a component of the South Bay Aqueduct under NRHP/CRHR Criterion A/1. Patterson Reservoir’s historical significance is expressed through the following character-defining features:

- Continued function as a water management and delivery structure within the larger SWP system
- The original 1960–1962 location and relationship to the South Bay Aqueduct alignment

6.3.2 Analysis of Potential Adverse Effects

The proposed Project activities were analyzed in consideration of the adverse effect examples provided in Title 36 Code of Federal Regulations, Part 800.5(a)(2). The Project will have no adverse effect on the Patterson Reservoir segments within the APE. For a detailed assessment of potential adverse effects please refer to Table 6.

Table 6. Application of Criteria of Adverse Effects for Patterson Reservoir

<table>
<thead>
<tr>
<th>Examples of Adverse Effects. Adverse Effects on Historic Properties Include, but are Not Limited to:</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) Physical destruction of or damage to all or part of the property;</td>
<td>No Adverse Effect. At Patterson Dam and Reservoir, the Project would involve burrow and shallow rut remediation, as well as vegetation removal, erosion control, and minor repairs to the low-level drainage channel. No changes proposed will result in physical destruction or damage to the Patterson Reservoir property.</td>
</tr>
<tr>
<td>(ii) Alteration of a property, including restoration, rehabilitation, repair, maintenance, stabilization, hazardous material remediation, and provision of handicapped access, that is not consistent with the Secretary’s standards for the treatment of historic properties (36 CFR part 68) and applicable guidelines;</td>
<td>No Adverse Effect. The main purpose of this Project is to remediate rodent burrows in the earthen embankment of Patterson Dam, so that Patterson Dam and Reservoir continues their role and function as part of the SWP. Overall, the construction activities are geared toward repairing rodent burrows and shallow ruts in the earthen reservoir embankment using materials similar to the extant reservoir embankment materials, and this appears to be consistent with the Secretary’s Standards for the Treatment of Historic Properties (36 CFR 68) and applicable guidelines. Backfill materials would consist of earthen fill of suitable specifications. The proposed rodent burrow fill materials include impervious native soil, cementitious-soil slurry, low pressure grout, and/or similar embankment material. After filling, repaired areas will be compacted level with the surrounding ground. These new materials would be substantially similar in appearance to the existing reservoir.</td>
</tr>
</tbody>
</table>
### Table 6. Application of Criteria of Adverse Effects for Patterson Reservoir

<table>
<thead>
<tr>
<th>Examples of Adverse Effects. Adverse Effects on Historic Properties Include, but are Not Limited to:</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>embankment. Overall, the proposed construction would not constitute an adverse effect to Patterson Reservoir. Additionally, the Project proposes vegetation removal, erosion control, and minor repairs with in-kind materials to the low-level drainage channel outside of the reservoir. None of these proposed vegetation removal, erosion control, or minor repair actions will result in alterations inconsistent with the Secretary’s standards for the treatment of historic properties.</td>
<td></td>
</tr>
<tr>
<td>(iii) Removal of the property from its historic location;</td>
<td><strong>No Potential to Effect.</strong></td>
</tr>
<tr>
<td>No changes in location are proposed for this Project.</td>
<td></td>
</tr>
<tr>
<td>(iv) Change of the character of the property’s use or of physical features within the property’s setting that contribute to its historic significance;</td>
<td><strong>No Adverse Effect.</strong></td>
</tr>
<tr>
<td>No changes to the use of Patterson Reservoir are proposed for this Project at either the Dyer Dam location or the Patterson Dam location. No changes to the physical features of Patterson Reservoir’s setting, which contribute to its historic significance, are proposed.</td>
<td></td>
</tr>
<tr>
<td>(v) Introduction of visual, atmospheric or audible elements that diminish the integrity of the property’s significant historic features;</td>
<td><strong>No Adverse Effect.</strong></td>
</tr>
<tr>
<td>The Project would not introduce visual, atmospheric, or audible elements; thus Patterson Reservoir’s historic integrity will not be diminished by the introduction of visual, atmospheric, or audible elements.</td>
<td></td>
</tr>
<tr>
<td>(vi) Neglect of a property which causes its deterioration, except where such neglect and deterioration are recognized qualities of a property of religious and cultural significance to an Indian tribe or Native Hawaiian organization; and</td>
<td><strong>No Potential to Effect.</strong></td>
</tr>
<tr>
<td>Not applicable.</td>
<td></td>
</tr>
<tr>
<td>(vii) Transfer, lease, or sale of property out of Federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property’s historic significance.</td>
<td><strong>No Potential to Effect.</strong></td>
</tr>
<tr>
<td>Patterson Reservoir is not owned by a federal agency and will not be transferred out of DWR’s ownership or control as part of the proposed Project.</td>
<td></td>
</tr>
</tbody>
</table>

### 6.4 Finding of No Adverse Effect

The NRHP- and CRHR-eligible South Bay Aqueduct and Patterson Reservoir would not be adversely impacted as a result of the proposed Project. This analysis concludes a finding of **no adverse effect to historic properties**.
Summary of Findings

As a result of archival research, the application of NRHP/CRHR criteria, and guidelines for evaluation of water conveyance systems, two built environment resources/properties over 45 years in age were identified within the Project APE—the South Bay Aqueduct and Patterson Reservoir. Both historic-era properties were identified as eligible for listing in the NRHP and CRHR. Preparation of a detailed effects assessment concludes that the proposed Project would have a less-than-significant impact on historical resources under CEQA and no adverse effect on historic properties in the APE under Section 106. No further documentation is required for NRHP/CRHR eligible resources when a finding of no adverse effect has been reached. Table 7 summarizes eligibility and effects findings for these historic properties.

Table 7. Summary of Findings

<table>
<thead>
<tr>
<th>APE Map Figure</th>
<th>Property Name/Component of the SWP</th>
<th>Property Type</th>
<th>NRHP/CRHR Significance Criteria</th>
<th>Previous CHRS Code (if applicable)</th>
<th>Current CHRS Code</th>
<th>Section 106 Finding of Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>5, 6</td>
<td>South Bay Aqueduct (1958–1969)</td>
<td>Conveyance System (Aqueduct)/Component of the SWP</td>
<td>A/1, C/3</td>
<td>Not applicable</td>
<td>3S: Appears eligible for NR as an individual property through survey evaluation 3CS: Appears eligible for CR as an individual property through survey evaluation</td>
<td>No Adverse Effects</td>
</tr>
<tr>
<td>6</td>
<td>Patterson Reservoir (1960–1962)</td>
<td>Reservoir/Component of the SWP</td>
<td>A/1</td>
<td>Not applicable</td>
<td>3S: Appears eligible for NR as an individual property through survey evaluation 3CS: Appears eligible for CR as an individual property through survey evaluation</td>
<td>No Adverse Effects</td>
</tr>
</tbody>
</table>

Notes: APE = area of potential effect; NRHP = National Register of Historic Places; CRHR = California Register of Historical Resources; CHRS = California Historical Resource Status; SWP = California State Water Project NR = National Register; California Register.
8 References and Preparers

8.1 References Cited


JRP (JRP Historical Consulting Services). 1993. “P-01-011603 (South Bay Aqueduct).” DPR 523-series forms on file at the California Historical Resources Information System Southern Northwest Information Center, Sonoma State University, Rohnert Park.


8.2 List of Preparers

Kathryn Haley, MA, Co-author, Senior Architectural Historian and Built Environment Project Lead
Kate Kaiser, MSHP, Co-author, Architectural Historian

Publications
Nicole Sanchez-Sullivan, Technical Editor
Hannah Wertheimer, Technical Editor
INTENTIONALLY LEFT BLANK
Project Location - Patterson Reservoir

Delta Dams Rodent Burrow Remediation Project

FIGURE 2

BASEMAP SOURCE: DWR 05/05/2021; USGS 7.5-Minute Series Altamont Quadrangle

PROJECT SITE

Project Location - Patterson Reservoir

Delta Dams Rodent Burrow Remediation Project
Proposed Activities at Dyer Dam

Temporary Impact:
- Staging Area
- Construction Access
- Sediment Removal

Permanent Impact:
- Burrow Remediation Area
- Rip Rap
- Aggregate Road Base Repairs
- Regraded Slopes
- Concrete-lined Ditch and Stormwater Control Feature Repairs

Project Site:
- Dyer Reservoir
- Spillway
- Existing Construction Access Road
- Entrance Rd
- Dyer Rd
- South Bay Aqueduct
- Settling Pond

SOURCE: DWR 05/17/2021; ESRI World Imagery

FIGURE 3
Delta Dams Rodent Burrow Remediation Project
**Proposed Activities at Patterson Dam**

**Delta Dams Rodent Burrow Remediation Project**

- **Burrow Remediation Area**
- **Drainage Feature Improvements**
- **Concrete-lined Ditch**
- **Drainage Channel Access**
- **Vegetation Removal**
- **Staging Area**
- **Construction Access**

**SOURCE:** DWR 05/13/2021; ESRI World Imagery

**FIGURE 4**

Patterson Reservoir

Existing Construction Access Road

Project Site

Permanent Impact
- Burrow Remediation Area
- Drainage Feature Improvements
- Concrete-lined Ditch
- Drainage Channel Access

Temporary Impact
- Drainage Feature Improvements - Vegetation Removal
- Staging Area
- Construction Access
Dyer Reservoir Cultural Resources - Built Environment - Area of Potential Effect

SOURCE: Alameda County 2020; DWR 05/17/2021; USGS 2020; ESRI World Imagery
Patterson Reservoir Cultural Resources - Built Environment - Area of Potential Effect

Delta Dams Rodent Burrow Remediation Project

FIGURE 6

SOURCE: DWR 05/13/2021; Alameda County 2020; USGS 2020; ESRI World Imagery
**State of California - The Resources Agency**  
**DEPARTMENT OF PARKS AND RECREATION**  
**PRIMARY RECORD**

**UPDATE FORM**  

<table>
<thead>
<tr>
<th>Page</th>
<th>Resource Name or #:</th>
<th>South Bay Aqueduct</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1.</td>
<td>Other Identifier:</td>
<td>South Bay Aqueduct: Livermore Canal, Dyer Canal</td>
</tr>
</tbody>
</table>

**a. County** Alameda  
**b. USGS 7.5’ Quad** Byron Hot Springs, Calif.  
**c. Address**  
**d. UTM:** (Give more than one for large or linear resources)  
**e. Other Locational Data:** (e.g., parcel #, directions to resource, elevation, decimal degrees, etc., as appropriate)  

The South Bay Aqueduct segment near Dyer Reservoir is located in Alameda County, approximately 13 miles west of the City of Tracy and approximately 7 miles northeast of the City of Livermore. The South Bay Aqueduct segment near Patterson Reservoir is located about 4 miles east of Livermore, California, on the east side of Livermore Valley.

**P3a. Description:** (Describe resource and its major elements. Include design, materials, condition, alterations, size, setting, and boundaries)  

(See Continuation Sheet)

**P3b. Resource Attributes:** (List attributes and codes) HP20. Canal, Aqueduct

**P5a. Photograph or Drawing** (Photograph required for buildings, structures, and objects.)

**P4. Resources Present:**
- Building  
- Structure  
- Object  
- Site  
- District  
- Element of District  
- Other (isolates, etc.)

**P5b. Description of Photo:** South Bay Aqueduct segment near Dyer Reservoir, view looking north, 4/22/2021 (IMG_4992)

**P6. Date Constructed/Age and Source:** Historic  
- Prehistoric  

**P7. Owner and Address:**  
Department of Water Resources  
1416 Ninth Street, Room 604  
Sacramento, CA 95814

**P8. Recorded by:** (Name, affiliation, and address)  
Kate Kaiser, MSHP,  
Architectural Historian, Dudek  
38 N. Marengo Avenue  
Pasadena, CA 91101

**P9. Date Recorded:** 6/29/2021

**P10. Survey Type:** (Describe) intensive level survey

**P11. Report Citation:** (Cite survey report and other sources, or enter “none.”)  

**Attachments:** NONE  
- Location Map  
- Continuation Sheet  
- Building, Structure, and Object Record  
- Archaeological Record  
- District Record  
- Linear Feature Record  
- Milling Station Record  
- Rock Art Record  
- Artifact Record  
- Photograph Record  
- Other (List):

---

*Required information*
*Resource Name or # (Assigned by recorder) South Bay Aqueduct

*Map Name:  
1. Byron Hot Springs, Calif.  
2. Altamont, Calif.

*Scale: 1:24,000

*Date of map:  
(1) 2010  
(2) 2015
Resource Name or # (Assigned by recorder): South Bay Aqueduct

Map Name: (1) Byron Hot Springs, Calif. (2) Altamont, Calif.

Scale: 1:24,000

Date of map: (1) 2010 (2) 2015

Recorded Segments: South Bay Aqueduct (constructed 1958-1969)
**Resource Name or #** (Assigned by recorder)  South Bay Aqueduct  
**NRHP Status Code**  3S, 3CS  
**Resource Name or #** (Assigned by recorder)  South Bay Aqueduct  
**NRHP Status Code**  3S, 3CS

B1. Historic Name: South Bay Aqueduct  
B2. Common Name: South Bay Aqueduct  
B3. Original Use: water conveyance  
B4. Present Use: water conveyance  
B5. Architectural Style: utilitarian  
B6. Construction History: (Construction date, alterations, and date of alterations)

1958 – South Bay Aqueduct designed, exploratory excavations begins, construction begins  
1960 – Construction of Patterson Reservoir begins  
1962 – South Bay Aqueduct segment from Surge Tank to Patterson Reservoir completed (includes Brushy Creek Pipeline, Dyer Canal, Altamont Pipeline, and Livermore Canal segments)  
1963 – Alameda Division Canal segment completed  
1964 – La Costa Tunnel and Mission Tunnel segments completed  
(See Continuation Sheet)

B7. Moved?  X No  Yes  Unknown  Date:  
B8. Related Features: Patterson Reservoir, Bethany Reservoir, Lake Del Valle, Santa Clara Terminal Facilities  
B9a. Architect: California Department of Water Resources  
B9b. Builder: Case-Hood  
B10. Significance: Theme: Water Development and Supply in California  
Area: Engineering  
Property Type: Aqueduct/canal  
Applicable Criteria: A/1, C/3  
(See Continuation Sheet)

As a result of archival research, the application of NRHP/CRHR Criteria, and guidelines for evaluation water conveyance systems, the South Bay Aqueduct is eligible individually under Criteria A/1 for its association with significant events in SWP’s history as the first completed conveyance system and its role in the first successful water delivery in 1962. The South Bay Aqueduct is also eligible under Criteria A/1 as a component of the larger SWP system and the events which led to its implementation, and under Criteria C/3 for its role in the testing and application of conveyance system technology in the SWP. The period of significance for the South Bay Aqueduct is 1958-1969.

B11. Additional Resource Attributes: (List attributes and codes)  
B12. References: (See Continuation Sheet)  
B13. Remarks:

Segments of the South Bay Aqueduct were previously recorded in 1993 and 1994, however, the resource had not yet reached the 45- and 50-year age thresholds for significance consideration.

B14. Evaluator: Kate Kaiser, MSHP  
B15. Date of Evaluation: 03/15/2021  
(Sketch Map with north arrow required.)

(This space reserved for official comments.)
L1. Historic and/or Common Name: South Bay Aqueduct

L2a. Portion Described: □ Entire Resource ■ Segment □ Point Observation

b. Location of point or segment: (Provide UTM coordinates, decimal degrees, legal description, and any other useful locational data. Show the area that has been field inspected on a Location Map.)

Dyer segment: start - Zone 10S, 616658.9 mE/4180101.5 mN, end - Zone 10S, 616654.6 mE/4179415.1 mN

Patterson segment: start - Zone 10S, 615814.0 mE/4173337.0 mN, end Zone - 10S, 616410.9 mE/4172879.2 mN

L3. Description: (Describe construction details, materials, and artifacts found at this segment/point. Provide plans/sections as appropriate.)

(See Section P3a. Description, Continuation Sheet)

L4. Dimensions: (In feet for historic features and meters for prehistoric features)

a. Top Width: average 30-32 feet

b. Bottom Width: 8 feet

c. Height or Depth: average 10 feet deep, 1.5 feet freeboard

d. Length of Segment:
   - Dyer segment: 300 feet, 215 feet
   - Patterson segment: 2,613 feet

L5. Associated Resources:

(See Section B8. Related Features)

L6. Setting: (Describe natural features, landscape characteristics, slope, etc., as appropriate.):

Segments of the South Bay Aqueduct are above ground canal portions and are located outside of dense urban areas, among the rolling hills and suburban or agricultural settings it was originally developed in.

L4e. Sketch of Cross-Section

Facing: throughout length

L8a. Photograph, Map or Drawing

L7. Integrity Considerations:

(See Section B10. Significance, Continuation Sheet)

L8b. Description of Photo, Map, or Drawing (View, scale, etc.)


L9. Remarks: None

L10. Form Prepared by: (Name, affiliation, and address)

Kate Kaiser, MSHP, Architectural Historian,
Dudek, 38 N. Marengo Avenue
Pasadena, CA 91101

L11. March 15, 2021
P3a. Description (Continued):
The South Bay Aqueduct was constructed between 1958 and 1969, and the Project APE occurs within the first reach of the South Bay Aqueduct from Surge Tank to Patterson Reservoir, which was complete and operational by 1962. The South Bay Aqueduct is within the Project APE along the Dyer Canal segment, adjacent to Dyer Reservoir, and adjacent to the APE at Patterson Reservoir in the Livermore Canal segment. The South Bay Aqueduct, in its entirety, extends 121 miles from Bethany Reservoir to the Santa Clara Terminal Facilities.

The South Bay Aqueduct segment adjacent to the Dyer Reservoir APE is a trapezoidal shaped, open-air, concrete-lined canal. Because the South Bay Aqueduct segment adjacent to Dyer Reservoir is on flat terrain, it uses an all-cut style, meaning the canal is cut directly into and below the ground surface. The bottom width of the canal is 8 feet and the sides are sloped at a 1.5:1 ratio. The average aqueduct depth is 10 feet with a 1.5-foot freeboard and the average top width of the canal from embankment crest to embankment crest is 30–32 feet. The lining material is unreinforced concrete, 3 inches thick. Within the Dyer Reservoir APE, the Entrance Road ports over the South Bay Aqueduct at a road that is situated atop Check 3, a check structure. Checks share a standardized design along the length of the South Bay Aqueduct. At the check structure inlet, the South Bay Aqueduct walls invert towards the check structure at an angle, narrowing the stream as it passes through the check gates, and flare on the outlet side as well returning to the aqueduct width. Checks in open-canal sections of the South Bay Aqueduct are equipped with two radial gates and stoplog slots. Downstream of Dyer Reservoir, and the Dyer Reservoir outlet canal, also within the APE, there is a box over chute structure spanning the South Bay Aqueduct. Over chute structures also share a standardized design along the length of the South Bay Aqueduct. They are typically 6 feet wide and have 4-foot-tall sidewalls, with no roof or cover, and are supported by two reinforced concrete piers set into the sloping inner aqueduct wall, below the embankment crest.

The South Bay Aqueduct segment adjacent to the Patterson Reservoir APE is a trapezoidal shaped, open-air, concrete-lined canal. Along its length there are four styles of aqueduct canals, depending on where they sit in relation to the terrain: deep-cut, all-cut, all-fill, and cut-and-fill or hillside styles. Because the South Bay Aqueduct segment adjacent to Patterson Reservoir is on a hillslope terrain, it uses a cut-and-fill style, meaning the canal is banked into a hillside and the uphill side is cut directly into and below the ground surface and the downhill side is built up with fill, in this case forming and sharing the wall with Patterson Reservoir. The bottom width of the canal is 8 feet and the sides are sloped at a 1.5:1 ratio. The average aqueduct depth is 10 feet with a 1.5-foot freeboard and the average top width of the canal from embankment crest to embankment crest is 30–32 feet. The lining material is unreinforced concrete, 3 inches thick. Within the Patterson Reservoir APE, the South Bay Aqueduct briefly shares its southwest sidewall with Patterson Reservoir, but this does not affect the design, shape, or size of the aqueduct.

Figure 5. South Bay Aqueduct: Dyer segment, Dyer Reservoir in background, view looking northeast (IMG_4990)
Figure 6. South Bay Aqueduct: Dyer segment near Dyer reservoir, view looking east (IMG_4066)

Figure 7. South Bay Aqueduct, Dyer Segment, looking south to check structure (IMG_4889)
Figure 8. South Bay Aqueduct: Dyer segment, view looking south to confluence of Dyer Reservoir outlet canal and South Bay Aqueduct and overchute structure (IMG_5038)

Figure 9. South Bay Aqueduct: Patterson segment, adjacent to Patterson Reservoir, view looking north (IMG_4128)
Figure 10. Patterson segment of South Bay Aqueduct, adjacent to Patterson Reservoir, view looking south (IMG_4129)

Figure 11. Patterson segment of South Bay Aqueduct, adjacent to Patterson Reservoir, view looking south (IMG_4163)
Figure 12. Patterson segment of South Bay Aqueduct, adjacent to Patterson Reservoir, view looking northwest
(IMG_4164)

Figure 13. Patterson segment of South Bay Aqueduct, at modern pipe crossing, view looking northeast
(IMG_4172)
Figure 14. Patterson segment of South Bay Aqueduct, north of reservoir, view looking northwest (IMG_4178)

Figure 15. Patterson segment of South Bay Aqueduct, north of reservoir, view looking southeast (IMG_4179)

B6. Construction History (Continued):
1965 – Del Valle Pipeline and Sunol Pipeline segments completed. Niles Pipeline and Santa Clara Division Pipeline completed, Santa Clara Terminal Facilities completed
1966 – Construction of Del Valle Dam begins
1968 – Del Valle Dam completed, Lake Del Valle filled
1967-1969 – Modifications to South Bay Aqueduct
1969 – Del Valle Branch pipeline completed

B10. Significance (Continued):
Historical Context of the South Bay Aqueduct

Planning the South Bay Aqueduct and Related Facilities

San Francisco and the Bay Area cities were some of the first in the state to secure their own municipal water from non-local sources. In 1914, the City of San Francisco began construction on the Hetch Hetchy Aqueduct (1914-1934), which brought water from the Tuolumne River to the Bay. In 1923, Oakland and nine other East Bay cities formed the East Bay Municipal Utility District in 1923 and built The Mokelumne Aqueduct (1924-1928) from the Pardee Reservoir to the Bay. However, the south bay cities and agricultural producers in Alameda and Contra Costa Counties, near the Delta, were unaccounted for (EBMUD 1932: 3-4; JRP and Caltrans 2000, p. 73).

Attempting to make up for the deficiencies in water distribution, State Engineer Edward Hyatt presented the State Water Plan to the California Legislature in 1931. Hyatt’s plan called for aqueducts, canals, and conduits to transport water from Northern California to the Sacramento and San Joaquin Valleys, and included provision for the Contra Costa Conduit, which was one of the 1931 State Water Plan units proposed for immediate development and was to serve the industrial and agricultural areas along the south shore of Suisun Bay (Exhibit A). (DPW 1930, p. 44).

![Exhibit A](image)

Exhibit A. Major Units of State Plan for development of water resources in California: Contra Costa Conduit (DPW 1930, Plate VII).

Hyatt’s Plan was approved but fell through due to the state’s inability to issue bonds during the Great Depression, but was revived in the Central Valley Project, one of President F.D. Roosevelt’s emergency infrastructure programs. In the Central Valley Plan, the Contra Costa Canal was posed instead. This relatively small component of the Central Valley Project was to deliver water to industrial, agricultural and residential properties in Contra Costa County, and mitigate the effects of pumping water from the Delta. Construction on the 48-mile Contra Costa Canal began in 1937 but completion was delayed until 1948 (Herbert et al. 2004, p. 2-10–2-12; JRP and Caltrans 2000, p. 74).

The South Bay counties, however, continued to fall short of meeting its water needs and saltwater intrusion into the groundwater wells became a growing concern. The “South Bay Aqueduct,” conceptually, was proposed as part of A.D. Edmonston’s 1951 Feather River Project proposal. As discussed above in Section 4.4.2.3, the Feather River Project proposed a dam for the Feather River near Oroville, two powerplants, a Delta cross-channel, an electric transmission system, an aqueduct between the Delta and Santa Clara and Alameda Counties, and another aqueduct to Central and Southern California. The South Bay Aqueduct was included in the 1955 revisions to the Feather River Project and was authorized for construction in 1957 as part of the Feather River Project (DWR 1974a, p. 7-8, 46; Oakland Tribune 1956, pg. 1).
The route of the aqueduct was a point of some debate and was altered several times in the planning process. Nevertheless, design work and land acquisition for the South Bay Aqueduct began in 1958. Exploratory tests for the proposed tunnels began in summer 1958, officially kicking off the construction period for the South Bay Aqueduct. The project was briefly in danger in 1959, when the State Legislature considered abandoning all work on the South Bay Aqueduct, as a cost-saving measure, DWR, the South Bay Cities, and Governor Edmund G. Brown continued to advocate the South Bay Aqueduct, which was needed not only to serve growing South Bay cities, but to combat saltwater intrusion into groundwater wells. The State Legislature eventually funded the South Bay Aqueduct in fall 1959, and construction bids for the first reach of the Aqueduct opened by October. The initial project work would encompass a 2-mile canal segment, a pumping plant and the Bethany Dam and Reservoir. On November 23, a groundbreaking ceremony for the South Bay Aqueduct project was given by Governor Brown and DWR officials (DWR 1974b, p. 41-44; LAT 1958, p. 31; Oakland Tribune 1958a, pg. 11; 1958b, pg. 19; 1959a, pg. 11; 1959b. pg. 1; 1959c, p. 29; 1959d, pg. 19; 1959e, pg. 9).

South Bay Aqueduct was already under construction, but it was also included in the SWP with the passage of the 1959 Burns-Porter Act, which specified it as “a South Bay aqueduct extending to terminal reservoirs in the Counties of Alameda and Santa Clara” (Water Code Sections 12934.d.2). Burns-Porter did not specifically provide for the construction of the Patterson Reservoir, or the pump stations and storage reservoirs along the South Bay Aqueduct which aid in its water delivery contracts and flow regulation. Still, as the South Bay Aqueduct was already underway specifying it in the Burns-Porter Act had no effect on the progress of construction (DWR 1974a, p. 46; Oakland Tribune 1961, pg. 12; Water Code Sections 12934.d.2).

Because the South Bay Aqueduct was designed before the California Aqueduct, South Bay Aqueduct was the location where a variety of water conveyance types were piloted, before the open-air, trapezoidal, concrete-lined canal was adopted for the California Aqueduct.

**Construction of the Patterson Reservoir**

The South Bay Aqueduct was completed in phases, reach by reach, starting from the Bethany Reservoir. In 1960, DWR took bids for the Patterson Reservoir, the 2.4-mile Brushy Creek First-Stage Pipeline, the 2-mile Dyer Canal, the 2.3-mile Altamont Pipeline, and a 1.8-mile portion of the Livermore Canal, constituting the first reach of the South Bay Aqueduct from the Surge Tank to Patterson Reservoir. Contractor Case-Hood (F.W. Case Corp., Hood Construction Co. Hood Northwest Pipeline Co. and Hood Flexible Pipe Cleaning Co.) from Chico won the contract for this reach as well as for the construction of Patterson Dam and Reservoir. The first reach contract included the construction of Brushy Creek Pipeline, Dyer Canal, and the Livermore Canal, and also included the construction of Patterson Reservoir (Exhibit B) (DWR 1974b, pg. 68; Oakland Tribune 1960a, p. 22; 1961, p. 12).

![Exhibit B. Patterson Reservoir as-built sheets (DWR 1974b, p. 78).](Image)
When Case-Hood finished the work at Patterson Reservoir in 1962, the Surge Tank to Patterson Reservoir reach was complete. On May 10, 1962, Governor Brown again came out to dedicate the South Bay Aqueduct, this time celebrating the first water delivery, which was made from Patterson Reservoir to water contractor Alameda County Flood Control and Water Conservation District ( Exhibit C). This was the first water delivery completed for the SWP. Contracts were let immediately after the dedication ceremony for the next segment of the South Bay Aqueduct, from Patterson Reservoir to Lake Del Valle. (DWR 1974, p. 79; Oakland Tribune 1962, p. 1; OMR 1962, p. 7.)

**Finishing the South Bay Aqueduct**

Success was short-lived though as the Patterson Reservoir, upon being filled, immediately began to leak. The repair work began in 1964 and was completed by the end of the year. During repair construction, temporary earthen dams had to be placed on the South Bay Aqueduct above and below the Patterson Reservoir, and another 24-inch temporary pipeline was placed to make water deliveries in the meantime. Multiple repairs, additions, and secondary facilities, including a Second-Stage Pipeline from South Bay Pumping Plant to the Dyer Canal, were completed by contractors while construction of the South Bay Aqueduct continued (DWR 1974b, p. 79; Oakland Tribune 1964, p. 8).

While repairs to Patterson progressed, the next reach from Patterson Reservoir to Lake Del Valle was built in stages. The 6.9-mile Alameda Canal, which was constructed from August 1962 to August 1963 by contracting firm McGuire and Hester. The Alameda Canal was the last open-air trapezoidal canal in the South Bay Aqueduct. All facilities past the Alameda Canal were pipelines or tunnels. The next section before Lake Del Valle was the Del Valle Pipeline, which was completed along with the Sunol Pipeline in March 1965. These two pipelines, along with the La Costa and Mission Tunnel finished in 1964, form a pressure conveyance system to the Santa Clara Pipeline, the final segment before the Santa Clara Terminal Facilities. The Niles and Santa Clara Division Pipeline was complete by May 1965, concluding the Aqueduct conveyance component construction. Just a month later, the South Bay Aqueduct Terminal Facilities were completed in June 1965 by the Kaiser Steel Corporation. At this point, even without the completion of Lake Del Valle, the South Bay Aqueduct was operational and could make water deliveries to its three water contractors. The South Bay Aqueduct was officially dedicated on July 1, 1965 by Governor Brown, DWR Director William E. Warne, and other state officials (DWR 1974b, p. 68, 79-113; Oakland Tribune 1965, p. 19).

Construction still continued after the dedication. Lake Del Valle, a regulatory storage reservoir that also provided flood control, recreation and fish and wildlife enhancement benefits was still not complete. The final design of the Del Valle Dam was finally approved in 1964, and construction on the dam began in 1966, concluding in 1968. The Del Valle Branch pipeline, which connected the reservoir storage and pumping plants to the larger Aqueduct was complete by spring 1969 (DWR 1974b, p. 68; DWR 1974c, p. 242).

The South Bay Aqueduct required several repairs, corrections, and additions as construction went on, because of economic factors, and increasing water demands as construction went on. As one of the first components of the SWP to be complete enough to make water deliveries, once water districts and municipalities saw the South Bay Aqueduct's success, more groups wanted to secure their water contracts. Design changes to the South Bay Aqueduct include the two-stage construction of the Brushy Creek Pipeline, which added a second pipeline due to the demands once the first South Bay Aqueduct Reach became operational in 1962. Adjustments were also made to the Santa Clara Terminal Facilities, which were originally designed as a terminal dam and large reservoir, but had to be adjusted to a 2.5-million gallon steel tank and water treatment plant after geologic and seismic conditions were deemed too unfavorable for a large reservoir. The Doolan Branch Pipeline and reservoir were also added in 1966 make deliveries to southern Contra Costa County, and a tunnel extension under Highway 50 was complete by 1966 to connect the Doolan Pipeline to the Altamont Pipeline. In addition, additional support structures like pumps and checking structures had to be added at various points to the Aqueduct as needed when repairs or additional construction took place. More modifications were completed after Lake Del Valle.
went into operation in 1968 and continued through 1969. Overall, the South Bay Aqueduct Project was completed in stages, but officially concluded in 1969 (DWR 1974b, p. 44, 68, 79; Oakland Tribune 1964, p. 8).

South Bay Aqueduct was constructed from 1958 to 1969 and was the first aqueduct delivery system to be completed in the SWP, predating the completion of the California Aqueduct or the Delta Pumping Plant, as well as the first SWP project to make water deliveries to contract-holders, as early as 1962. Though all of the Aqueducts in the SWP generally follow the same design concepts and principles, the South Bay Aqueduct was designed prior to DWR's development of the general aqueduct design, and experiences from designing and constructing the South Bay Aqueduct were later applied to the larger California Aqueduct and the North Bay Aqueduct. Differences include experiments with various canal lining materials, various siphon and check structures, various pipeline materials and designs, and the placement and number of maintenance access roads (DWR 1974b, p. 41, 46-48).

**South Bay Aqueduct Post-Construction and Expansion: 1969-2021**

Exhibit D. Dyer Reservoir under construction, 2011 (DWR n.d.)

NETR 2021; Oakland Tribune 1964, p. 8).

**NRHP/CRHR Significance**

The South Bay Aqueduct has been partially, previously recorded in 1993 and 1994 as the South Bay Aqueduct (JRP 1993). The initial evaluation, now 26 years out of date, summarizes the significance of the South Bay Aqueduct as “a conduit of considerable importance to the local economies of Alameda and Santa Clara Counties,” and the first completed component of the SWP, which “represents one of the most ambitious public works projects undertaken by the State of California and rivals the CVP in its role in the state water delivery system.” However, because the South Bay Aqueduct was constructed by 1965, it did not meet the 50-year age threshold in 1994 and was recommended ineligible by the recorders. It also did not yet reach a level of significance necessary to meet Criterion Consideration G. Because of the age of this evaluation and because the South Bay Aqueduct has achieved the necessary 45- and 50-year age thresholds, Dudek has re-evaluated the South Bay Aqueduct below.

The following statement of significance evaluates the South Bay Aqueduct in consideration of NRHP and CRHR designation criteria, integrity requirements, and these guidelines.

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1 Dudek has found through extensive archival research and communication with DWR that the actual construction dates for the South Bay Aqueduct are 1958 to 1969. However, the above-ground canal portions of the South Bay Aqueduct, including Dyer Canal, Livermore Canal and Alameda Canal, were complete by 1965.
Criterion A/1: That are associated with events that have made a significant contribution to the broad patterns of our history.

The South Bay Aqueduct is significant under Criteria A/1 for its association as an integral component of the SWP (1959 to 1974). The SWP is significant as a massive innovative public works program recognized nationally that resulted in substantially altering water distribution throughout the State of California. The SWP profoundly altered the distribution of water across California, facilitating population increases and agricultural development of the San Joaquin Valley and Southern California. The South Bay Aqueduct, as a component of the larger SPW system, was the first completed facility to make water deliveries, as well as providing acutely needed water infrastructure that was greatly important to the communities it served. The South Bay Aqueduct was initiated in 1958 and completed by 1969. The period of significance for the SWP is 1959 to 1974, the years of construction for the first phase.

As discussed in detail in Section 4.3 Historic Development of the South Bay Aqueduct, the South Bay Aqueduct is representative of two significant "firsts" within the SWP: the construction and implementation of the State Water Project (1959-1974), and its role as the first completed component of the SWP and the first to make water deliveries, providing acutely needed water infrastructure important to the communities it served. As such, the South Bay Aqueduct is individually eligible for its significance under NRHP/CRHR Criterion A/1 as a key component of the SWP system.

Criterion B/2: That are associated with the lives of persons significant in our past.

To be found eligible under B/2 the property has to be directly tied to an important person and the place where that individual conducted or produced the work for which he or she is known. While the South Bay Aqueduct is tangentially related to important figures such as Governor Edmund G. Brown and DWR chief William E. Warne, it has no direct association to these figures and should not be considered the place where Brown or Warne produced the work they are known for. Archival research also failed to indicate direct association with any other individuals that are known to be historic figures at the national, state, or local level and the South Bay Aqueduct. As such, the South Bay Aqueduct is not known to have any historical associations with people important to the nation's or state's past. Due to a lack of identified significant associations with important persons in history, the South Bay Aqueduct is not eligible under NRHP/CRHR Criterion B/2.

Criterion C/3: That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.

The South Bay Aqueduct is a component of its role within the SWP, one of the most ambitious and extensive engineering projects in the State of California. The SWP features 34 storage facilities, 20 pumping plants, 4 pumping-generating plants, 5 hydroelectric power plants, and over 700 miles of open canals and pipelines. The South Bay Aqueduct comprises 121 miles of SWP’s conveyance systems, as well as three of its storage facilities and two pumping plants. The South Bay Aqueduct is also important for its role as the conveyance system where designs were first tested; the results of these tests were later applied to the remainder of the SWP conveyance systems based on their engineering success and economic feasibility. Because construction of the South Bay Aqueduct was designed in 1958, partially complete by 1962, and effectively complete by 1965, design problems were solved on the smaller South Bay Aqueduct before they were applied to the California Aqueduct. The South Bay Aqueduct is where the SWP tested the side wall-slope ratio, thickness of concrete lining, and material types for the fill structure beneath the aqueduct, based on material experiments and material failures (leaks) along the different reaches and canal segments of the aqueduct. The South Bay Aqueduct is also one of the only large-scale conveyance systems in the SWP that uses extensive pipelines and tunnels, which were later abandoned for the open-air, trapezoidal-shaped canals, as that design was more economical than tunnels or pipelines. Though open-air canals were the preferred design for larger SWP structures like the California Aqueduct, the South Bay Aqueduct embodies three types of water conveyance construction in the SWP with various open-air canals, concrete tunnels, and pipelines along its length.

Therefore, the South Bay Aqueduct is eligible as a component of the SWP for its significance under NRHP/CRHR Criterion C/3 for its innovative engineering and design values, as the pilot design for the SWP’s water conveyance systems, and for acting as the test laboratory for conveyance system designs, lining materials, and other design components before they were implemented across the entire SWP.

Criterion D/4: That have yielded, or may be likely to yield, information important in prehistory or history.

The South Bay Aqueduct is not significant as a source, or likely source, of important historical information nor does it appear likely to yield important information about historic construction methods, materials or technologies. Therefore, the South Bay Aqueduct is not eligible under NRHP/CRHR Criterion D/4.
Integrity Discussion

The South Bay Aqueduct segments recorded for this project retain sufficient integrity to convey their associative significance under Criteria A/1 and C/3. It retains integrity of location and is in its original alignment, which is one of the critical aspects of integrity required to convey significance. The aqueduct also largely retains its integrity of setting. While some sections of the South Bay Aqueduct are underground as tunnels and pipelines, where visible as an aboveground canal, it was originally located outside of dense urban areas; and located among the rolling hills and suburban or agricultural settings it was originally developed in. Though there have been several repairs and an expansion project for the South Bay Aqueduct, it still retains the basic aspects of its original design. Of the two segments of the Aqueduct examined in this report, the Patterson Reservoir section of the project APE retains the character-defining features of the original South Bay Aqueduct design. Integrity of design and setting are diminished by the presence of the newly constructed Dyer Reservoir and within the Dyer Reservoir APE. However, when understood that the aboveground canal sections are dozens of miles long and largely retain their integrity and that the entire resource is 121 miles long and largely retains its integrity, the impact to the setting and changes to the design of the aqueduct by Dyer Reservoir are contextualized as less impactful. Integrity of materials and workmanship are retained, as the original materials and construction techniques are still visible in this segment of the South Bay Aqueduct and any material replacement or repair has been done with in-kind materials and is indistinguishable from historic-age fabric. The South Bay Aqueduct is able to convey the feeling of a twentieth century public works project completed at a massive scale and can still convey a sense of the time and space in which it was constructed, especially within the Project APE. Finally, the segment retains integrity of association as it retains its association with its role as the location of the first water deliverers to contractors in the SWP, association with the original DWR designers and operators, and historical associations with the SWP as a whole as a component of the first conveyance system in the SWP. The South Bay Aqueduct, therefore, retains the requisite level of integrity to convey significance under Criterion A/1 and C/3.

Character Defining Features

The character defining features of the South Bay Aqueduct are limited to:

- Continued function as a water management and delivery structure within the larger SWP system,
- Original 1958-1969 alignment,
- Variety of conveyance design types: Open-air, trapezoidal, concrete-lined canals; metal pipeline; and reinforced concrete tunnel segments, and
- Originally constructed ancillary features such as overchutes, culverts, and ladder features constructed as part of the unifying design of the SWP project (1959 to 1974).

B12. References (Continued):


https://water.ca.gov/Programs/State-Water-Project/SWP-Facilities


JRP (JRP Historical Consulting Services). 1993. "P-01-011603 (South Bay Aqueduct)." DPR 523-series forms on file at the CHRIS Southern Northwest Information Center, Sonoma State University, Rohnert Park.


Property Name: South Bay Aqueduct
Page 19 of 19

UPDATE FORM


Prior to March and April of 2006, recording events ‘c’ and ‘d’ of P-01-010629 (South Bay Aqueduct) were assigned individually to P-01-001770 and P-01-0010772. At this time, these resources were all subsumed under P-01-0010629 (Livermore Valley Canal Bridge).

This is likely due to the depiction of 7 bridges and 3 canals on the location map of recording event ‘b’ of P-01-010629. The locations of these associated resources are provided in the location map for context and are not meant to be included as part of the Livermore Valley Canal Bridge.

On November 30, 2015 recording events 'c' and 'd' have been removed from P-01-010629 and assigned the designation P-01-011603 as recording events ‘a’ and ‘b’ of that Primary record. All unrelated NWIC GIS features have been removed.

Date: November 30, 2015
NWIC Staff: C. Mikulik
May depict confidential cultural resource locations.

do not distribute.

location of P-01-010629 as depicted in the NWIC database prior to November 30, 2015.
Locations of P-01-010629 and P-01-011603 as depicted in the NWIC database after November 30, 2015.
SITE NAME: South Bay Aqueduct, Alameda County
SITE NUMBER: SBA-1
PIPELINE LOCATION: Milepost 1.7 Altamont Alternative Route
(Altamont quad #4452 1953[81] UTM: Zone10; 616520/4172530)

Description of Feature

Site EBA-1 is the point at which the APE for the proposed Mojave Pipeline Northward Expansion Project crosses the South Bay Aqueduct at Patterson Pass Road. The South Bay Aqueduct is a conduit operated by the State of California as part of the State Water Project [SWP] system (for a history of this system see Section 2.2 above). The South Bay Aqueduct runs from Bethany Reservoir, near Tracy, in a generally north-south alignment to the San Jose area. The first portion of the conduit, from the South Bay Pumping Plant at Bethany Reservoir to the south side of State Route 580, is piped underground. The next section, approximately 11 miles, is open canal, as it winds to a point southeast of Livermore where the aqueduct is piped for the rest of its length. Beginning west of Livermore, the aqueduct roughly parallels the south side of Highway 84, and then the east side of State Route 680, to the Warm Springs District. At this point the pipeline turns southeast toward San Jose and ends at the Santa Clara Terminal Facilities on Penitencia Creek (DWR 1969: 23). The total length (43.7 miles) of the South Bay Aqueduct includes 11.5 miles of canal, 30.6 miles of pipeline and 1.6 miles of tunnels (DWR 1965b: 40). Pumps lift water at two places along the aqueduct, one at Bethany Reservoir and the other at Lake Del Valle (DWR 1969: 14).

JRP recorded three points along the South Bay Aqueduct, SBA-1, SW-55 and SW-55(s). The APE for SBA-1 crosses the aqueduct very near the northern end of its only open canal portion. At SW-55 the proposed pipeline alignment crosses the aqueduct near a wooden bridge that spans the canal. The other recordan point [SW-55(s)] is where the aqueduct crosses under Greenville Road. Because of high water flowing in the canal JRP could not record its depth or bottom width, however, the approximate top width of the aqueduct at the recordation points is 30 feet.

History of Feature

The first phase of work on the SWP, including construction of the South Bay Aqueduct, took place from 1961 to 1972. The Department of Water Resources [DWR] built the aqueduct between 1961 and 1965, with the first deliveries of delta water to the Livermore Valley beginning in 1962. When this conduit, the first element of the SWP undertaken by the state, was completed it served the Alameda County Flood Control and Water Conservation District Zone 7, the Alameda County Water District, and the Santa Clara County Flood Control and Water District (DWR 1966: I-3; Cooper 1968: 244). By 1969 these three agencies had a combined annual entitlement of 188,000 acre-feet of water used "principally for municipal and industrial uses, and for some agricultural use" (DWR 1969: 4, 23).
Evaluation of Feature

The South Bay Aqueduct does not appear to be eligible for listing in the National Register of Historic Places. Although it is a conduit of considerable importance to the local economies of Alameda and Santa Clara Counties, the South Bay Aqueduct is far less than 50 years old. Applying National Register guidelines to this property, it appears that the aqueduct is simply too young to warrant National Register listing.

As discussed in Section 2.2, the SWP, which includes the colossal California Aqueduct, represents one of the most ambitious public works projects undertaken by the State of California and rivals the CVP in its role in the state's water delivery system. [In raw numbers -- acre-feet stored and delivered, miles of canals, numbers of reservoirs, acres served, and so forth -- the CVP is a much larger system. The SWP serves a somewhat different purpose, supplying municipal-industrial users as well as agricultural users.] In the absence of the 50-year exclusion, the South Bay Aqueduct would seem to be an obvious candidate for National Register listing, on the basis of its part in a system using bold engineering solutions and its role in the state's economy and society. In evaluating significance for the South Bay Aqueduct, however, it must be recognized that the canal is not only less than 50 years old, it is not yet 30 years old. With a property so young, the 50-years exclusion becomes a major consideration in assessing eligibility.

In addressing the 50 year exclusion, two considerations must be taken into account. First, National Register guidelines permit listing properties that have achieved significance within the last 50 years, provided these properties are "exceptionally" significant. Second, the same guidelines and regulations make a common sense distinction between properties which are nearly 50 years old and those which are much younger. The guidelines observe:

Correspondingly, the more recently a property has achieved significance, the more justification will be required to demonstrate its value as an exceptionally important historic resource in the field architecture, history, archeology, or culture. A property listed 10 or 15 years after it has achieved significance requires clear, widespread recognition of its importance while a property that has been significant for almost 50 years can more easily be justified as exceptionally significant in a more limited context. (Keeper of the National Register, 1979: 3)

The South Bay Aqueduct was constructed between 1961 and 1965, but the conduit began delivery to some areas as early as 1962. However, it could not be fully operational until Oroville Dam, the key storage facility for the system, was completed in the early 1970s. The system, then, was fully completed some time between 20 and 25 years ago.

In applying the National Register guidelines to this property, one must ultimately balance significance against age, recognizing that an increasingly higher degree of significance must be established that is inversely proportional to the property's age. Unfortunately, National Register guidelines offer no clear formula for striking this balance. The only clear guidance is that quoted earlier, stating the requirement that very young properties must be shown to possess a very high degree of significance.

In the absence of other guidance, one must conclude that the Keeper of the National Register intended to list very few properties that achieved significance in very recent years. Certainly, a few properties from the 1960s and 1970s have been so listed. These properties tend to be
National Historic Landmarks, associated with events or trends of national significance. Several sites associated with the Man in Space program have been so listed as have a few of the works of the masters of the International Style of commercial and residential design. The guidelines and practices of the Keeper indicate, however, that very young properties should be listed sparingly.

Recognizing the language of the guidelines and the practices mentioned earlier, it would appear that the South Bay Aqueduct does not meet the eligibility criteria for listing in the National Register. The property should nonetheless be regarded as a sensitive resource, recognizing that there is no obvious point at which it may qualify for National Register listing. The canal would meet the criteria, for example, if it were 50 years old and probably if it were 40 years old. At some point in the not too distant future, the aqueduct will meet the criteria.
1. Name of Feature: South Bay Aqueduct

2. Location of recordation: This site is where the aqueduct intersects Patterson Pass Road one half mile west of its junction with Flynn Road (Photograph 1).

3. Other locations for recording this feature: SW-55, SW-55(s)

4. Structures at or near this location: The aqueduct is siphoned under Patterson Pass Road.

5. Setting at this location: Pastures on rolling hills are located to the east, sloping generally downhill to the Livermore Valley on the west. There is a ranch complex to the southeast, and a water filtration plant to the northwest.

6. Integrity considerations for this feature: Site SBA-1 is completely intact and appears to be in its original condition. The aqueduct was built in the 1970s.

7. Attributes at this location (measurements in feet):
   - Top width: 30
   - Bottom width: Unable to measure -- canal full
   - Height or Depth: Unable to measure -- canal full
   - Material: Concrete lined

8. Sketch, in cross section: Looking north

[Sketch diagram with measurements]
SITE NAME: South Bay Aqueduct, Alameda County
SITE NUMBER: SBA-1
QUAD SHEET: "Altamont Quadrangle," USGS: 1953, photorevised 1901
PIPELINE LOCATION: MP 1.7  Altamont Alternative
SITE NAME: South Bay Aqueduct, San Joaquin County
SITE NUMBER: SW-55
PIPELINE LOCATION: Milepost 245.9, Mainline

(Altamont quad #4452 1953[81] UTM: Zone 10; 615760/4174840; 615880/4174660)

Description of Feature

Site SW-55 is the point at which the APE for the proposed Mojave Pipeline Northward Expansion Project crosses the South Bay Aqueduct, a conduit operated by the State of California as part of the State Water Project ISWPI system (for a history of this system see Section 2.2 above). The South Bay Aqueduct runs from Bethany Reservoir, near Tracy, in a generally north-south alignment to the San Jose area. The first portion of the conduit, from the South Bay Pumping Plant at Bethany Reservoir to the south side of State Route 580, is piped underground. The next section, approximately 11 miles, is open canal, as it winds to a point southeast of Livermore where the aqueduct is piped for the rest of its length. Beginning west of Livermore, the aqueduct roughly parallels the south side of Highway 84, and then the east side of State Route 580, to the Warm Springs District. At this point the pipeline turns southeast toward San Jose and ends at the Santa Clara Terminal Facilities on Ponitenoa Creek (DWR 1969: 23). The total length (43.7 miles) of the South Bay Aqueduct includes 11.5 miles of canal, 30.6 miles of pipeline and 1.6 miles of tunnels (DWR 1965b: 40). Pumps lift water at two places along the aqueduct, one at Bethany Reservoir and the other at Lake Del Valle (DWR 1969: 14).

JRP recorded two points along the South Bay Aqueduct, SW-55 and SW-55(s). The APE crosses the aqueduct very near the northern end of its only open canal portion. The conduit is piped underground about 0.6 mile north of the APE, therefore JRP recorded only a southern comparison point. At SW-55 the proposed pipeline alignment crosses the aqueduct near a wooden bridge that spans the canal; this is the only recordation point within the APE (Photograph 1). The other recordation point [SW-55(s)] is about 2.5 miles southwest of the APE where the aqueduct crosses under Greenville Road (Photograph 2). Because of high water flowing in the canal JRP could not record its depth or bottom width, however, the approximate top width of the aqueduct for both recordation points is 30 feet.

History of Feature

The first phase of work on the SWP, including construction of the South Bay Aqueduct, took place from 1961 to 1972. The Department of Water Resources [DWR] built the aqueduct between 1961 and 1965, with the first deliveries of delta water to the Livermore Valley beginning in 1962. When this conduit, the first element of the SWP undertaken by the state, was completed it served the Alameda County Flood Control and Water Conservation District Zone 7, the Alameda County Water District, and the Santa Clara County Flood Control and Water District (DWR 1966: I-3; Cooper 1968: 244). By 1969 these three agencies had a combined annual entitlement of 188,000 acre-feet of
water used "principally for municipal and industrial uses, and for some agricultural use" (DWR 1969: 4, 23).

Evaluation of Feature

The South Bay Aqueduct does not appear to be eligible for listing in the National Register of Historic Places. Although it is a conduit of considerable importance to the local economies of Alameda and Santa Clara Counties, the South Bay Aqueduct is far less than 50 years old. Applying National Register guidelines to this property, it appears that the aqueduct is simply too young to warrant National Register listing.

As discussed in Section 2.2, the SWP, which includes the colossal California Aqueduct, represents one of the most ambitious public works projects undertaken by the State of California and rivals the CVP in its role in the state’s water delivery system. [In raw numbers -- acre-feet stored and delivered, miles of canals, numbers of reservoirs, acres served, and so forth -- the CVP is a much larger system. The SWP serves a somewhat different purpose, supplying municipal-industrial users as well as agricultural users.] In the absence of the 50-year exclusion, the South Bay Aqueduct would seem to be an obvious candidate for National Register listing, on the basis of its part in a system using bold engineering solutions and its role in the state’s economy and society. In evaluating significance for the South Bay Aqueduct, however, it must be recognized that the canal is not only less than 50 years old, it is not yet 30 years old. With a property so young, the 50-years exclusion becomes a major consideration in assessing eligibility.

In addressing the 50 year exclusion, two considerations must be taken into account. First, National Register guidelines permit listing properties that have achieved significance within the last 50 years, provided these properties are "exceptionally" significant. Second, the same guidelines and regulations make a common sense distinction between properties which are nearly 50 years old and those which are much younger. The guidelines observe:

Correspondingly, the more recently a property has achieved significance, the more justification will be required to demonstrate its value as an exceptionally important historic resource in the field of architecture, history, archeology, or culture. A property listed 10 or 15 years after it has achieved significance requires clear, widespread recognition of its importance while a property that has been significant for almost 50 years can more easily be justified as exceptionally significant in a more limited context. (Keeper of the National Register, 1979: 3)

The South Bay Aqueduct was constructed between 1961 and 1965, but the conduit began delivery to some areas as early as 1962. However, it could not be fully operational until Oroville Dam, the key storage facility for the system, was completed in the early 1970s. The system, then, was fully completed some time between 20 and 25 years ago.

In applying the National Register guidelines to this property, one must ultimately balance significance against age, recognizing that an increasingly higher degree of significance
must be established that is inversely proportional to the property's age. Unfortunately, National Register guidelines offer no clear formula for striking this balance. The only clear guidance is that quoted earlier, stating the requirement that very young properties must be shown to possess a very high degree of significance.

In the absence of other guidance, one must conclude that the Keeper of the National Register intended to list very few properties that achieved significance in very recent years. Certainly, a few properties from the 1960s and 1970s have been so listed. These properties tend to be National Historic Landmarks, associated with events or trends of national significance. Several sites associated with the Man in Space program have been so listed as have a few of the works of the masters of the International Style of commercial and residential design. The guidelines and practices of the Keeper indicate, however, that very young properties should be listed sparingly.

Recognizing the language of the guidelines and the practices mentioned earlier, it would appear that the South Bay Aqueduct does not meet the eligibility criteria for listing in the National Register. The property should nonetheless be regarded as a sensitive resource, recognizing that there is no obvious point at which it may qualify for National Register listing. The canal would meet the criteria, for example, if it were 50 years old and probably if it were 40 years old. At some point in the not too distant future, the aqueduct will meet the criteria.
1. Name of Feature: South Bay Aqueduct

2. Location of recordation: Where the proposed gas pipeline intersects with the South Bay Aqueduct, approximately 0.7 mile east of Greenville Road and 0.5 mile south of State Route 580, on the Christensen A-C Ranch.

3. Other locations for recording this feature: SW 55(a)

4. Structures at or near this location: The proposed gas pipeline alignment crosses the aqueduct diagonally, just south of the northwest corner of a wooden bridge which spans the aqueduct at this point. A road from the Christensen ranch leads to the bridge, which sits on wooden pilings, and provides access to range lands east of the canal. About 60 feet south of the bridge, a water pipe spans the aqueduct. A gravel road parallels the west side of the aqueduct, while a small dirt road runs along the aqueduct's east side.

5. Setting at this location: The range lands of the Christensen A-C Ranch surround the site, the ranch and outbuildings are approximately 0.3 miles to the northwest.

6. Integrity considerations for this feature: The aqueduct was constructed as part of the State Water Plan and was completed to terminus in 1965.

7. Attributes at this location (measurements in feet):
   - Top width: 29
   - Bottom width: Unable to observe due to high flows
   - Height or Depth: Unable to observe due to high flows
   - Material: Concrete

8. Sketch, in cross section: Looking north
1. Name of Feature: South Bay Aqueduct

2. Location of recordation: Where the aqueduct crosses under Greenville Road, 0.1 mile south of East Avenue, and 2.5 miles southwest of the APE.

3. Other locations for recording this feature: SW-55

4. Structures at or near this location: A concrete bridge carries Greenville Road traffic over the fenced-off aqueduct. There is a gravel access road that parallels the aqueduct’s north side.

5. Setting at this location: To the northwest is open land, with the Lawrence Livermore Nuclear Laboratory beyond. East of Greenville Road, on either side of the aqueduct, is pasture land.

6. Integrity considerations for this feature: The aqueduct was constructed as part of the State Water Plan and was completed to terminus in 1965.

7. Attributes at this location (measurements in feet):
   - Top width: 30 (estimated measurement taken from the bridge – canal fenced off)
   - Bottom width: Unable to observe due to high flows
   - Height or Depth: Unable to observe due to high flows
   - Material: Concrete

8. Sketch, in cross section. Looking west

   ![Sketch of the South Bay Aqueduct](image-url)
Photograph Number: 1
Site Number: SW-55
Common Name: South Bay Aqueduct
Camera Facing: East

Photograph Number: 2
Site Number: SW-55
Common Name: South Bay Aqueduct
Camera Facing: West
SITE NAME: South Bay Aqueduct, San Joaquin County
SITE NUMBER: SW-55
PIPELINE LOCATION: Milepost 245.9, Mainline
FEATURE SW-55, REROUTE A-32
ADDENDUM TO HISTORIC FEATURE EVALUATION FORM

ALT #
ORIGINAL SITE #
SEGMENT
MILEPOSTS
QUAD NO., NAME

A-32
SW-55
Mainline
245.9
41, Altamont (1953/1901)

COMMENTS:

The original alignment at SW-55, the South Bay Aqueduct, passed to the north approximately 1.2 miles from where the Alternate Route crosses the aqueduct at the junction of Patterson Pass Road with the canal. JRP field crews recorded this new location on April 16, 1994. This site form, with evaluation, can be found as an attachment to the main report, as Site SBA-1. (see Site Form SW-51 in main body of Class III Report)
State of California  The Resources Agency
DEPARTMENT OF PARKS AND RECREATION

PRIMARY RECORD

Other Listings
Review Code
Reviewer
Date

Page of *Resource Name or #: (Assigned by recorder)  Patterson Reservoir

P1. Other Identifier:

*P2. Location:  □ Not for Publication  ■ Unrestricted
*a. County  Alameda and (P2c, P2e, and P2b or P2d.  Attach a Location Map as necessary.)
*b. USGS 7.5' Quad  Altamont, Calif.  Date  2015  T 03S ; R 03E ; NW 1/4 of SW 1/4 of Sec 06;  MD B.M.
c. Address  8750 Patterson Pass Road  City Livermore  Zip  94550
d. UTM:  (Give more than one for large and/or linear resources)  Zone  10S.  616069.9  mE/  4173077.1  mN
e. Other Locational Data:  (e.g., parcel #, directions to resource, elevation, decimal degrees, etc., as appropriate)

Patterson Reservoir is located about 4 miles east of Livermore, California, on the east side of Livermore Valley. Patterson Reservoir is a 104-acre-foot off-stream storage facility along the South Bay Aqueduct at the terminus of the Livermore Valley Canal. This reservoir, which was constructed between 1960 and 1962, provides off-line storage for the Zone 7 Water Agency (Zone 7) Patterson Pass Water Treatment Plant. Water enters the reservoir by flowing over a 175-foot-long reinforced concrete ogee-crest weir from the adjoining South Bay Aqueduct. Assessor Parcel Number (APN) 99B-5600-7; Elevation: 713 amsl; Decimal Degrees: 37.6975449°, -121.68331498829583°

*P3a. Description:  (Describe resource and its major elements.  Include design, materials, condition, alterations, size, setting, and boundaries)

(See Continuation Sheet)

*P3b. Resource Attributes:  (List attributes and codes)
*P4. Resources Present:  □ Building  ■ Structure  □ Object  □ Site  □ District  □ Element of District  □ Other (Isolates, etc.)

*P5a. Photograph or Drawing  (Photograph required for buildings, structures, and objects.)

*P5b. Description of Photo:  (view, date, accession #)

*P6. Date Constructed/Age and Source:  ■ Historic  □ Prehistoric
□ Both 1962 (DWR 1974c)

*P7. Owner and Address:
Department of Water Resources
1416 Ninth Street, Room 604
Sacramento, CA 95814

*P8. Recorded by:  (Name, affiliation, and address)

*P9. Date Recorded:  3/15/2021

*P10. Survey Type:  (Describe)

*P11. Report Citation:  (Cite survey report and other sources, or enter "none.")

Burrow Remediation Project at Dyer Reservoir and Dam and Patterson Reservoir and Dam, Alameda County, California, Prepared by Dudek for DWR, April 2021

*Attachments:  □ NONE  ■ Location Map  ■ Continuation Sheet  ■ Building, Structure, and Object Record
□ Archaeological Record  □ District Record  □ Linear Feature Record  □ Milling Station Record  □ Rock Art Record
□ Artifact Record  □ Photograph Record  □ Other (List):
*Resource Name or # (Assigned by recorder)  Patterson Reservoir

*Map Name:  Altamont, Calif.  *Scale:  1:24,000  *Date of map:  2015

Planning the San Francisco Aqueduct

Patterson Reservoir

**NRHP Status Code** 3S, 3CS

**Resource Name or #** (Assigned by recorder)

| Page | 3 of 13 |

B1. Historic Name: Patterson Reservoir

B2. Common Name: Patterson Reservoir

B3. Original Use: regulatory storage for the South Bay Aqueduct; and water delivery point for Alameda County Flood Control and Water Conservation District

B4. Present Use: regulatory storage and water delivery point

**Architectural Style:** utilitarian

**Construction History:** (Construction date, alterations, and date of alterations)

1958 – South Bay Aqueduct designed, exploratory excavations begins, construction begins

1960 – Construction of Patterson Reservoir begins

1962 – South Bay Aqueduct segment from Surge Tank to Patterson Reservoir completed (includes Brushy Creek Pipeline, Dyer Canal, Altamont Pipeline, and Livermore Canal segments)

1964 – repairs made to Patterson Reservoir liner

1965 – remainder of South Bay Aqueduct completed

1980 – repair to Patterson Reservoir after earthquake

2009-2015 – Patterson Reservoir refurbished and liner raised

**Moved?** □No ☑Yes ☐Unknown Date: ____________ Original Location: ____________

**Related Features:** P-01-011603 South Bay Aqueduct


**Significance:** Theme Water Development and Supply in California  Area Engineering

**Perpetual Significance** 1958-1969  Property Type Reservoir  Applicable Criteria A/1

(Discuss importance in terms of historical or architectural context as defined by theme, period, and geographic scope. Also address integrity.)

Patterson Reservoir is eligible under Criteria A/1 as a component of the South Bay Aqueduct, however it does not rise to the level of individual significance and should instead be considered within the context of the overarching South Bay Aqueduct system. The Patterson Reservoir is an operational and regulatory component of the South Bay Aqueduct and shares the same historical and design contexts. Patterson Reservoir, constructed 1960-1962, falls within the period of significance for the South Bay Aqueduct, 1958-1969.

**Planning the South Bay Aqueduct and Related Facilities**

San Francisco and the Bay Area cities were some of the first in the state to secure their own municipal water from non-local sources. In 1914, the City of San Francisco began construction on the Hetch Hetchy Aqueduct (1914-1934), which brought water from the Tuolumne River to the Bay. (See Continuation Sheet)

B11. Additional Resource Attributes: (List attributes and codes)

**References:** (See Continuation Sheet)

B13. Remarks:

**Evaluator:** Kate Kaiser, MSHP

**Date of Evaluation:** 03/15/2020

(This space reserved for official comments.)
P3a. Description (Continued):

Patterson Reservoir was constructed between 1960 and 1962 as part of the first reach (Surge Tank to Patterson Reservoir) of the South Bay Aqueduct (Figures 3-7). Patterson Reservoir was designed by engineers at DWR and built by Case-Hood Company contractors. The reservoir is relatively small compared with others in the SWP system, only 100 acre-feet capacity, and serves as emergency storage, regulatory storage, and a water delivery point to SWP water contractor Alameda County Flood Control and Water Conservation District.

The reservoir embankment perimeter height is 712.50 feet amsl and the canal-side embankment is 708.72 feet amsl. The Inboard side slopes are at a 2:1 ration and the embankment crest is 15 feet wide, around the entire perimeter. The reservoir basin is sloped from north to south to promote drainage through a 12-inch concrete drain line which is controlled with a 12-inch plug valve. Aqueduct water enters the reservoir on the north side through a 175-foot long concrete-lined weir. The entire reservoir from embankment crest to embankment crest measures 500 feet NW-SE and 475 feet SW-NE. The average depth of the reservoir is 29 feet.

Figure 3. Patterson Reservoir, view looking southeast (IMG_4158)
Figure 4. Patterson Reservoir, view looking south (IMG_4159)

Figure 5. Dyer segment near Dyer Reservoir, view looking northeast (IMG_4119)
Figure 6. Patterson Reservoir, view looking southeast (IMG_4146)

Figure 7. Patterson Reservoir, view looking east (IMG_4152)

**B10. Significance (Continued):**
In 1923, Oakland and nine other East Bay cities formed the East Bay Municipal Utility District in 1923 and built The Mokelumne Aqueduct (1924-1928) from the Pardee Reservoir to the Bay. However, the south bay cities and agricultural producers in Alameda and Contra Costa Counties, near the Delta, were unaccounted for (EBMUD 1932: 3-4; JRP and Caltrans 2000, p. 73).

Attempting to make up for the deficiencies in water distribution, State Engineer Edward Hyatt presented the State Water Plan to the California Legislature in 1931. Hyatt’s plan called for aqueducts, canals, and conduits to transport water from Northern California to the Sacramento and San Joaquin Valleys, and included provision for the Contra Costa Conduit, which was one of the 1931 State Water Plan units proposed for immediate development and was to serve the industrial and agricultural areas along the south shore of Suisun Bay (Exhibit A). (DPW 1930, p. 44).

Hyatt’s Plan was approved but fell through due to the state’s inability to issue bonds during the Great Depression, but was revived in the Central Valley Project, one of President F.D. Roosevelt’s emergency infrastructure programs. In the Central Valley Plan, the Contra Costa Canal was posed instead. This relatively small component of the Central Valley Project was to deliver water to industrial, agricultural and residential properties in Contra Costa County, and mitigate the effects of pumping water from the Delta. Construction on the 48-mile Contra Costa Canal began in 1937 but completion was delayed until 1948 (Herbert et al. 2004, p. 2-10–2-12; JRP and Caltrans 2000, p. 74).

The South Bay counties, however, continued to fall short of meeting its water needs and saltwater intrusion into the groundwater wells became a growing concern. The “South Bay Aqueduct,” conceptually, was proposed as part of A.D. Edmonston’s 1951 Feather River Project proposal. As discussed above in Section 4.4.2.3, the Feather River Project proposed a dam for the Feather River near Oroville, two powerplants, a Delta cross-channel, an electric transmission system, an aqueduct between the Delta and Santa Clara and Alameda Counties, and another aqueduct to Central and Southern California. The South Bay Aqueduct was included in the 1955 revisions to the Feather River Project and was authorized for construction in 1957 as part of the Feather River Project (DWR 1974a, p. 7-8, 46; Oakland Tribune 1956, pg. 1).

The route of the aqueduct was a point of some debate and was altered several times in the planning process. Nevertheless, design work and land acquisition for the South Bay Aqueduct began in 1958. Exploratory tests for the proposed tunnels began in summer 1958, officially kicking off the construction period for the South Bay Aqueduct. The project was briefly in danger in 1959, when the State Legislature considered abandoning all work on the South Bay Aqueduct, as a cost-saving measure, DWR, the South Bay Cities, and Governor Edmund G. Brown continued to advocate the South Bay Aqueduct, which was needed not only to serve growing South Bay cities, but to combat saltwater intrusion into groundwater wells. The State Legislature eventually funded the South Bay
Aqueduct in fall 1959, and construction bids for the first reach of the Aqueduct opened by October. The initial project work would encompass a 2-mile canal segment, a pumping plant and the Bethany Dam and Reservoir. On November 23, a groundbreaking ceremony for the South Bay Aqueduct project was given by Governor Brown and DWR officials (DWR 1974b, p. 41-44; LAT 1958, p. 31; Oakland Tribune 1958a, pg. 11; 1958b, pg. 19; 1959a, pg. 11; 1959b. pg. 1; 1959c, p. 29; 1959d, pg. 19; 1959e, pg. 9).

South Bay Aqueduct was already under construction, but it was also included in the SWP with the passage of the 1959 Burns-Porter Act, which specified it as “a South Bay aqueduct extending to terminal reservoirs in the Counties of Alameda and Santa Clara” (Water Code Sections 12934.d.2). Burns-Porter did not specifically provide for the construction of the Patterson Reservoir, or the pump stations and storage reservoirs along the South Bay Aqueduct which aid in its water delivery contracts and flow regulation. Still, as the South Bay Aqueduct was already underway specifying it in the Burns-Porter Act had no effect on the progress of construction (DWR 1974a, p. 46; Oakland Tribune 1961, pg. 12; Water Code Sections 12934.d.2).

Because the South Bay Aqueduct was designed before the California Aqueduct, South Bay Aqueduct was the location where a variety of water conveyance types were piloted, before the open-air, trapezoidal, concrete-lined canal was adopted for the California Aqueduct.

Construction of the Patterson Reservoir (1960-1962)

The South Bay Aqueduct was completed in phases, reach by reach, starting from the Bethany Reservoir. In 1960, DWR took bids for the Patterson Reservoir, the 2.4-mile Brushy Creek First-Stage Pipeline, the 2-mile Dyer Canal, the 2.3-mile Altamont Pipeline, and a 1.8-mile portion of the Livermore Canal, constituting the first reach of the South Bay Aqueduct from the Surge Tank to Patterson Reservoir. Contractor Case-Hood (F.W. Case Corp., Hood Construction Co. Hood Northwest Pipeline Co. and Hood Flexible Pipe Cleaning Co.) from Chico won the contract for this reach as well as for the construction of Patterson Dam and Reservoir. The first reach contract included the construction of Brushy Creek Pipeline, Dyer Canal, and the Livermore Canal, and also included the construction of Patterson Reservoir (Exhibit B) (DWR 1974b, pg. 68; Oakland Tribune 1960a, p. 22; 1961, p. 12).
While repairs to Patterson progressed, the next reach from Patterson Reservoir to Lake Del Valle was built in stages. The 6.9-mile Alameda Canal, which was constructed from August 1962 to August 1963 by contracting firm McGuire and Hester. The Alameda Canal was the last open-air trapezoidal canal in the South Bay Aqueduct. All facilities past the Alameda Canal were pipelines or tunnels. The next section before Lake Del Valle was the Del Valle Pipeline, which was completed along with the Sunol Pipeline in March 1965. These two pipelines, along with the La Costa and Mission Tunnel finished in 1964, form a pressure conveyance system to the Santa Clara Pipeline, the final segment before the Santa Clara Terminal Facilities. The Niles and Santa Clara Division Pipeline was complete by May 1965, concluding the Aqueduct conveyance component construction. Just a month later, the South Bay Aqueduct Terminal Facilities were completed in June 1965 by the Kaiser Steel Corporation. At this point, even without the completion of Lake Del Valle, the South Bay Aqueduct was operational and could make water deliveries to its three water contractors. The South Bay Aqueduct was officially dedicated on July 1, 1965 by Governor Brown, DWR Director William E. Warne, and other state officials (DWR 1974b, p. 68, 79-113; Oakland Tribune 1965, p. 19).

Construction still continued after the dedication. Lake Del Valle, a regulatory storage reservoir that also provided flood control, recreation and fish and wildlife enhancement benefits was still not complete. The final design of the Del Valle Dam was finally approved in 1964, and construction on the dam began in 1966, concluding in 1968. The Del Valle Branch pipeline, which connected the reservoir storage and pumping plants to the larger Aqueduct was complete by spring 1969 (DWR 1974b, p. 68; DWR 1974c, p. 242).

The South Bay Aqueduct required several repairs, corrections, and additions as construction went on, because of economic factors, and increasing water demands as construction went on. As one of the first components of the SWP to be complete enough to make water deliveries, once water districts and municipalities saw the South Bay Aqueduct’s success, more groups wanted to secure their water contracts. Design changes to the South Bay Aqueduct include the two-stage construction of the Brushy Creek Pipeline, which added a second pipeline due to the demands once the first South Bay Aqueduct Reach became operational in 1962. Adjustments were also made to the Santa Clara Terminal Facilities, which were originally designed as a terminal dam and large reservoir, but had to be adjusted to a 2.5-million gallon steel tank and water treatment plant after geologic and seismic conditions were deemed too unfavorable for a large reservoir. The Doolan Branch Pipeline and reservoir were also added in 1966 make deliveries to southern Contra Costa County, and a tunnel extension under Highway 50 was complete by 1966 to connect the Doolan Pipeline to the Altamont Pipeline. In addition, additional support structures like pumps and checking structures had to be added at various points to the Aqueduct as needed when repairs or additional construction took place. More modifications were completed after Lake Del Valle went into operation in 1968 and continued through 1969. Overall, the South Bay Aqueduct Project was completed in stages, but officially concluded in 1969 (DWR 1974b, p. 44, 68, 79; Oakland Tribune 1964, p. 8).

When Case-Hood finished the work at Patterson Reservoir in 1962, the Surge Tank to Patterson Reservoir reach was complete. On May 10, 1962, Governor Brown again came out to dedicate the South Bay Aqueduct, this time celebrating the first water delivery, which was made from Patterson Reservoir to water contractor Alameda County Flood Control and Water Conservation District (Exhibit C). This was the first water delivery completed for the SWP. Contracts were let immediately after the dedication ceremony for the next segment of the South Bay Aqueduct, from Patterson Reservoir to Lake Del Valle. (DWR 1974, p. 79; Oakland Tribune 1962, p. 1; OMR 1962, p. 7.)

**Finishing the South Bay Aqueduct (1962-1969)**

Success was short-lived though as the Patterson Reservoir, upon being filled, immediately began to leak. The repair work began in 1964 and was completed by the end of the year. During repair construction, temporary earthen dams had to be placed on the South Bay Aqueduct above and below the Patterson Reservoir, and another 24-inch temporary pipeline was placed to make water deliveries in the meantime. Multiple repairs, additions, and secondary facilities, including a Second-Stage Pipeline from South Bay Pumping Plant to the Dyer Canal, were completed by contractors while construction of the South Bay Aqueduct continued (DWR 1974b, p. 79; Oakland Tribune 1964, p. 8).

**Exhibit C. Dedication ceremony at Patterson Reservoir, South Bay Aqueduct, 1962 (The Bancroft Library, University of California Berkeley.)**
South Bay Aqueduct was constructed from 1958 to 1969 and was the first aqueduct delivery system to be completed in the SWP, predating the completion of the California Aqueduct or the Delta Pumping Plant, as well as the first SWP project to make water deliveries to contract-holders, as early as 1962. Though all of the Aqueducts in the SWP generally follow the same design concepts and principles, the South Bay Aqueduct was designed prior to DWR’s development of the general aqueduct design, and experiences from designing and constructing the South Bay Aqueduct were later applied to the larger California Aqueduct and the North Bay Aqueduct. Differences include experiments with various canal lining materials, various siphon and check structures, various pipeline materials and designs, and the placement and number of maintenance access roads (DWR 1974b, p. 41, 46-48).

South Bay Aqueduct Post-Construction and Expansion: 1969-2021

The Patterson Reservoir, as well as segments of the South Bay Aqueduct, have been affected by earthquakes along the Calaveras fault multiple times throughout their lifespan, resulting in repairs, including in 1980, 1997 and 2001. Other improvements were to individual features of the South Bay Aqueduct, including for South Bay Aqueduct Improvement and Enlargement Project from 2006-2015. This project restored the first 16.38 miles of the South Bay Aqueduct to originally designed flow rate of 300 cubic feet per second (cfs). Part of this enlargement was to add Dyer Reservoir, another regulating reservoir, to the South Bay Aqueduct. Construction of Dyer Reservoir was completed between 2008 and 2012 (Exhibit D). This project also enlarged the South Bay Pumping Plant, which concluded in 2014, and various modifications to Dyer Canal, Livermore Canal, Alameda Canal, and Del Valle Pipeline, such as linear raises and maintenance road repair. Notably, as part of this project, the lining and embankment for Patterson Reservoir was also raised and refurbished in 2015 (DWR 2021; DWR 2019, p. 122; DWR 1974b, p. 79; NETR 2021; Oakland Tribune 1964, p. 8).

NRHP/CRHR Significance

The Patterson Reservoir is an operational and regulatory component of the South Bay Aqueduct and shares the same historical and design contexts. As a component of the South Bay Aqueduct, Patterson Reservoir cannot operate independently and should not be considered individually eligible or separate from the South Bay Aqueduct. Despite its age, Patterson Reservoir has never been evaluated. AS with the South Bay Aqueduct, Dudek followed the evaluation guidelines established in Water Conveyance Systems in California: Historic Context Development and Evaluation Procedures, developed by JRP and Caltrans and published in December 2000 (JRP and Caltrans 2000, p. 92-97). Dudek also researched other components of the SWP that have already been evaluated (Oroville Facilities, in Herbert et al 2004) or determined significant (the California Aqueduct, in Donaldson 2012 and Ambacher 2011), to help craft the statement of significance. The following statement of significance evaluates the Patterson Reservoir in consideration of NRHP and CRHR designation criteria, integrity requirements, and these guidelines.

Criterion A/1: That are associated with events that have made a significant contribution to the broad patterns of our history.

As discussed in Section 4.3, Patterson Reservoir is a component of the South Bay Aqueduct (1958–1969), and as a component of the aqueduct, is associated with important, state-level events that have made a significant contribution to the broad patterns of our history—the construction and implementation of the SWP (1959–1974). For a water conveyance system “to be eligible under Criterion A, it must be found to be associated with specific important events (e.g., first long-distance transmission of hydroelectric power) or important patterns of events (e.g., development of irrigated farming)” (JRP and Caltrans 2000, p. 93). The construction of Patterson Reservoir, in its capacity as a component of the South Bay Aqueduct, is a significant first event in SWP’s history: the first water delivery to a contractor. Because the SWP was meant to be self-sufficiently funded by its own water and power sales, the 1962 water deliveries made from Patterson Reservoir also represent a significant event within the larger SWP context. The SWP is eligible under Criterion A/1 within its own right, because it profoundly altered the distribution of water across California, facilitating population increases and agricultural development in the San Joaquin Valley and Southern California. Patterson Reservoir was notably
refurbished and raised during the South Bay Aqueduct Improvement and Enlargement Project from 2006–2015, but the reservoir retains enough integrity to convey significance under Criteria A/1.

Because of the scale of Patterson Reservoir and its role in the South Bay Aqueduct as a water regulatory body, emergency storage, and water customer delivery point, its role in the greater system does not rise to the level of individual significance. Therefore, Patterson Reservoir is eligible under NRHP/CRHR Criterion A/1 as a component of the South Bay Aqueduct. The period of significance for the South Bay Aqueduct for NRHP/CRHR Criteria A/1 is its construction period: 1958–1969.

**Criterion B/2: That are associated with the lives of persons significant in our past.**

To be found eligible under B/2 the property has to be directly tied to an important person and the place where that individual conducted or produced the work for which he or she is known. Archival research failed to indicate direct association with any individuals that are known to be historic figures at the national, state, or local level and Patterson Reservoir. As such, Patterson Reservoir is not known to have any historical associations with people important to the nation’s or state’s past. Due to a lack of identified significant associations with important persons in history, the Patterson Reservoir is not eligible under NRHP/CRHR Criterion B/2.

**Criterion C/3: That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.**

Though the South Bay Aqueduct is important for its role within the SWP and is significant as one of the most ambitious and extensive engineering projects in the State of California, Patterson Reservoir’s design and role along the South Bay Aqueduct is unremarkable and does not rise to the same level of significance. Unlike the remainder of the South Bay Aqueduct, no new technologies were tested at Patterson Reservoir and it does not add to the overall body of engineering in the South Bay Aqueduct or the larger SWP.

Patterson Reservoir was also refurbished, and its lining was raised for the South Bay Aqueduct Improvement and Enlargement Project (2006–2015). These alterations to design, materials, and workmanship go beyond an acceptable threshold of alteration for a working structure and diminish the ability of Patterson Reservoir to convey significance under NRHP/CRHR Criterion C/3. Therefore, Patterson Reservoir is not eligible either at the individual level or as a component of the South Bay Aqueduct under NRHP/CRHR Criterion C/3.

**Criterion D/4: That have yielded, or may be likely to yield, information important in prehistory or history.**

Patterson Reservoir is not significant as a source, or likely source, of important historical information nor does it appear likely to yield important information about historic construction methods, materials or technologies. Therefore, Patterson Reservoir is not eligible under NRHP/CRHR Criterion D/4.

**Integrity Discussion**

Patterson Reservoir retains sufficient integrity to convey significance under Criteria A/1 but lacks sufficient integrity to be considered under C/3 due to material replacements and minor design alterations. The Patterson Reservoir retains its original location and position along the South Bay Aqueduct’s original alignment. It retains integrity of setting, retaining its rural setting among rolling hills east of the City of Livermore but safely outside of the boundary and setting of the urban area. There have been repairs to Patterson Reservoir since its construction, especially owing to an early grouting and leak issue that was resolved by 1964; however, major changes to the reservoir resulted from the South Bay Aqueduct Improvement and Enlargement Project (2006–2015), which impacted the integrity of design, materials, and workmanship by raising and refurbishing the reservoir. Because Patterson Reservoir is so small, these changes cannot be contextualized or reduced in importance. Despite these alterations, Patterson Reservoir is still able to convey the feeling of a twentieth century public works project and of its role within the larger South Bay Aqueduct system, and can still convey a sense of the time and space in which it was constructed. Finally, Patterson Reservoir retains integrity of association as it retains its association with the original DWR designers and operators, association with its original water supply contractors, and historical associations with the South Bay Aqueduct as the first water delivery location. Therefore, Patterson Reservoir retains the requisite level of integrity to convey significance under Criterion A/1 as a component of the South Bay Aqueduct but lacks sufficient integrity to be considered under C/3.

**Character Defining Features**

The character-defining features of Patterson Reservoir are limited to the following:

- Continued function as a water management and delivery structure within the larger SWP system
The original 1960–1962 location and relationship to South Bay Aqueduct alignment

B12. References (Continued):


Dear Alameda Architectural Preservation Society,

I am reaching out today on behalf of Dudek and the California Department of Water Resources (DWR) to provide you with some information about the Delta Dams Rodent Burrow Remediation Project at Clifton Court Forebay, in Contra Costa County and Alameda County and the Dyer and Patterson Reservoirs in Alameda County. As part of the cultural resources study for the proposed project, Dudek is consulting all regional historical organizations to determine if there are any known historic or cultural resources that may be within the proposed project areas. Please see the attached letters and maps for more information about the nature and location of the project, and please feel free to contact me should you have questions or information regarding cultural or historical resources in this area.

Kate G. Kaiser, MSHP
Architectural Historian

DUDEK
O: 626.204.9815  C: 760.814.4664
www.dudek.com
May 12, 2021

Alameda Architectural Preservation Society
P.O. Box 1677
Alameda, CA 94501
aaps@alameda-preservation.org

Subject: Delta Dams Rodent Burrow Remediation Project at Clifton Court Forebay

To the Alameda Architectural Preservation Society:

Dudek has been retained by the Department of Water Resources (DWR) to complete a cultural resources inventory evaluation and finding of effect report for the Delta Dams Rodent Burrow Remediation Project at Clifton Court Forebay (Proposed Project). Clifton Court Forebay is located at the southwestern edge of the Sacramento–San Joaquin River Delta, approximately 10 miles northwest of the City of Tracy and adjacent to Byron Road. The Proposed Project is located along the 8-mile dam embankment (see Figure 1, enclosed).

Clifton Court Forebay has been subject to ongoing rodent burrowing throughout its service life. Rodent burrows are a recognized hazard to dams and levees as they can be associated with potential failure modes for dams by promoting piping and internal erosion that can ultimately lead to dam failure. The Project proposes rodent burrow repairs and restoration measures, as well as permanent measures to prevent future burrowing. DWR also proposes to repair shallow ruts and near-surface deformations by filling these areas with native soil and compacting it.

As part of our study, we are consulting all regional historical organizations to determine if there are any known historic or cultural resources that may be affected by the Proposed Project. Your efforts in this process will provide invaluable information for the proper identification and treatment of such resources.

If you have any questions or comments regarding cultural resources in the proposed project area, please direct your response to:

Dudek
Attn: Kate Kaiser
Phone: 626-204-9815
Email: kkaiser@dudek.com

All comments, emails, or letters received will be included in the reports generated by this study. Thank you very much for your time regarding our request.

Sincerely,

Kate Kaiser, MSHP
Architectural Historian

Enclosures: Figure 1. Clifton Court Forebay Project Location
May 12, 2021

Alameda Architectural Preservation Society
P.O. Box 1677
Alameda, CA 94501
aaps@alameda-preservation.org

Subject: Delta Dams Rodent Burrow Remediation Project at Dyer Reservoir and Dam and Patterson Reservoir and Dam

To the Alameda Architectural Preservation Society:

Dudek has been retained by the Department of Water Resources (DWR) to complete a cultural resources inventory evaluation and finding of effect report for the Delta Dams Rodent Burrow Remediation Project at Dyer Reservoir and Patterson Reservoir (Proposed Project). Dyer Reservoir is located in the Altamont Hills, approximately 7 miles northeast of the City of Livermore in Alameda County; and Patterson Reservoir is approximately 1 mile east of the City of Livermore (see Map Figures 1 and 2, enclosed).

Both the Dyer Dam (2012) and Patterson Dam (1962) embankments have been subject to ongoing rodent burrowing throughout their service life. Rodent burrows are a recognized hazard to dams and levees as they can be associated with potential failure modes for dams by promoting piping and internal erosion that can ultimately lead to dam failure. The Project proposes rodent burrow repairs and restoration measures, as well as permanent measures to prevent future burrowing. DWR also proposes to repair shallow ruts and near-surface deformations by filling these areas with native soil and compacting it.

As part of our study, we are consulting all regional historical organizations to determine if there are any known historic or cultural resources that may be affected by the Proposed Project. Your efforts in this process will provide invaluable information for the proper identification and treatment of such resources.

If you have any questions or comments regarding cultural resources in the proposed project area, please direct your response to:

Dudek
Attn: Kate Kaiser
Phone: 626-204-9815
Email: kkaiser@dudek.com

All comments, emails, or letters received will be included in the reports generated by this study. Thank you very much for your time regarding our request.

Sincerely,

Kate Kaiser, MSHP
Architectural Historian

Enclosures: Figure 1. Dyer Dam Project Location and Figure 2. Patterson Dam Project Location
Project Site

Delta Dams Rodent Burrow Remediation Project

BASEMAP SOURCE: DWR 12/11/2020; USGS 7.5-Minute Series Altamont Quadrangle

FIGURE 2

Project Location - Patterson Reservoir

Delta Dams Rodent Burrow Remediation Project
Hello Alameda County Historical Society,

I am reaching out today on behalf of Dudek and the California Department of Water Resources (DWR) to provide you with some information about the Delta Dams Rodent Burrow Remediation Project at Clifton Court Forebay, in Contra Costa County and Alameda County and the Dyer and Patterson Reservoirs in Alameda County. As part of the cultural resources study for the proposed project, Dudek is consulting all regional historical organizations to determine if there are any known historic or cultural resources that may be within the proposed project areas. Please see the attached letters and maps for more information about the nature and location of the project, and please feel free to contact me should you have questions or information regarding cultural or historical resources in this area.

Kate G. Kaiser, MSHP
Architectural Historian

Dudek
O: 626.204.9815  C: 760.814.4664
www.dudek.com
May 12, 2021

Alameda County Historical Society
P.O. Box 13145
Oakland, CA 94661
info@AlamedaCountyHistory.org

Subject: Delta Dams Rodent Burrow Remediation Project at Clifton Court Forebay

To the Alameda County Historical Society:

Dudek has been retained by the Department of Water Resources (DWR) to complete a cultural resources inventory evaluation and finding of effect report for the Delta Dams Rodent Burrow Remediation Project at Clifton Court Forebay (Proposed Project). Clifton Court Forebay is located at the southwestern edge of the Sacramento–San Joaquin River Delta, approximately 10 miles northwest of the City of Tracy and adjacent to Byron Road. The Proposed Project is located along the 8-mile dam embankment (see Figure 1, enclosed).

Clifton Court Forebay has been subject to ongoing rodent burrowing throughout its service life. Rodent burrows are a recognized hazard to dams and levees as they can be associated with potential failure modes for dams by promoting piping and internal erosion that can ultimately lead to dam failure. The Project proposes rodent burrow repairs and restoration measures, as well as permanent measures to prevent future burrowing. DWR also proposes to repair shallow ruts and near-surface deformations by filling these areas with native soil and compacting it.

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Both the Dyer Dam (2012) and Patterson Dam (1962) embankments have been subject to ongoing rodent burrowing throughout their service life. Rodent burrows are a recognized hazard to dams and levees as they can be associated with potential failure modes for dams by promoting piping and internal erosion that can ultimately lead to dam failure. The Project proposes rodent burrow repairs and restoration measures, as well as permanent measures to prevent future burrowing. DWR also proposes to repair shallow ruts and near-surface deformations by filling these areas with native soil and compacting it.

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May 12, 2021

Mr. Ken MacLennan
Museum on Main
603 Main Street
Pleasanton, CA 94566
curator@museumonmain.org

Subject: Delta Dams Rodent Burrow Remediation Project at Clifton Court Forebay

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