CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

Order No. R2-2011-0004

Waste Discharge Requirements and Water Quality Certification for:

San Francisco Public Utilities Commission
Lower Crystal Springs Dam Improvement Project
San Mateo County

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A. Findings

The California Regional Water Quality Control Board, San Francisco Bay Region (hereinafter Regional Water Board), finds that:

1. **Background:** The San Francisco Public Utilities Commission (hereinafter SFPUC or Discharger) owns a regional water system that serves approximately 2.4 million people, most of whom live in the San Francisco Bay Area. The system obtains about 85 percent of its water from the Tuolumne River in the Sierra Nevada, with the remainder originating from watersheds in Alameda, Santa Clara, and San Mateo counties. The SFPUC conveys water from Hetch Hetchy Reservoir in Yosemite National Park directly to customers and to three local reservoirs in the Bay Area. One of these local reservoirs, Crystal Springs Reservoir, is located on San Mateo Creek about 12 miles south of San Francisco in unincorporated San Mateo County (See Figure 1 in Attachment A). Crystal Springs Reservoir is formed by impounding water behind Lower Crystal Springs Dam and has a surface area of 1,300 acres when filled to an elevation of 283.8 feet[1].

   The California Department of Water Resources, Division of Safety of Dams (DSOD), is responsible for regulating all dams in California. In 1983, the DSOD restricted the amount of water the SFPUC could store in Crystal Springs Reservoir because of concerns that the dam could be overtopped, and subsequently damaged and/or even fail, during the Probable Maximum Flood (PMF)[2]. Design for the PMF event is mandated by the DSOD as a "fail safe" design for lesser flood events. Therefore, the DSOD required the SFPUC to limit the maximum water surface elevation in Crystal Springs Reservoir to 283.8 feet until one of the following actions was taken:

   - Demonstrate that the dam as it currently exists can safely pass the PMF;
   - Construct hydraulic improvements that would enable the dam to safely pass the PMF; or
   - Adopt further restrictive operating procedures that would enable the dam (as it currently exists) to safely pass the PMF.

   This operating level is equivalent to 18.5 billion gallons of water storage and represents a 16 percent reduction in the reservoir's storage capacity when compared to the previously approved water storage of 22.15 billion gallons (equivalent to a maximum water surface elevation of 291.8 feet).

2. **Project Description:** The purpose of the Lower Crystal Springs Dam Improvements Project (Project) is to lift the DSOD restrictions and restore the reservoir's historical capacity. To accomplish this, the Project will retrofit the dam to enable it to safely pass the PMF. Specific project components include raising the parapet wall, widening, raising and reshaping the spillway, improving drainage on top of the dam, replacing the existing stilling basin with a larger basin, and placing grouted riprap downstream of the new stilling basin (see Figures 2

[1] All elevations in this Order are referenced to the National Geodetic Vertical Datum of 1929.
[2] The PMF is the theoretical flood event predicted to occur under the most severe and extreme combination of meteorological and hydrological conditions in a particular drainage area, and the DSOD includes the PMF as part of its design requirements to ensure the safety of the Lower Crystal Springs Dam.

through 4 in Attachment A). In addition, a water quality sampling station at the southern end of the reservoir would be raised to accommodate higher reservoir levels (see Figure 5 in Attachment A). This sampling station was constructed at an elevation of 287.5 feet after the DSOD required the SFPUC to lower reservoir levels to 283.8 feet.

The post-construction operating goals for Crystal Springs Reservoir will be similar to current goals. The SFPUC will try to keep the reservoir as full as possible without exceeding the maximum normal operating level, thereby, avoiding uncontrolled spills (i.e., water over the spillway). As part of the proposed project, the SFPUC will implement an operational policy that limits the maximum normal water surface elevation to 287.8 feet, 4 feet higher than the current normal maximum of 283.8 feet, providing an additional 5,402 acre-feet of open water in the reservoir. In addition, the Discharger will provide beneficial flows for steelhead (*Oncorhynchus mykiss*) by releasing water from the reservoir to San Mateo Creek in accordance with a schedule developed in consultation with the National Marine Fisheries Service and the California Department of Fish and Game.

3. **Complete Application:** On January 25, 2010, the Discharger submitted an initial application for Water Quality Certification and Waste Discharge Requirements for the Project (Application). The Application was subsequently completed by additional submittals on October 14, 2010.

4. **Waters of the United States and State:** There are approximately 1,342 acres of jurisdictional waters of the U.S. and State in the Project site. The site's waters of the U.S. and State are comprised of:

   a. 253 acres of seasonal and perennial wetlands;

   b. 53 acres of riparian wetlands;

   c. 2.2 acres of creeks; and

   d. 1,034 acres of open water (includes Crystal Springs Reservoir and a 0.06 acre pond).

5. **Rare and Endangered Species:** Waters at the Project site serve or likely serve as habitat for the following rare, threatened, or endangered species:

   a. San Francisco garter snake (*Thamnophis sirtalis tetrataenia*): federally-listed and state-listed endangered, and state fully protected species;

   b. Fountain thistle (*Cirsium fontinale* var. *fontinale*): federally-listed and state-listed endangered;

   c. Steelhead - Central California Coast Distinct Population Segment: federally-listed endangered;

   d. California red-legged frog (*Rana aurora draytonii*): federally-listed threatened and state-listed species of special concern;

   e. American peregrine falcon (*Falco peregrinus anatum*): state-listed endangered and state fully protected species;

   f. White-tailed kite (*Elanus leucurus*): state fully protected species;

g. Cooper's hawk (*Accipiter cooperii*), sharp-shinned hawk (*Accipiter striatus*), tricolored blackbird (*Agelaius tricolor*), northern harrier (*Circus cyaneus*), western pond turtle (*Clemmys marmorata marmorata* and *C. m. pallida*), greater western mastiff bat (*Eumops perotis californicus*), merlin (*Falco columbarius*), Common loon (*Gavia immer*), saltmarsh common yellowthroat (*Geothlypis trichas sinuosa*), San Francisco dusky-footed woodrat (*Neotoma fuscipes annectans*), osprey (*Pandion haliaetus*), and double-crested cormorant (*Phalacrocorax auritus*): state-listed species of special concern; and

h. Western leatherwood (*Dirca occidentalis*): California Native Plant Society List 1B (Plants Rare, Threatened, or Endangered in California and Elsewhere).

6. **Inundation Impacts:** This Project will impact wetland and riparian functions by inundating wetlands and riparian habitat when reservoir water levels are raised. Once reservoir water levels are raised, both existing wetland and upland habitats will be converted to other habitat types based on changes in the frequency, duration, and magnitude of inundation (Attachment B). Some wetland habitats will persist although their species composition may change due to the altered pattern of inundation. New wetland habitats will also form within the new, higher fluctuation zone at elevations currently supporting upland habitats. The overall net effect of raising reservoir operating levels will be to convert about 5.8 acres of wetlands and 7.7 acres of upland riparian habitat to open water. Conversion of these wetlands and riparian habitat to open water will impact functions associated with vegetated habitats, such as nutrient cycling, primary production, pollutant filtration, and carbon sequestration[3].

7. **Fill Impacts:** The Project will result in the direct fill of 1.62 acres and 362 linear feet of jurisdictional waters of the United States and State (See Figures 6 and 7 in Attachment A). These impacts include the following:

   a. Permanent impacts to 0.45 acres and 113 linear feet of San Mateo Creek and willow riparian wetlands;

   b. Permanent impacts to 0.06 acres of pond habitat that has formed on top of Lower Crystal Springs Dam;

   c. Temporary impacts, including temporal losses in function, to 1.1 acres and 249 linear feet of San Mateo Creek and willow riparian wetlands; and

   d. Temporary impacts, including temporal losses in function, to 0.001 acres of willow riparian wetlands at the water quality sampling station.

8. **Mitigation for Inundation Impacts:** To compensate for impacts to functions resulting from inundation of wetlands and riparian habitat, the SFPUC will establish 9.9 acres of wetlands, enhance 3.9 acres of wetlands, and establish 1.3 acres and 820 linear feet of creek and riparian habitat through the SFPUC's Habitat Reserve Program. The Habitat Reserve Program is a program for developing comprehensive consolidated compensation for projects implemented under the Water System Improvement Program, which is seeking to upgrade the SFPUC's aging drinking water facilities. This mitigation will be provided at the following sites:

[3] Carbon sequestration is the uptake and storage of carbon (USEPA Glossary of Climate Change Terms 2009).

a. **Adobe Gulch Grassland Restoration Site.** The Adobe Gulch Grassland Restoration Site is within the Crystal Springs Reservoir watershed and is located west of Interstate 280 and Upper Crystal Springs Reservoir and south of State Route 92. Mitigation activities at the site will (1) restore 50 acres of grasslands, (2) enhance 0.2 acres of seasonal wetlands, (3) establish 0.5 acres of seasonal wetlands, (4) enhance and establish 9.2 acres of coast live oak woodlands, (5) restore 1.8 acres and 1,135 linear feet of creek and arroyo willow riparian forest, of which 1.0 acres and 631 linear feet will be applied towards mitigation of the Project's inundation impacts and 0.8 acres and 504 linear feet will be applied towards mitigation of the Project's fill impacts (see Finding 9 below), and (6) establish 1.8 acres and 1,150 linear feet of creek and coast live oak riparian forest, of which 0.3 acres and 200 linear feet will be applied towards mitigation of the Project's inundation impacts and 1.5 acres and 950 linear feet will be used for other SFPUC projects. These ecosystems will provide habitat for the California red-legged frog, San Francisco garter snake, western pond turtle, saltmarsh common yellowthroat, San Francisco dusky-footed woodrat, and two federally endangered butterflies, the Bay checkerspot butterfly (*Euphydryas editha bayensis*) and Mission Blue Butterfly (*Icaricia icarioides missionensis*).

b. **Adobe Gulch Creek Wetland Creation Site.** The Adobe Gulch Creek Wetland Creation Site is within the Crystal Springs Reservoir watershed and is located along Adobe Gulch Creek between Old Cañada Road and Upper Crystal Springs Reservoir. Mitigation activities at the site will establish 0.4 acres of seasonal wetlands, 0.2 acres of riparian woodlands, and 1.3 acres of oak woodlands. These natural communities will provide habitat for the California red-legged frog and San Francisco garter snake, and San Francisco dusky-footed woodrat.

c. **Boat Ramp Wetland Creation Site**. The Boat Ramp Wetland Creation Site is within the Crystal Springs Reservoir watershed and is located west of Interstate 280 and Skyline Boulevard, and north of State Route 92. Mitigation activities at this site will establish 0.12 acres of seasonal wetlands, enhance 0.045 acres of seasonal wetlands, enhance 0.03 acres of riparian woodlands, enhance 0.1 acres of seeps, enhance and restore 28 acres of serpentine grasslands, and enhance 0.22 acres of coyote brush scrub. These natural communities will provide habitat for the California red-legged frog, San Francisco garter snake, and San Francisco dusky-footed woodrat.

d. **San Andreas Reservoir Wetland Creation Site.** The San Andreas Reservoir Wetland Creation Site is located along the northwestern shoreline of San Andreas Reservoir. Mitigation activities at the site will establish 2.9 acres of seasonal wetlands with ponds, of which 2.5 acres will be applied towards mitigation of the Project's inundation impacts, 0.12 acres will be applied towards mitigation of the Project's fill impacts (see Finding 9 below), and 0.28 acres will be used for other SFPUC projects. Mitigation activities at the site will also establish 1.9 acres of emergent wetlands, of which 1.5 acres will be applied towards mitigation of the Project's inundation impacts and 0.4 acres will be used for other SFPUC projects. These wetlands will provide habitat for the California red-legged frog, San Francisco garter snake, western pond turtle, and saltmarsh common yellowthroat.

e. **Skyline Boulevard Habitat Improvement Site**. The Skyline Boulevard Habitat Improvement Site is located north of San Andreas Reservoir and west of Skyline Boulevard. Mitigation activities at the site will establish up to 3.8 acres of seasonal wetlands and restore 2.2 acres of scrublands. These natural communities will provide habitat for the fountain

thistle, California red-legged frog, San Francisco garter snake, western pond turtle, and San Francisco dusky-footed woodrat.

f. **Skyline Quarry Site.** The Skyline Quarry Site is within the Crystal Springs Reservoir watershed and consists of a reclaimed hard rock quarry located north of State Route 92 and west of Lower Crystal Springs Reservoir. Mitigation activities at the site will enhance 3.7 acres of emergent wetlands. These wetlands provide habitat for the California red-legged frog and San Francisco garter snake.

g. **Upper San Mateo Creek Site.** The Upper San Mateo Creek Site is within the Crystal Springs Reservoir watershed and is located about 0.7 mile upstream and northwest of Mud Dam on the east side of Pilarcitos Road. Mitigation activities at the site will establish 1.08 acres of wetlands, restore 3.07 acres of native grasslands, and enhance 0.06 acres and 75 linear feet of willow riparian scrublands. These natural communities will provide habitat for the California red-legged frog, San Francisco garter snake, San Francisco dusky-footed woodrat, and Mission Blue Butterfly.

The acres (rounded to the nearest 0.1 acre) and linear feet of mitigation at each site are provided in Table 1 below.

Table 1: Compensatory Mitigation for Inundation Impacts

Location/Habitat Type	Established Wetland Acres	Established Creek/Riparian Acres	Enhanced Wetland Acres
Adobe Gulch Grassland			
Creek & Willow Riparian	0	1.0 (631 LF)	0
Creek & Oak Riparian	0	0.3 (200 LF)	0
Seasonal Wetlands	0.5	0	0.2
Adobe Gulch Creek Wetland			
Seasonal Wetlands	0.4	0	0
Boat Ramp			
Seasonal Wetlands	0.1	0	0
San Andreas Reservoir HRP			
Emergent Wetlands	1.5	0	0
Seasonal Wetlands	2.5	0	0
Skyline Boulevard			
Seasonal Wetlands (and small amt of seep wetlands)	3.8	0	0
Skyline Quarry			
Emergent Wetlands[1]	0	0	3.7
Upper San Mateo Creek			
Seasonal Wetlands	1.1	0	0
Total	**9.9**	**1.3 (831 LF)**	**3.9**

Notes:

LF = Linear feet

1 The acres of enhanced wetlands only includes wetlands at the Skyline Quarry Mitigation Site. The enhancement at the Skyline Quarry Mitigation Site, however, will address a source of jubata grass that affects the entire reservoir.

The proposed mitigation shall be completed as described in (1) the *Mitigation and Monitoring Plan—Adobe Gulch Grassland Site*, (2) the *(S.A.S.S) Mitigation and Monitoring Plan—Sherwood Point Oak Restoration, Adobe Gulch Creek Wetland Creation, Skyline Quarry Wetland Restoration, and Skyline Boulevard Habitat Improvement Sites*, (3) the *Mitigation and Monitoring Plan—Boat Ramp Wetland and Fountain Thistle Sites*, (4) the *San Andreas Wetland Creation (Site 27) Mitigation and Monitoring Plan*, and (5) the *Habitat Mitigation and Monitoring Plan—Upper San Mateo Creek* (hereinafter Mitigation and Monitoring Plans; Attachment C). The Monitoring and Mitigation Plans are acceptable to the Regional Water Board, with the required submittals and revisions listed in the Provisions.

9. **Mitigation for Fill Impacts:** To compensate for permanent impacts to waters of the State and temporal losses in function associated with temporary impacts to waters of the State, the SFPUC will establish 0.12 acres of seasonal wetland and pond habitat, and will establish 0.80 acres and 504 linear feet of creek and associated riparian habitat at the Adobe Gulch Grassland and San Andreas Wetland Creation sites. The acres and linear feet of mitigation at each site are provided in Table 2 below.

Table 2: Compensatory Mitigation for Fill Impacts

Location/Habitat Type	Restoration Acres	Establishment Acres
Onsite		
Willow Riparian Wetlands	1.0 (249 LF)	
Riparian Forest	0.08 (113 LF)	
Adobe Gulch Grassland		
Creek & Willow Riparian		0.80 (504 LF)
San Andreas Reservoir HRP		
Pond Habitat		0.12
Total	**1.1 (362 LF)**	**0.92 (504 LF)**

Notes:

LF = Linear feet

The proposed mitigation shall be completed as described in the Mitigation and Monitoring Plans for the Adobe Gulch Grassland and San Andreas Wetland Creation sites (Attachment C). These Monitoring and Mitigation Plans are acceptable to the Regional Water Board, with the required submittals and revisions listed in the Provisions.

To mitigate for temporary impacts to wetlands and creeks, the SFPUC will return the habitat to its original condition upon completion of the project as described in the *Lower Crystal Springs Dam Improvements Project Conceptual Restoration and Revegetation Plan* (Attachment D) (hereinafter Restoration and Revegetation Plan).

10. **Long-Term Management Plans:** The SFPUC is developing a comprehensive long-term management plan for the Adobe Gulch Grassland, Adobe Gulch Creek Wetland Creation, Boat Ramp Wetland Creation, San Andreas Wetland Creation, Skyline Boulevard Habitat Improvement, Skyline Quarry Wetland Restoration, and Upper San Mateo Creek sites using the

multi-agency mitigation banking template for long-term management plans[4] and the outline provided in Attachment E. The final long-term management plan will describe how the lands are to be managed under conservation easements. This Order requires the SFPUC to submit a final long-term management plan, acceptable to the Regional Water Board's Executive Officer and to implement the final long-term management plan.

11. **Legal Authorities.** Pursuant to Section 13263 of the California Water Code (CWC) and Title 23, Section 3857 of the California Code of Regulations (CCR), the Regional Water Board is issuing Waste Discharge Requirements (WDRs) to regulate the proposed discharge of fill materials into waters of the State in addition to issuing Water Quality Certification pursuant to 23 CCR Section 3859. The Regional Water Board considers WDRs necessary to adequately address impacts and mitigation to beneficial uses of waters of the State from the Project, to meet the objectives of the California Wetlands Conservation Policy (Executive Order W-59-93), and to accommodate and require appropriate changes over the life of the Project and its construction.

12. **California Environmental Quality Act (CEQA):** CEQA requires all projects approved by public agencies to be in full compliance with CEQA, and requires a lead agency to prepare an appropriate environmental document for such projects. The City and County of San Francisco, as lead agency for CEQA, certified an Environmental Impact Report (EIR) for the Project on October 7, 2010.

    The Regional Water Board, as a responsible agency under CEQA, has considered the EIR and finds that all environmental effects have been identified for project activities which it is required to approve, and that the environmental effects identified for those activities will be less-than-significant with implementation of the mitigation measures set forth in the EIR and the mitigation identified in Findings 8 and 9 above and required by this Order.

13. **Water Quality Control Plans.** The Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) was duly adopted by the Regional Water Board and approved by the State Water Resources Control Board, US Environmental Protection Agency (USEPA), and the Office of Administrative Law where required. The Basin Plan is the Regional Water Board's master water quality control planning document. It designates beneficial uses of receiving waters, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for all waters addressed by the Plan. Section 2.2.1 of the Basin Plan indicates that the beneficial uses of any specifically identified water body generally apply to its tributary streams. Existing and potential beneficial uses of waters at the Project include the following:

    - San Mateo Creek: Freshwater Replenishment (FRSH), Cold Freshwater Habitat (COLD), Preservation of Rare and Endangered Species (RARE), Fish Spawning (SPWN), Wildlife Habitat (WILD), Water Contact Recreation (REC-1), and Noncontact Water Recreation (REC-2)

[4] The mitigation banking template for long-term management plans was developed through a statewide multi-agency effort, involving the California Resources Agency, California Department of Fish and Game, US Army Corps of Engineers (USACE), US Fish and Wildlife Service, US Environmental Protection Agency, Natural Resources Conservation Service, and National Marine Fisheries Service. The mitigation banking template was released via USACE Public Notice on May 9, 2008, and is available on-line at http://www.dfg.ca.gov/habcon/conplan/mitbank/.

- Crystal Springs Reservoir: Municipal and Domestic Supply (MUN), COLD, RARE, SPWN, Warm Freshwater Habitat (WARM), WILD, and REC-2

In addition, Section 2.2.3 of the Basin Plan recognizes the multiple beneficial uses provided by wetlands, and Table 2-3 of the Basin Plan lists beneficial uses associated with wetland types. Existing and potential beneficial uses for wetlands at the Project site were established as indicated in Section 4.23 of the Basin Plan by (1) referencing information in the Application to identify wetland types at the Project site, (2) using Table 2-3 of the Basin Plan to identify examples of beneficial uses associated with these wetland types, and (3) referencing site-specific information provided in the EIR and Application to refine the example beneficial uses listed in Table 2-3 of the Basin Plan into a list of existing and potential beneficial uses for wetlands at the Project site. Wetland types at the Project site include riverine[5], lacustrine[6], and palustrine[7]. The beneficial uses associated with wetlands at the Project site include FRSH, COLD, RARE, WARM, WILD, and REC-2.

Requirements of this Order implement the Basin Plan.

14. **Basin Plan Wetland Fill Policy.** The Basin Plan Wetland Fill Policy (Fill Policy) establishes that there is to be no net loss of wetland acreage and no net loss of wetland value when a project and any proposed mitigation are evaluated together, and that mitigation for wetland fill projects is to be located in the same area of the Region, whenever possible, as the project. The Fill Policy further establishes that wetland disturbance should be avoided whenever possible, and if not possible, should be minimized, and only after avoidance and minimization of impacts should mitigation for lost wetlands be considered.

    The Project is water dependent; therefore, impacts to wetlands can not be entirely avoided. The Discharger minimized the acres of wetlands being inundated by committing to a modification in operations that would limit the maximum normal water surface elevation to 287.8 feet instead of 291.8 feet as initially proposed. In addition, filling of the reservoir will be delayed to reduce impacts on biological resources, including the special status species that are present around the perimeter of the reservoir. For instance, reservoir levels will not be increased until Fountain Thistle populations have been fully mitigated (i.e., replaced). Water levels will also be increased incrementally over a period of three or more years to allow sufficient time for red-legged frogs, San Francisco garter snakes, and other species to adapt to the 4-foot increase in maximum normal operating water levels.

[5] A riverine wetland is a wetland within a system that (1) is contained within a channel; (2) is not dominated by trees, shrubs, persistent emergent vascular plants, emergent mosses or lichens; and (3) has less than 0.5 parts per thousand (ppt) of ocean derived salts (Cowardin and others 1979).

[6] A lacustrine wetland is a wetland within a system that (1) is situated in a topographic depression or a dammed river channel; (2) lacks trees, shrubs, persistent emergent vascular plants, emergent mosses or lichens with greater than 30 percent areal coverage; (3) exceeds 20 acres; and (4) has less than 0.5 ppt of ocean derived salts (Cowardin and others 1979).

[7] A palustrine wetland is a wetland within a system that (1) is dominated by trees, shrubs, persistent emergent vascular plants, emergent mosses or lichens and (2) has less than 0.5 ppt of ocean derived salts. It also includes wetlands lacking vegetation that (1) are less than 20 acres; (2) lack of an active wave-formed or bedrock shoreline; and (3) have water depths less than 2 meters in the deepest part of basin at low water (Cowardin and others 1979).

15. **California Wetlands Conservation Policy.** The goals of the California Wetlands Conservation Policy (Executive Order W-59-93, signed August 23, 1993) include ensuring "no overall loss" and achieving a "…long-term net gain in the quantity, quality, and permanence of wetland acreage and values… ." The California Wetlands Conservation Policy also calls for "development of means to provide flexibility in the regulatory process … for allowing public agencies, water districts, and landowners to establish wetlands on their property consistent with the primary purpose of the property."

    Senate Concurrent Resolution No. 28 states that "[i]t is the intent of the legislature to preserve, protect, restore, and enhance California's wetlands and the multiple resources which depend on them for benefit of the people of the State."

    Requirements of this Order implement the California Wetlands Conservation Policy.

16. **Wetland Tracking System.** It has been determined through regional, State, and national studies that tracking of mitigation/restoration projects must be improved to better assess the performance of these projects, following monitoring periods that last several years. In addition, to effectively carry out the California Wetlands Conservation Policy, the State needs to closely track both wetland losses and mitigation/restoration project success. Therefore, we require that the Discharger use the California Wetlands Portal Standard Form to provide project information related to impacts and mitigation/restoration measures (see Provision C.6 of this Order). An electronic copy of the form and instructions can be downloaded at: http://www.waterboards.ca.gov/sanfranciscobay/certs.shtml. Project information concerning impacts and mitigation/restoration will be made available at the web link: http://www.californiawetlands.net.

17. **Storm Water Discharges.** Discharges of storm water associated with construction activities will occur. The CEQA documents certified for the Project identify such discharges, including the pollutants associated with them, as a potentially significant impact that could be mitigated to less-than-significant. The Discharger is responsible for obtaining and complying with appropriate permits for these discharges, including the State's National Pollutant Discharge Elimination System (NPDES) General Permit for Discharges of Storm Water Associated with Construction Activity (NPDES No. CAS000002; Order No. 2009-0009-DWQ).

18. **U. S. Army Corps of Engineers (USACE).** On May 12, 2010, the USACE issued a Public Notice for a proposed Individual Permit for the Project (USACE File No. 30317S) pursuant to Section 404 of the federal Clean Water Act.

19. **Endangered Species Act.** This Order does not authorize any act that results in the taking of a threatened or endangered species or any act that is now prohibited, or becomes prohibited in the future, under either the California Endangered Species Act (Fish and Game Code sections 2050 to 2097) or the federal Endangered Species Act (16 U.S.C.A. sections 1531 to 1544). The Discharger is responsible for meeting all requirements of the applicable endangered species act.

20. **Notification of Interested Parties.** The Regional Water Board has notified the USACE, City, U.S. Fish and Wildlife Service (USFWS), California Department of Fish and Game, and other

interested agencies and persons of its intent to prescribe WDRs and Water Quality Certification for this discharge.

21. **Consideration of Public Comment.** The Regional Water Board, in a public meeting, heard and considered all comments pertaining to the discharge.

22. **Records Management.** This Project file is maintained at the Regional Water Board under Site No. 02-41-C0637 and CIWQS Place No. 743590.

It is Hereby Ordered pursuant to the provisions of Division 7 of the CWC and regulations, and guidelines adopted thereunder, that the Discharger, its agents, successors, and assigns shall comply with the following:

B. Discharge Prohibitions

1. The discharge of wastes, including debris, rubbish, refuse, or other solid wastes into surface waters or at any place where they would contact or where they would be eventually transported to surface waters, including flood plains, is prohibited.

2. The discharge of floating oil or other floating materials from any activity in quantities sufficient to cause deleterious bottom deposits, turbidity, or discoloration in surface waters is prohibited.

3. The discharge of silt, sand, clay, or other earthen materials from any activity in quantities sufficient to cause deleterious bottom deposits, turbidity, or discoloration in surface waters is prohibited.

4. The wetland fill activities subject to these requirements shall not cause a nuisance as defined in CWC Section 13050(m).

5. The groundwater in the vicinity of the Project shall not be degraded as a result of project activities or placement of fill for the Project.

6. The discharge of materials, which are not otherwise regulated by a separate NPDES permit or allowed by this Order, to waters of the State is prohibited.

C. Provisions

1. The Discharger shall comply with all Prohibitions and Provisions of this Order immediately upon adoption of this Order or as provided below.

Mitigation Requirements

2. To mitigate for temporary impacts to wetlands and creeks, the Discharger shall restore wetland and creek contours, revegetate disturbed areas with native herbaceous and willow riparian plant species, and remove any invasive plant species using methods described in the Restoration and Revegetation Plan (Attachment D). Restoration and revegetation shall occur within one year of cessation of temporary impacts, and monitoring shall be performed for a minimum of five years, and until the sites have met the success/performance criteria specified in the Restoration and

Revegetation Plan, and the Regional Water Board's Executive Officer has approved a notice of mitigation completion for temporarily-impacted locations (see Provision C.16 below). Any replacement of seeding or planting shall be monitored for five years from the date of reseeding/replanting. Supplemental watering shall not be supplied; however, should supplemental watering be required, the monitoring period shall be reset to Year 1 starting from the year in which supplemental watering is no longer required. Any Restoration and Revegetation Plan revisions, including changes to the success/performance criteria or timelines, must be submitted to the Regional Water Board's Executive Officer for review and approval before the changes are implemented.

3. To mitigate for impacts to functions resulting from inundation of wetlands and riparian habitat, the Discharger shall establish 9.9 acres of wetlands, enhance 3.9 acres of wetlands, and establish 1.3 acres and 831 linear feet of creek and riparian habitat at the Adobe Gulch Grassland, Adobe Gulch Creek Wetland Creation, Boat Ramp Wetland Creation, San Andreas Wetland Creation, Skyline Boulevard Habitat Improvement, Skyline Quarry Wetland Restoration, and Upper San Mateo Creek sites. This mitigation shall be completed as described in the Mitigation and Monitoring Plans (Attachment C). In addition, monitoring shall be performed for (1) a minimum of five years for wetland sites and a minimum of ten years for creek and riparian sites, and (2) until the sites have met the success/performance criteria specified in the Mitigation and Monitoring Plans, and the Regional Water Board's Executive Officer has approved a notice of mitigation completion (see Provision C.17 below). Plant monitoring shall also be performed independently at each mitigation site and for seasonal wetlands, perennial wetlands, oak riparian woodlands, and willow riparian woodlands (i.e., data from each mitigation site and plant community shall not be pooled with data from any other mitigation site or plant community). Any replacement of seeding or planting shall reset the monitoring period from the date of reseeding/replanting. Any supplemental watering beyond Year 2 shall also reset the monitoring period to Year 1 starting from the year in which supplemental watering is no longer required. In addition, the following revisions shall be incorporated into to the success/performance criteria specified in the Mitigation and Monitoring Plans:

a. Willow Riparian Criteria. The success/performance criteria for willow riparian woodlands at all applicable mitigation sites shall be as follows:

Year 1: 5 percent or greater absolute canopy cover of native riparian tree and shrub species. At least 90 percent survival of planted trees and shrubs.

Year 2: 10 percent or greater absolute canopy cover of native riparian tree and shrub species. At least 85 percent survival of planted trees and shrubs.

Year 3: 25 percent or greater absolute canopy cover of native riparian tree and shrub species. At least 80 percent survival of planted trees and shrubs.

Year 4: 55 percent or greater absolute canopy cover of native riparian tree and shrub species.

Year 5: 70 percent or greater absolute canopy cover of native riparian tree and shrub species.

The criteria for absolute cover of invasive plants shall remain as specified in the Mitigation and Monitoring Plans.

b. Oak Riparian Criteria. The success/performance criteria for oak riparian woodlands at all applicable mitigation sites shall be as follows:

Year 1: 5 percent or greater absolute canopy cover of native riparian tree and shrub species. At least 90 percent survival of planted trees and shrubs.

Year 2: 10 percent or greater absolute canopy cover of native riparian tree and shrub species. At least 85 percent survival of planted trees and shrubs.

Year 3: 15 percent or greater absolute canopy cover of native riparian tree and shrub species. At least 80 percent survival of planted trees.

Year 4: 20 percent or greater absolute canopy cover of native riparian tree and shrub species. At least 80 percent survival of planted trees.

Year 5: 25 percent or greater absolute canopy cover of native riparian tree and shrub species. At least 75 percent survival of planted trees and shrubs.

Year 7: 35 percent or greater absolute canopy cover of native riparian tree and shrub species. At least 75 percent survival of planted trees and shrubs.

Year 9: 45 percent or greater absolute canopy cover of native riparian tree and shrub species. At least 70 percent survival of planted trees and shrubs.

Year 10: 50 percent or greater absolute native woody plant canopy cover (willows, oaks, and other native woody plant recruitments). At least 65 percent survival of planted trees and shrubs.

The criteria for absolute cover of invasive plants shall remain as specified in the Mitigation and Monitoring Plans.

c. Deeper Pool Hydrology Criteria. The deeper pools at the San Andreas Reservoir Wetland Creation, Adobe Gulch Creek, and Skyline Boulevard sites shall provide appropriate conditions to allow for successful breeding of California red-legged frog. In Year 5, the pools shall be a minimum depth of 3 ft. In addition, the ponds shall remain wetted long enough into the summer (generally through July) to allow for complete metamorphosis of tadpoles. However, to ensure that bullfrog breeding habitat is not created, these areas shall also dry out completely (i.e., shall not be inundated nor saturated) for at least a week each year.

d. Wetland Delineation Criteria. The total acreage of seasonal and emergent wetlands created at the mitigation sites shall be equal to or greater than the acreage proposed for mitigation in Year 5. A formal delineation including an examination of vegetation, soils, and hydrology to determine the acreage and distribution of the wetlands shall be performed to verify that the acres of created wetlands equals or exceeds the acres of created wetlands required for mitigation. Field indicators of hydric soils are not anticipated to be present by Year 5 in the created wetlands because hydric soils typically develop over long periods of

time (e.g., tens to hundreds of years). As such, the protocol outlined in Section F "Atypical Situations," Subsection 4 "Man-Induced Wetlands" of the USACE's Wetlands Delineation Manual[8] describing the use of two parameters (hydrology and plants) or an equivalent protocol shall be followed.

Any revisions to the Mitigation and Monitoring Plans, including changes to the success/performance criteria or timelines, must be submitted to the Regional Water Board's Executive Officer for review and approval before the changes are implemented.

4. To mitigate for permanent fill impacts to wetland, pond, and creek habitat and temporal losses in functions associated with temporary impacts to wetland and creek habitats, the Discharger shall establish 0.12 acres of seasonal wetland and pond habitat, and establish 0.80 acres and 504 linear feet of creek and associated riparian habitat at the Adobe Gulch Grassland and San Andreas Wetland Creation sites. The proposed mitigation shall be completed as described in the Mitigation and Monitoring Plans for the Adobe Gulch Grassland and San Andreas Wetland Creation sites (Attachment C). In addition, monitoring shall be performed for (1) a minimum of five years for wetland sites and a minimum of ten years for creek and riparian sites, and (2) until the sites have met the success/performance criteria specified in the Mitigation and Monitoring Plans, and the Regional Water Board's Executive Officer has approved a notice of mitigation completion (see Provision C.17 below). Plant monitoring shall also be performed independently at each mitigation site and for seasonal wetlands, perennial wetlands, oak riparian woodlands, and willow riparian woodlands (i.e., data from each mitigation site and plant community shall not be pooled with data from any other mitigation site or plant community). Any replacement of seeding or planting shall reset the monitoring period from the date of reseeding/replanting. Any supplemental watering beyond Year 2 shall also reset the monitoring period to Year 1 starting from the year in which supplemental watering is no longer required. In addition, the following revisions shall be incorporated into to the success/performance criteria specified in the Mitigation and Monitoring Plans:

a. Willow Riparian Criteria. The success/performance criteria for willow riparian woodlands at the Adobe Gulch Grassland Site shall be as follows:

Year 1: 5 percent or greater absolute canopy cover of native riparian tree and shrub species. At least 90 percent survival of planted trees and shrubs.

Year 2: 10 percent or greater absolute canopy cover of native riparian tree and shrub species. At least 85 percent survival of planted trees and shrubs.

Year 3: 25 percent or greater absolute canopy cover of native riparian tree and shrub species. At least 80 percent survival of planted trees and shrubs.

Year 4: 55 percent or greater absolute canopy cover of native riparian tree and shrub species.

Year 5: 70 percent or greater absolute canopy cover of native riparian tree and shrub species.

[8] Environmental Laboratory. (1987). "Corps of Engineers wetlands delineation manual," Technical Report Y-87-1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS. NTIS No. AD A176 912.

The criteria for absolute cover of invasive plants shall remain as specified in the Mitigation and Monitoring Plans.

b. **Oak Riparian Criteria.** The success/performance criteria for oak riparian woodlands at the Adobe Gulch Grassland Site shall be as follows:

Year 1: 5 percent or greater absolute canopy cover of native riparian tree and shrub species. At least 90 percent survival of planted trees and shrubs.

Year 2: 10 percent or greater absolute canopy cover of native riparian tree and shrub species. At least 85 percent survival of planted trees and shrubs.

Year 3: 15 percent or greater absolute canopy cover of native riparian tree and shrub species. At least 80 percent survival of planted trees.

Year 4: 20 percent or greater absolute canopy cover of native riparian tree and shrub species. At least 80 percent survival of planted trees.

Year 5: 25 percent or greater absolute canopy cover of native riparian tree and shrub species. At least 75 percent survival of planted trees and shrubs.

Year 7: 35 percent or greater absolute canopy cover of native riparian tree and shrub species. At least 75 percent survival of planted trees and shrubs.

Year 9: 45 percent or greater absolute canopy cover of native riparian tree and shrub species. At least 70 percent survival of planted trees and shrubs.

Year 10: 50 percent or greater absolute native woody plant canopy cover (willows, oaks, and other native woody plant recruitments). At least 65 percent survival of planted trees and shrubs.

The criteria for absolute cover of invasive plants shall remain as specified in the Mitigation and Monitoring Plans.

c. **Deeper Pool Hydrology Criteria.** The deeper pools at the San Andreas Reservoir Wetland Creation shall provide appropriate conditions to allow for successful breeding of California red-legged frog. In Year 5, the pools shall be a minimum depth of 3 ft. In addition, the ponds shall remain wetted long enough into the summer (generally through July) to allow for complete metamorphosis of tadpoles. However, to ensure that bullfrog breeding habitat is not created, these areas shall also dry out completely (i.e., shall not be inundated nor saturated) for at least a week each year.

d. **Wetland Delineation Criteria.** The total acreage of seasonal and emergent wetlands created at the mitigation sites shall be equal to or greater than the acreage proposed for mitigation in Year 5. A formal delineation including an examination of vegetation, soils, and hydrology to determine the acreage and distribution of the wetlands shall be performed to verify that the acres of created wetlands equals or exceeds the acres of created wetlands required for mitigation. Field indicators of hydric soils are not anticipated to be present by Year 5 in the created wetlands because hydric soils typically develop over long periods of time (e.g., tens to hundreds of years). As such, the protocol outlined in Section F “Atypical

Situations," Subsection 4 "Man-Induced Wetlands" of the USACE's Wetlands Delineation Manual[9] describing the use of 2 parameters (hydrology and plants) or an equivalent protocol shall be followed.

Any revisions to the Mitigation and Monitoring Plans, including changes to the success/performance criteria or timelines, must be submitted to the Regional Water Board's Executive Officer for review and approval before the changes are implemented.

Reporting Requirements

5. All reports pursuant to these Provisions shall be prepared under the supervision of suitable professionals registered in the State of California.

6. The Discharger shall submit Project information, including impacts and restoration measures, using a standard California Wetlands Portal form within fourteen days from the date of adoption of this Order. An electronic copy of the form can be downloaded at: http://www.waterboards.ca.gov/sanfranciscobay/certs.htm. The completed California Wetlands Portal form shall be submitted electronically to habitatdata@waterboards.ca.gov or shall be submitted as a hard copy via mail to the Regional Water Board to the attention of California Wetlands Portal.

7. Within 90 days of adoption of this Order, the Discharger shall submit, acceptable to the Regional Water Board's Executive Officer, a draft long-term adaptive management plan that includes all appropriate details that are not presently included in the Mitigation and Mitigation Plans but are necessary to manage the mitigation sites after the final success criteria have been met. This plan shall be developed using the multi-agency mitigation banking template for long-term management plans[10] and shall include goals and objectives for each habitat type, monitoring methods for assessing whether these goals and objectives are being achieved, management actions to achieve these goals, and schedules for activities. Activities addressed in this plan shall include, but not be limited to, invasive plant management, invasive predator control, infrastructure management, erosion and sedimentation control, and grazing management. This plan must be of sufficient detail to feed into the Property Analysis Record (PAR) or equivalent analysis that will be used to derive the financial assurance amount for the conservation easement. The final long-term management plan, acceptable to the Regional Water Board's Executive Officer, shall be submitted to the Regional Water Board within 180 days of adoption of this Order and shall be implemented.

8. Within 180 days of adoption of this Order, the Discharger shall submit, acceptable to the Regional Water Board's Executive Officer, draft conservation easements for all mitigation areas. The final executed easements, acceptable to the Regional Water Board's Executive

[9] Environmental Laboratory. (1987). "Corps of Engineers wetlands delineation manual," Technical Report Y-87-1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS. NTIS No. AD A176 912.

[10] The mitigation banking template for long-term management plans was developed through statewide multi-agency effort, involving the California Resources Agency, California Department of Fish and Game, USACE, USFWS, USEPA, US Department of Agriculture - Natural Resources Conservation Service, and National Oceanic and Atmospheric Association - National Marine Fisheries Service. The mitigation banking template was released via USACE Public Notice on May 9, 2008, and is available on-line at http://www.dfg.ca.gov/habcon/conplan/mitbank/.

Officer, shall be submitted to the Regional Water Board within one year of the date of adoption of this Order.

9. Within 180 days of adoption of this Order, the Discharger shall submit, acceptable to the Regional Water Board's Executive Officer, proof of financial assurance adequate to ensure long-term management of the mitigation sites. This may consist of a bond, certificate of deposit, or other appropriate instrument. Along with the proof of financial assurance, the Discharger shall submit the PAR or equivalent analysis, acceptable to the Regional Water Board's Executive Officer, that provides the information necessary to demonstrate that the amount in the financial assurance completely covers all activities needed to manage the mitigation sites in perpetuity.

10. Within 180 days of adoption of this Order, the Discharger shall submit, acceptable to the Regional Water Board's Executive Officer, proof of financial assurance adequate to ensure the success of the proposed creek and wetland mitigation projects. This may consist of a bond, certificate of deposit, or other instrument callable by the Regional Water Board in the event of creek and/or wetland mitigation failure. Along with the proof of financial assurance, the Discharger shall submit a report, acceptable to the Regional Water Board's Executive Officer, with supporting information necessary to demonstrate that the amount in the financial assurance includes all that is necessary to cover implementation of the proposed mitigation.

11. As per the Restoration and Revegetation Plan, monitoring reports for the temporary impact locations shall be submitted to the Regional Water Board by December 31 for the first five monitoring years, and until the sites have met their success/performance criteria, and the Regional Water Board's Executive Officer has approved a notice of completion of restoration and revegetation for each temporary impact location (see Provision C.16 below). Monitoring reports shall be submitted either by uploading them to the California Wetlands Portal website at http://www.californiawetlands.net/tracker/ba/list or via mail, and shall be prepared as described in the Restoration and Revegetation Plan, including photographs from the photo-documentation points and all mitigation monitoring data collected between October 1st and September 30th the previous year, to document whether success/performance criteria are being achieved. If success criteria are not being achieved, the monitoring reports shall also describe adaptive management measures to be undertaken to ensure that success/performance criteria will be achieved, including additional planting and/or extension of the monitoring period as warranted.

12. As per the Monitoring and Mitigation Plans, monitoring reports for wetland mitigation sites shall be submitted to the Regional Water Board by December 31 for the first five monitoring years, and until the sites have met their performance standards and final success criteria, and the Regional Water Board's Executive Officer has approved a notice of mitigation completion for each site (see Provision C.17 below). For creek and riparian mitigation sites, monitoring reports shall be submitted to the Regional Water Board by December 31 for the first five monitoring years and Years 7, 9 and 10, and until the sites have met their performance standards and final success criteria, and the Regional Water Board's Executive Officer has approved a notice of mitigation completion for each site (see Provision C.17 below). Monitoring reports shall be submitted either by uploading them to the California Wetlands Portal website at http://www.californiawetlands.net/tracker/ba/list or via mail, and shall be prepared as described

in the Mitigation and Monitoring Plans, including photographs, special-status species monitoring, and all other information, as appropriate.

13. Within eight weeks of completing project construction activities, including restoration and replanting of the temporarily-impacted locations, the Discharger shall submit an as-built report and plan to the Regional Water Board either by uploading it to the California Wetlands Portal website at http://www.californiawetlands.net/tracker/ba/list or via mail. The report shall provide a revised project plan clearly identifying and illustrating the location of temporary impacts.

14. As-built plans for the mitigation sites shall be prepared as per the Mitigation and Monitoring Plans, and submitted to the Regional Water Board within eight weeks of the completion of mitigation site construction. The Discharger shall submit an as-built report and plan to the Regional Water Board either by uploading it to the California Wetlands Portal website at http://www.californiawetlands.net/tracker/ba/list or via mail.

15. When the Discharger has determined that the success/performance criteria specified in the Restoration and Revegetation Plan have been achieved for a restored temporary impact location, it shall submit a notice of restoration and revegetation completion (restoration notice) to the Regional Water Board's Executive Officer for approval. The restoration notice shall include a description of the status of the restoration component that has been determined to be successful. After approval of the restoration notice in writing by the Regional Water Board's Executive Officer, the Discharger's submittal of restoration monitoring reports for that location is no longer required.

16. When the Discharger has determined that a mitigation site (i.e., Adobe Gulch Grassland Site, Adobe Gulch Creek Wetland Creation Site, Boat Ramp Wetland Creation Site, San Andreas Wetland Creation Site, Skyline Boulevard Habitat Improvement Site, Skyline Quarry Wetland Restoration Site, or Upper San Mateo Creek Site) has achieved the performance standards and final success criteria specified in the Mitigation and Monitoring Plans, it shall submit a notice of mitigation completion (mitigation notice) to the Regional Water Board's Executive Officer for approval. The mitigation notice shall include a status report on the implementation of the long-term maintenance and management portion of the Mitigation and Monitoring Plans and a description of the status of the mitigation component that has been determined to be successful. After approval of the mitigation notice in writing by the Regional Water Board's Executive Officer, the Discharger's submittal of mitigation monitoring reports for that mitigation component is no longer required.

Other Requirements

17. The Discharger shall immediately notify the Regional Water Board by telephone whenever an adverse condition occurs as a result of this discharge. Such a condition includes, but is not limited to, a violation of the conditions of this Order, a significant spill of petroleum products or toxic chemicals, or damage to control facilities that would cause noncompliance. Pursuant to CWC §13267(b), a written notification of the adverse condition shall be submitted to the Regional Water Board within two weeks of occurrence. The written notification shall identify the adverse condition, describe the actions necessary to remedy the condition, and specify a timetable, subject to the modifications of the Regional Water Board, for the remedial actions.

18. The Discharger shall notify the Regional Water Board in writing at least 30 days prior to actual start dates for each component of the Project (i.e., prior to the start of grading or other construction activity for any component, including the creek and wetland mitigation components).

19. The Discharger shall at all times fully comply with the engineering plans, specifications, and technical reports submitted with its application for water quality certification and the completed report of waste discharge.

20. The Discharger is considered to have full responsibility for correcting any and all problems that arise in the event of a failure that results in, or threatens to result in, an unauthorized release of waste or wastewater. The discharge of any hazardous, designated or non-hazardous waste as defined in Title 23, Division 3, Chapter 15 of the California Administrative Code, shall be disposed of in accordance with applicable state and federal regulations.

21. The Discharger shall remove and relocate any wastes that are discharged at any sites in violation of this Order.

22. The Discharger shall maintain a copy of this Order at the Project site so as to be available at all times to site operating personnel and agencies.

23. The Discharger shall permit the Regional Water Board or its authorized representative at all times, upon presentation of credentials:

- **a.** Entry onto Project premises, including all areas on which wetland fill or wetland mitigation is located or in which records are kept.
- **b.** Access to copy any records required to be kept under the terms and conditions of this Order.
- **c.** Inspection of any treatment equipment, monitoring equipment, or monitoring method required by this Order.
- **d.** Sampling of any discharge or surface water covered by this Order.

24. In accordance with CWC §13260, the Discharger shall file with the Regional Water Board a report of any material change in the character, location, or quantity of this waste discharge. Any proposed material change in the discharge requires approval by the Regional Water Board after a hearing under CWC §13263. Material change includes, but is not be limited to, all new soil disturbances, all proposed expansion of development, or any change in drainage characteristics at the Project site. For the purpose of this Order, this includes any proposed change in the boundaries of the area of wetland/waters of the State to be filled and mitigated.

25. This Order does not authorize commission of any act causing injury to the property of another or of the public; does not convey any property rights; does not remove liability under federal, state, or local laws, regulations or rules of other programs and agencies, nor does this Order authorize the discharge of wastes without appropriate permits from other agencies or organizations.

26. Certification is conditioned upon full payment of the required fee as set forth in 23 CCR Section 3833. The total fee required for certification of the Project is $4,878. Regional Water Board staff received payment in full on May 4, 2010.

27. This certification action is subject to modification or revocation upon administrative or judicial review, including review and amendment pursuant to Section 13330 of the CWC and 23 CCR Section 3867.

28. This certification action is not intended and shall not be construed to apply to any discharge from any activity involving a hydroelectric facility requiring a Federal Energy Regulatory Commission (FERC) license or an amendment to a FERC license unless the pertinent certification application was filed pursuant to 23 CCR Subsection 3855(b) and that application specifically identified that a FERC license or amendment to a FERC license for a hydroelectric facility was being sought.

29. The Regional Water Board will consider recision of this Order upon Project completion and the Regional Water Board's Executive Officer's approval of notices of restoration and mitigation completion for all revegetation, restoration, establishment, and enhancement projects required or otherwise permitted now or subsequently under this Order.

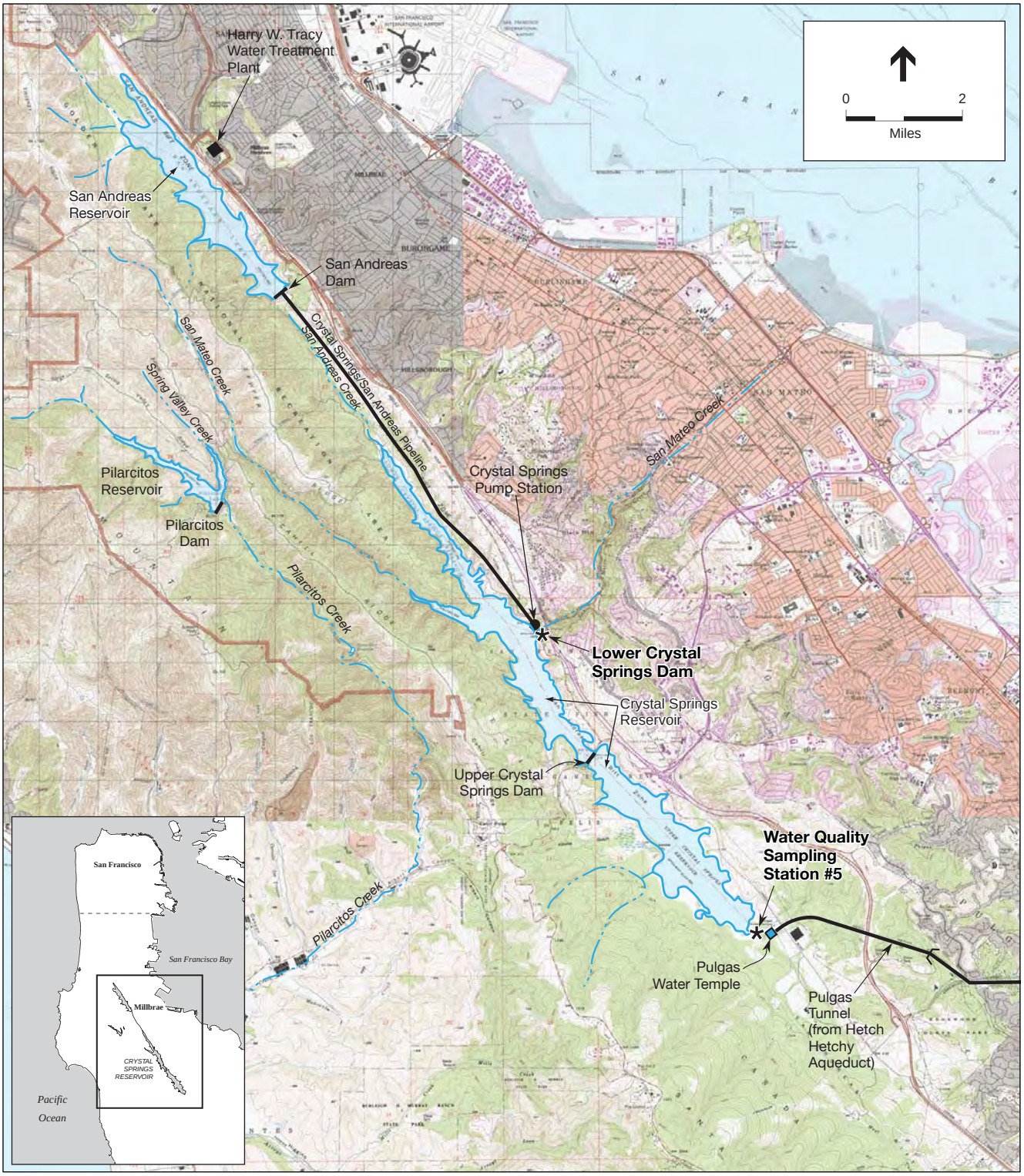
I, Bruce H. Wolfe, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of an order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on January 12, 2011.

Digitally signed by Bruce Wolfe
Date: 2011.01.19 13:42:32 -08'00'

BRUCE H. WOLFE
Executive Officer

Attachment A: Figures

Figure 1: Project Location
Figure 2: Proposed Modifications to Lower Crystal Springs Dam, Plan View
Figure 3: Proposed Spillway Modifications, Cross-section View
Figure 4: Proposed Stilling Basin Modifications, Plan and Cross-section Views
Figure 5: Water Quality Sampling Station #5, Staging and Storage Areas
Figure 6: Impacts to Waters of the State at Lower Crystal Springs Dam
Figure 7: Impacts to Waters of the State at Water Quality Sampling Station #5

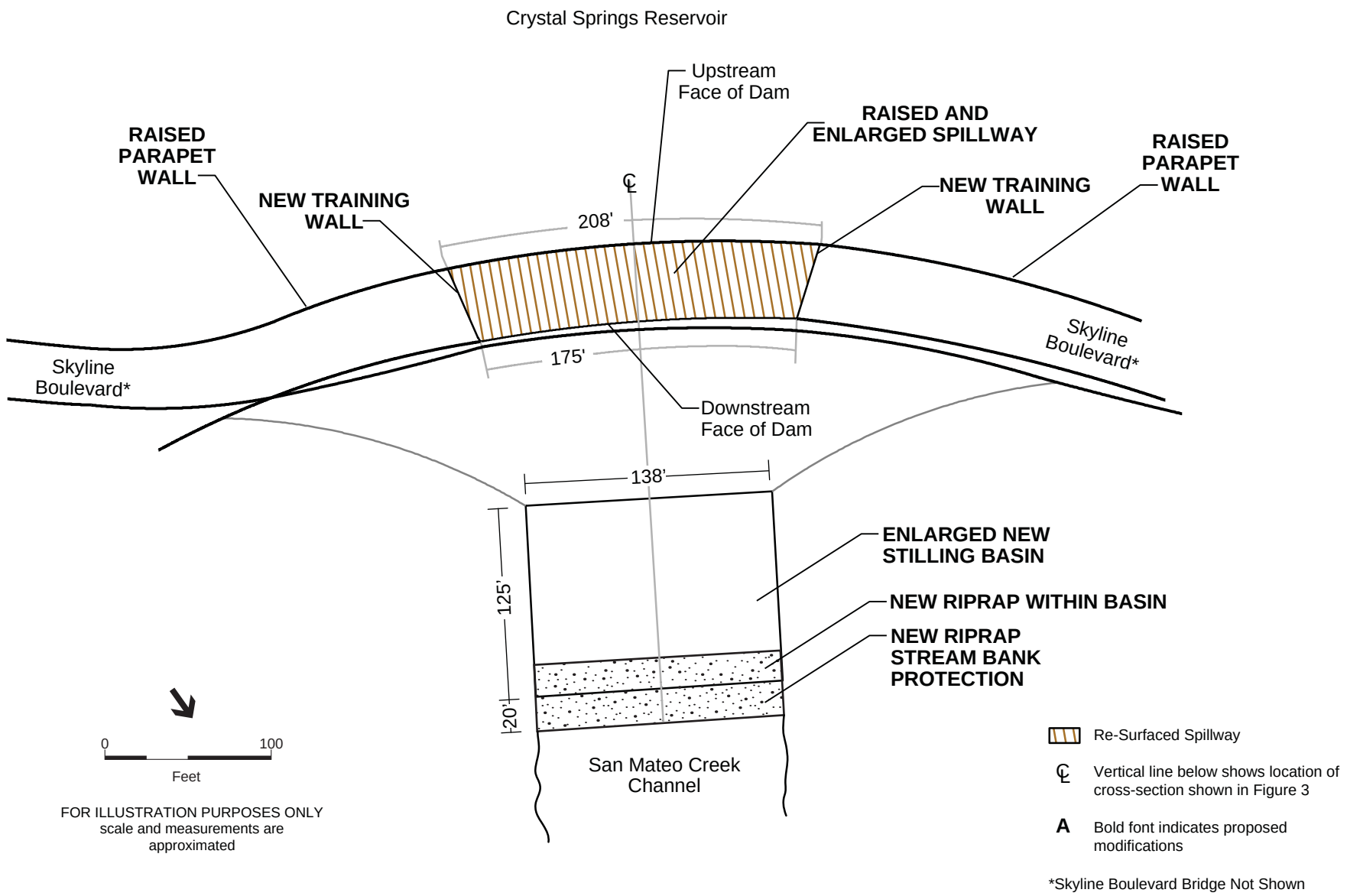


* Proposed Project

SOURCE: ESA + Orion; USGS 1978

SFPUC Lower Crystal Springs Dam Improvements

Figure 1
Project Location



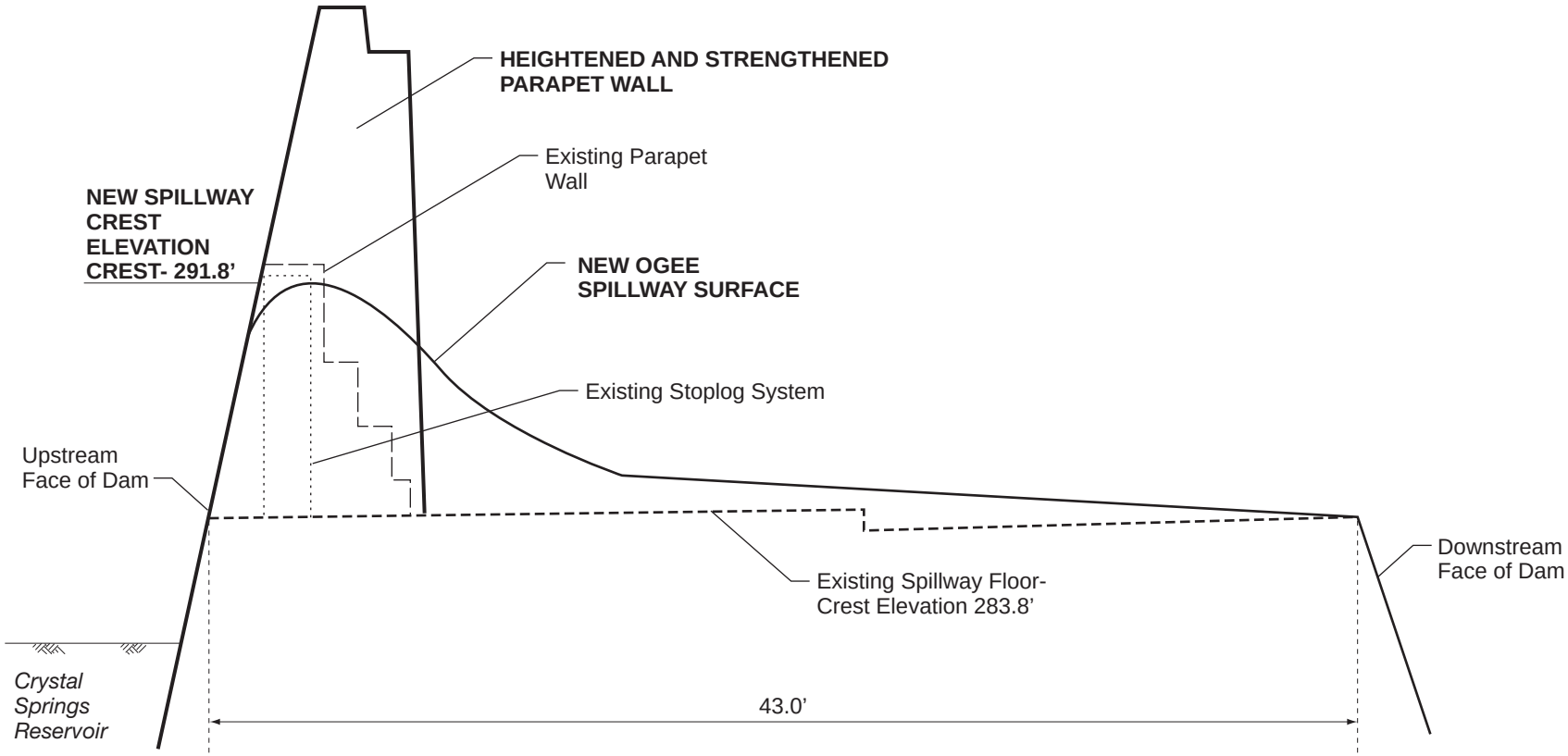
SOURCE: URS, 2006

SFPUC Lower Crystal Springs Dam Improvements

Figure 2

Proposed Modifications to Lower Crystal Springs Dam, Plan View

Administrative Draft (July 2009) – Subject to Change



FOR ILLUSTRATION PURPOSES ONLY
scale and measurements are approximated

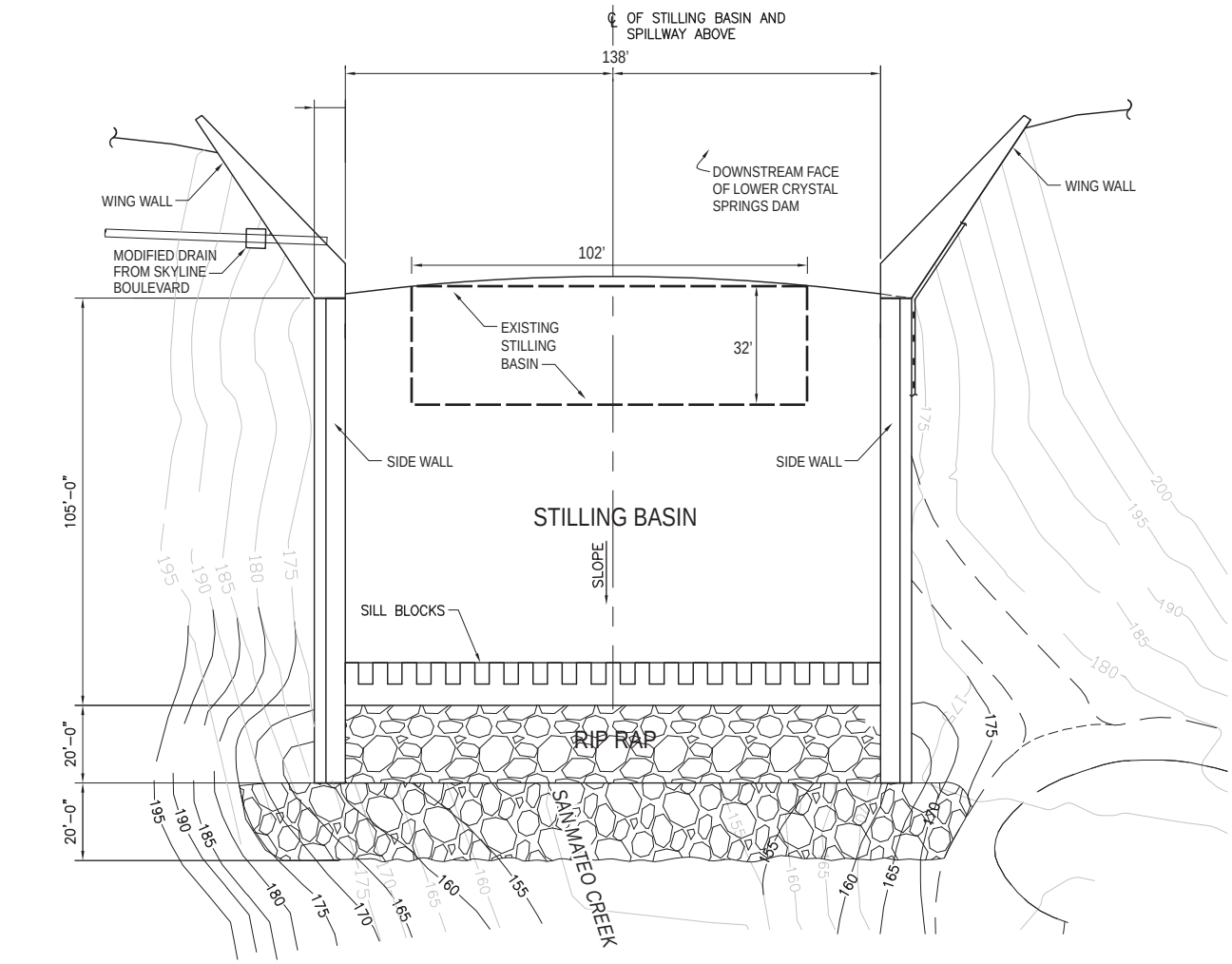
A Bold font indicates proposed modifications

SOURCE: URS, 2007

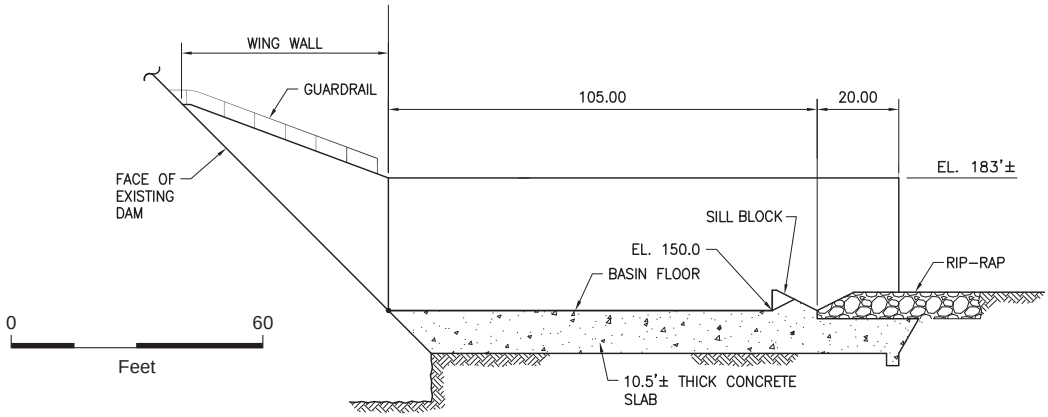
SFPUC Lower Crystal Springs Dam Improvements

Figure 3

Proposed Spillway Modifications, Cross-section View



STILLING BASIN PLAN VIEW



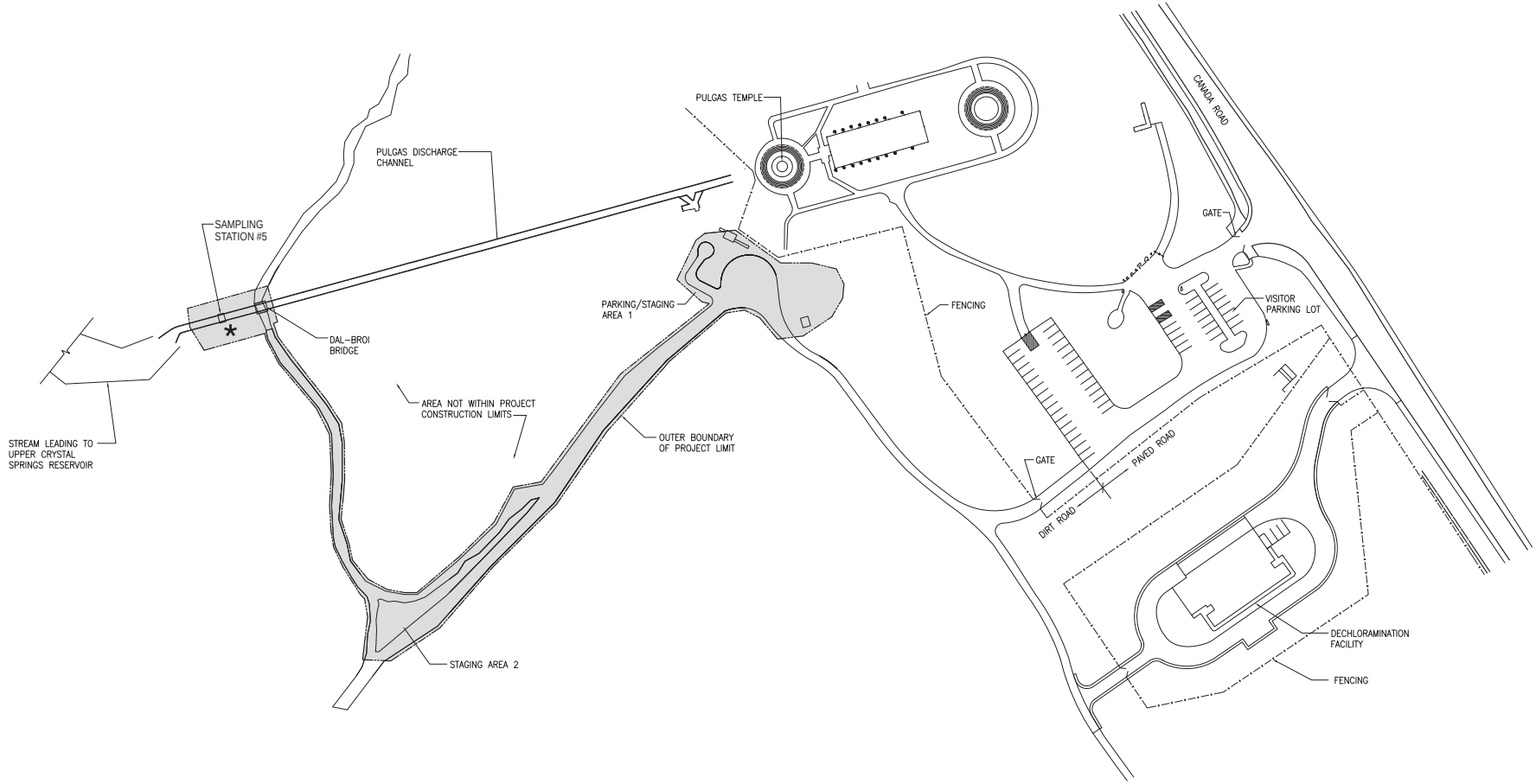
CROSS SECTION THROUGH CENTERLINE OF STILLING BASIN

SOURCE: URS, 2009

SFPUC Lower Crystal Springs Dam Improvements

Figure 4

Proposed Stilling Basin Modifications, Plan and Cross-section Views



Not to Scale

* Proposed Project

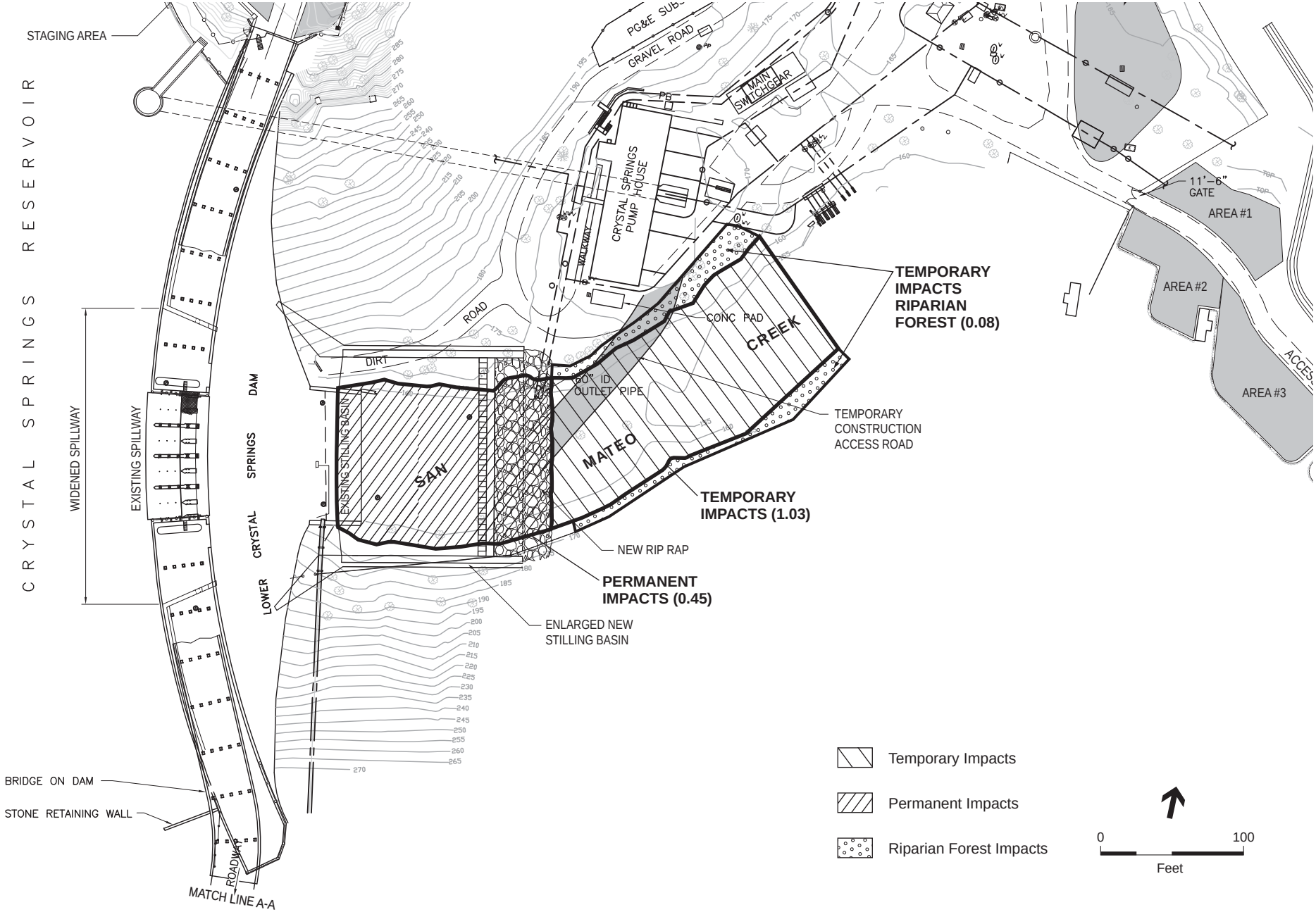
Staging and Construction Limits

SOURCE: SFPUC, 2008

SFPUC Lower Crystal Springs Dam Improvements

Figure 5

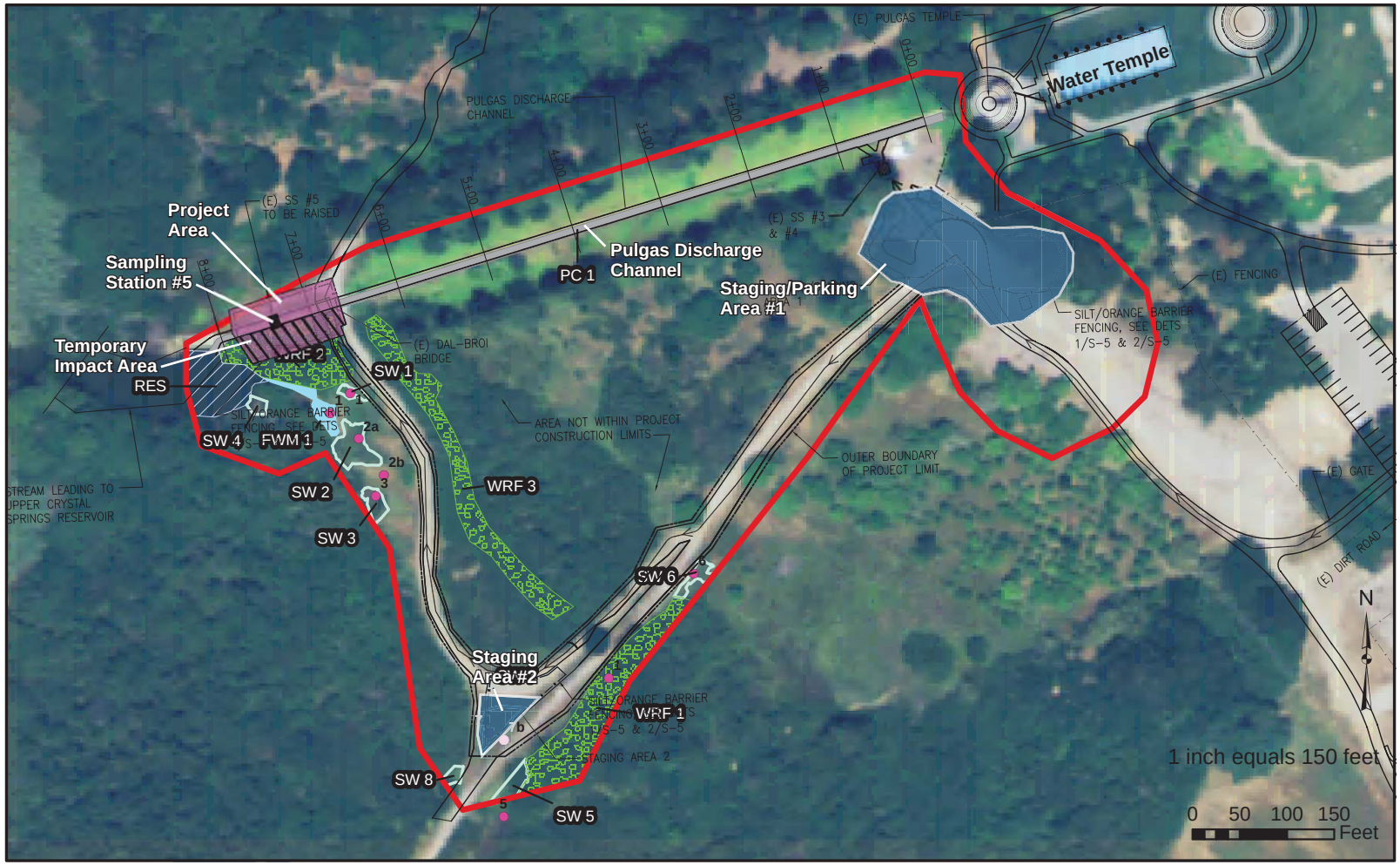
Water Quality Sampling Station #5, Staging and Storage Areas



SFPUC Lower Crystal Springs Dam Improvements

Figure 6

Impacts to Waters of the State



Soil data point

Estimated Project Boundary

Potential Jurisdictional Wetlands & Waters

Freshwater Marsh (FWM)

Perennial Stream (PC)

Open Water (RES)

Seasonal Wetland (SW)

Willow Riparian (WRF)

SOURCE: NRM Environmental

SFPUC Lower Crystal Springs Dam Improvements

Figure 7

Impacts to Waters of the State

Attachment B: Operational Impacts of the Lower Crystal Springs Dam Improvements Project on Vegetation and Habitat

Technical Memorandum

date July 22, 2009, revised November 30, 2009

to Anna Roche, SFPUC and Erika Lovejoy, MEA

from Barbara Leitner; Rachel Brush; Thomas Roberts, CWB; and Joyce Hsiao

subject Supporting Documentation for CEQA Impact Analysis of Vegetation/Habitat Impacts Due to Proposed Future Operations of Crystal Springs Reservoir under the Lower Crystal Springs Dam Improvements Project

Introduction

The objective of the Lower Crystal Springs Dam Improvements (LCSDI) project is to make structural improvements to Lower Crystal Springs Dam to comply with requirements of the California Department of Water Resources, Division of Safety of Dams to accommodate the probable maximum flood. These improvements would enable the SFPUC to restore use of the historical capacity of Crystal Springs Reservoir and to revise its current operations to increase the maximum normal operating level by four feet from the current level, increasing it from 283.8 to 287.8 ft (NGVD 29).

Elevating Crystal Springs Reservoir operating levels would inundate a portion of the existing wetland habitats to the extent that they would be converted to deepwater habitat; i.e., open water, as well as inundate some existing upland habitats. Some wetland habitats would persist, although their species composition could change due to the altered pattern of inundation. New wetland habitats would form within the new, higher operating elevations currently supporting upland habitats. It is also anticipated that some wetlands would be induced at elevations above the reservoir operating elevations, as groundwater, seeps, and streams approach a new equilibrium with the higher reservoir elevations. Estimation of the net change in habitat types and distribution around Crystal Springs Reservoir from these factors is required for the CEQA impact assessment.

The purpose of this technical memorandum is to provide the supporting details of the CEQA analysis of impacts on biological resources due to operational effects of the LCSDI project. The reader is referred to Section 5.10 of the LCSDI EIR for the complete discussion of impacts and the appropriate context of the information in this memorandum.

225 Bush Street, Suite 1700 San Francisco, California 94104 (415) 896-5900 *fax* (415) 896-0332 email: esa.sf@esassoc.com

Information Sources

The following information was used to analyze and estimate the vegetation impacts that would result from increasing the maximum normal operating level of Crystal Springs Reservoir under the LCSDI project:

1. Elevations of reservoir topography based on LiIDAR contour mapping of the Crystal Springs Reservoir and perimeter:

   LiDAR Mapping
   Airborne 1 Corporation
   300 N. Sepulveda Boulevard, #1060, El Segundo, California, 90245
   Phone: 310-414-7400 Fax: 310-414-7409
   Contact: Sean Bower, LiDAR Team Data Analyst Team Leader
   Delivery Date: January 18, 2007
   Data Description: 1 DVD containing 1 Meter Grids in ESRI ASC format in California State Plane, Zone 3, US Survey Feet, NAD83/NAVD88
   Data Accuracy: 100% of points falling within +/- 0.50 ft, 95% Confidence Level

2. Geographic information system (GIS) files of mapped vegetation at elevations below 291.8 ft surrounding Crystal Springs Reservoir prepared as part of the technical report on biological resources for the LCSDI Project (Entrix, 2006)

3. Hetch Hetchy/Local Simulation Model (HH/LSM) output of predicted Crystal Springs Reservoir storage volumes under the proposed project (Steiner, 2009)

4. Information regarding operating range of Crystal Springs Reservoir (Briggs and Cameron, 2009)

5. Data on existing and predicted inundation frequencies and average operating elevations of Crystal Springs Reservoir, presented in Section 5.12, Hydrology and Water Quality, of the LCSDI EIR.

Background

Background of the Data Set

ESA + Orion was provided with several GIS shapefiles from Entrix that contain data on biological resources at the Crystal Springs Reservoir (vegetation communities, special status plant locations, herpetology survey findings) as well as a high-resolution aerial image for the project area and LiDAR contour data (one foot intervals).

The vegetation communities layer, which includes the wetland polygons from the verified wetland delineation, has metadata that describes the steps of the mapping process. In addition, the Draft Biological Technical Reports from Entrix also includes a discussion of the methods for the vegetation mapping. A summary is provided below.

Vegetation mapping began in 2006 using a combination of hand delineation of vegetation polygons on printed aerial images and recorded GPS data[1]. This information was then digitized by hand using ArcGIS (ArcMap 9.x) and an aerial image with one pixel of resolution. High resolution LiDAR data that provide one foot elevation contour intervals were obtained at the time that digitization was taking place and with this combination of data the upper limit of the project area mapping was defined as 291.8 feet. The working vegetation map was then field verified (a process often referred to as "ground-truthing") to ensure accuracy of the mapped polygons and to identify any gaps. In general, vegetation polygons were mapped at a size of one acre and larger. The digital polygons were then modified as needed according to the results of the field verification.

The mapped vegetation communities are based on Holland's description of natural communities (Holland, 1986) and on the Cowardin wetland classification (Cowardin et al., 1979). A description of how these resources are applied to the project can be found in the project EIR and Wetland Determination Report.

The methods undertaken by Entrix to map the vegetation communities are extremely detailed and widely used. Mapping vegetation by hand digitization is generally considered to be the most accurate and cost effective method for projects of limited geographic scope. Although it may seem that delineating the boundary between two vegetation types with a relatively similar image signature (e.g. coast live oak forest and mixed evergreen forest) would be somewhat arbitrary, determining the boundary on the ground is often not clear either. Ecotones (boundaries between two or more natural communities) are often a continuum or gradual transition rather than a clearly defined line, which makes the act of determining the boundary extremely difficult. However, informed professional judgment combined with effective ground-truthing was used to resolve uncertainties of this nature.

The GIS data (shapefiles) for the special status plant and animal populations and observations were collected in the field using a GPS unit. GPS units were used to map occurrence or observation points and population polygons. There is always some degree of error or geographic inaccuracy in the data collected using a GPS unit; but this is unavoidable. The amount of error can be influenced by a variety of variables including: defined accuracy of the individual GPS unit, satellite reception, and potential for differential correction.

[1] The unit used for the GPS work was a hand-held Trimble CE Series, which has sub-meter accuracy, and is currently the most accurate hand-held GPS equipment available for civilian use. The level of accuracy depends greatly on the number of satellites available, the geometry of the satellites, and the amount of interference (clouds, trees, mountains, etc), which was substantial in steep canyons and wooded areas around Crystal Springs Reservoir. The GPS, although essential to the mapping efforts, provided just a basis for wetland boundaries and additional refinement was added to it. Wetland boundaries and soil pits were hand drawn on large-scale aerial images during field work, and all the mapped data was edited by hand using the field-verified map notes. This was especially applicable to wetland areas beneath tree canopy.

Definition of the Data Set

Given the information sources described above, ESA+Orion worked with the data in order to identify and define the appropriate data set relevant to the analysis. This included the following steps:

1. LiIDAR one-foot increment elevations of the reservoir periphery were superimposed over the mapped GIS vegetation cover layer. The vegetation cover polygons were then divided into one-foot increments to determine the type and extent of vegetation by elevation. A total of 1,479.5 acres, plus an additional 177 acres not attributed to a cover type, were categorized from elevations 0 to 295 ft. **Table J-1** presents this preliminary, raw data.

2. GIS convention is to report acreage to four decimal places, but for this analysis the actual precision was more appropriately reported as a single decimal place.

3. Delete all data at elevations greater than 292 ft. Vegetation was not consistently mapped above 292 ft because the limits of the project area were defined as the 292-ft contour interval. Little if any impact from the proposed project would be expected to occur above this elevation because the maximum operating elevation, that is, the highest elevation the reservoir would be expected to sustain for periods long enough to support the development of shoreline wetlands, is proposed to be 288 ft. Although this analysis predicts that higher prevailing groundwater elevations with the project could "induce" (rather than directly cause) the formation of wetlands higher than the proposed average operating elevation of 288 feet, it is anticipated that most of this effect would occur within the 4-foot elevation between 288 and 292 ft.

4. Combine "fluctuation zone/lacustrine" with "open water"; rename "lacustrine/unvegetated".

5. Delete all data at elevations below 263 ft. The full extent of wetlands were mapped as far as they could be seen, including submerged wetlands that were mapped by boat. Less than 1.5 percent of the total mapped wetland vegetation was found at elevations below 263 feet, and this elevation was concluded to be the practical lower limit of wetlands at the time of the survey. In fact, it would be difficult to define a lower elevation limit in the reservoir below which inundated wetlands could not occur or be mapped, since seasonal wetlands can form at any elevation as the reservoir subsides. This is part of the phenomenon of establishing a baseline as a single point in time in a highly variable system. In the baseline, no significant amount of wetland vegetation was present below 263 ft, and the lacustrine/unvegetated cover type at these elevations is expected to remain unchanged under the proposed project. This acreage, totaling 913 acres, was eliminated from further analysis. Therefore, the relevant range of elevations subject to this analysis was defined as 263 – 292 ft.

6. The proportion of acreage with high and low slope was also calculated, by one-foot increments. Throughout the relevant range, 263 – 292 ft, slopes of 0-6% averaged 40% of the total area and this proportion was fairly consistent among the one-foot increments.[2] To find the proportion of acreage in the 0-8% slope range found to consistently support wetland vegetation, we estimated that the extent

[2] Due to an error, the area within the slope interval 0-6 percent was calculated, rather than the slope interval 0-8 percent. The calculation involves identifying and summing the acreage within each slope polygon and elevation interval. Because the process is so laborious, the investigators chose to extrapolate the acreage in the additional slope interval, 6-8 percent slope. This extrapolation was justified on the basis that the average slope in the elevation range of interest is very consistent, as evidenced by the consistent number of total acres in each additional foot of reservoir elevation. The interval 0-8 percent is numerically one-third larger than the interval 0-6 percent, so we conservatively estimated that the area in the additional slope interval 6-8 percent was one-fourth larger than the area in the 0-6 percent slope interval, thus predicting a conservative (that is, low) estimate of the extent of potentially suitable habitat for the development of wetlands.

of 0-8% slope would encompass one-third more area than the 0-6% interval (since the 0-8% slope interval range is one-third larger than the 0-6% interval). One-third more area would encompass 54% of the total area, so we conservatively assumed that 50% of the acreage is within the low slope interval 0-8%, and 50% is steeper than 8%.

7. Delete "developed" areas, totaling 0.6 acres, within the 263 – 292 ft range. Habitat characteristics of these small areas could not be determined. If this acreage is developed, it is likely to remain so under future conditions. As a result, it was eliminated from further analysis.

8. Extend all vegetation polygons within the 291 – 292 ft range up to the 292 ft LiDAR contour interval to calculate the total acreage by vegetation type within this range by extending the cover type polygon having the longest shared border. Initial vegetation mapping was completed in the range between 0 – 291.8 ft based on a contour shapefile that was not derived from the LiDAR data and therefore did not completely cover the 291 – 292 ft range. An additional 13.7 acres of vegetation is now accounted for in the 291 – 292 ft range to bring the total acres of habitat to 23.6 between 291 and 292 ft.

9. Rearrange the columns of habitats to group upland habitats together and wetland habitats together (no change in acreage).

10. Assign to lacustrine/unvegetated 0.7 ac of woody upland vegetation in elevations less than 283 ft. This anomalous data was due to conditions such as overhanging tree canopy. Wherever wetland vegetation grew below overhanging tree canopy, wetlands were given priority for mapping, so logically, tree canopy mapped over low elevations were overhanging lacustrine/unvegetated habitat. One example of this situation is at the southern end of Upper Crystal Springs Reservoir, where willows and other riparian vegetation growing on the floodplain form a continuous canopy over the deeply incised Laguna Creek channel. Standard practice in wetland delineations is to map a riparian type as continuous where the canopy cover is continuous, yet when LiDAR topographic mapping is superimposed on the mapped, continuous canopy, riparian vegetation appears to grow at much greater depth than it actually does.

11. Small amounts of grassland totaling 1.2 acre were mapped between elevations 264 and 279 ft. These areas were reassigned to lacustrine/unvegetated to correct for anomalous data.

12. To correct for anomalous data, acreages assigned to riparian vegetation in elevations 263 – 274 ft, normally areas inundated for too long to support woody riparian vegetation, were reassigned to lacustrine/unvegetated. For example, "riparian" was mapped as complete canopy at the mouth of Laguna Creek. LiDAR shows an incised drainage passing through the riparian stand, so riparian canopy cover was assigned to the lower elevation of the incised channel, even though the trees themselves were growing only on the banks at higher elevations (B. Leitner, Orion, pers., obs.). By superimposing the mapped, continuous canopy over the LiDAR mapping, riparian vegetation appears to grow at much greater depth than it actually does. These anomalies were corrected by re-assigning the area within the incised channel to lacustrine/unvegetated. Such areas totaled 1.9 acre.

13. *Scirpus/Typha* mapped at elevations 263 – 269 ft, was reassigned to lacustrine/unvegetated. These areas had inundation frequencies of 85% or more, ecologically would have limited potential to support this vegetation type, and could be attributable to a small amount of sampling error (less than 0.4 percent of the total of *Scirpus/Typha* and Herbaceous Wetland acreage, which is combined for the purpose of predicting impacts. This simplification was employed where the acreage for any given cover type in a one-foot elevation increment was less than one-half acre, which was 269 ft in the case of *Scirpus/Typha*. A total of 0.9 acre was thus reassigned.

14. Delete all acreage assigned to lacustrine/unvegetated below 276 ft on the basis that conditions would remain unchanged under the proposed project. This eliminated 90.7 acres.

Following this interpretation, the acreage in the relevant data set totals 488.6 acres, shown in **Table J-2**.

Approach to Analysis

The analysis of impacts on natural communities is based on broad ecological principles in combination with empirical data collected during wetland delineation and habitat surveys conducted in 2006 around the periphery of Crystal Springs Reservoir. The basic assumption used in the analysis is that the current extent and elevational limit of a natural community (approximated by cover types in the GIS mapping) is closely associated with the prevailing pattern of inundation, expressed as inundation frequency. **Table J-3** shows the relevant data set and compares it to the current and future, with-project inundation frequencies.

Table J-3 also provides color coding to depict how habitat types at different elevation ranges are predicted to change under the future, with project conditions. Where GIS data showed the acreage of a cover type declined sharply from a one-foot elevation increment to the next, the inundation frequency at that elevation was concluded to be the limiting factor. **Table J-4** summarizes the results of the predicted changes acreages in vegetation and habitat types that would occur with the proposed long-term operation of Crystal Springs Reservoir following implementation of the LCSDI project. Table J-4 includes notes that explain the rationale used in making each determination and cross-references the detailed discussion below.

The rationale (identified as “R1”, “R2” and so on) used to predict how each cover type responds individually to prevailing conditions is described in the paragraphs that follow.

R1. <u>Changes in inundation frequencies are predicted to change the type and extent of cover types</u>. Inundation frequencies at Crystal Springs Reservoir (see columns ** in Table J-3) would remain essentially unchanged at elevations above 292 ft (above the spillway elevation) and below 263 ft, which was reported as the lower limit of herbaceous wetland vegetation. Therefore, the elevation from 263 – 292 ft is the range in which vegetation change is predicted. A total of 488.6 acres of is encompassed in this elevation range, as described below under “Definition of Data Set” (See Note 1, Table J-4).

R2. <u>The lower limit of riparian cover can be predicted based on inundation frequency</u>. GIS data showed that riparian cover dropped off sharply below elevation 274 – 275 ft, which corresponds to a current inundation frequency of about 61%. This elevation is assumed to be the lower limit of suitable conditions for riparian vegetation. Where future inundation frequency is predicted to remain less than 61%, existing riparian cover is predicted to persist (see Note 2, Table J-4). Where inundation frequency is predicted to be greater than 61% with implementation of the proposed project, existing riparian cover is predicted to be converted to other wetland types (see Note 8, Table J-4). It is assumed that slope and soil conditions currently supporting wetland (and riparian) vegetation within the future fluctuation zone will continue to do so under future with-project conditions, which is why all riparian habitat is predicted to be converted to other wetlands rather than lacustrine habitat. Slope was used as a predictive factor only for areas that are currently mapped as lacustrine/unvegetated.

R3. The lower limit of *Scirpus/Typha* cover can be predicted based on inundation frequency. The lower limit of *Scirpus/Typha* is currently 269 – 270 ft[3], which is correlated with an inundation frequency of about 81%. This is supported by the scientific literature indicating a requirement for about 9 months of inundation for optimum growth of this vegetation. Where inundation frequency is predicted to remain at no more than 81% (277 ft and higher), the extent of existing *Scirpus/Typha* cover is predicted to remain unchanged (see Note 3, Table J-4). Where future inundation frequency is predicted to increase to more than 81% (below 277 ft), existing *Scirpus/Typha* cover is predicted to be lost, converting to herbaceous wetland at depths of 12 ft or less below the average operating elevation[4] (see Note 9, Table J-4) or lacustrine/unvegetated at greater depths (see Note 10, Table J-4).

R4. Existing wetlands within the future fluctuation zone are assumed to be retained, although their composition and structure may change. It is assumed that slope and soil conditions currently supporting wetland vegetation within the future fluctuation zone will continue to do so under future with-project conditions in the fluctuation zone; that is, where inundation frequencies are greater than 0% and less than 100%. Although not quantifiable, it is likely that some riparian habitat in this zone will be converted to *Scirpus/Typha* or herbaceous wetland, and some herbaceous wetland may be converted to *Scirpus/Typha* because of changes in the predicted inundation patterns under the proposed project (see Note 9, Table J-4).

R5. The lower limit of wetland vegetation is determined by depth below average operating elevation. Through the comparison of LiDAR data and mapped wetland vegetation, ENTRIX concluded that most wetland vegetation grew no more than 12 feet below the average operating elevation, reported as 275.5 ft[5] (ENTRIX, 2008). In a changeable system, seasonal wetlands can form at any elevation where inundated habitat is exposed for several weeks during the growing season, so the actual extent of wetlands could vary from year to year. Thus, the lower limit of existing wetland cover (of all types, of which herbaceous wetland vegetation grew the lowest) was taken to be 263 – 264 ft. The future average operating elevation is predicted to be about 282 ft. Under proposed future conditions, the lower limit of wetland cover is predicted to be 12 ft lower, or 270 ft. Herbaceous wetland cover above 270 ft is predicted to persist (see Note 4, Table J-4), while herbaceous and *Scirpus/Typha* cover below 270 ft would be converted to lacustrine/unvegetated cover (see Notes 10 and 11, Table J-4).[6]

R6. Lacustrine/unvegetated is predicted to remain unchanged except where inundation frequency rises from below 5% to at least 5% and slopes are 0-8%. Most areas currently mapped as lacustrine/unvegetated are steep and rocky, conditions unsuitable for the development of wetland vegetation, even where the inundation frequency is high enough to support it (below 283 ft).

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[3] The lower elevational limit was generally taken as the one-foot increment containing at least 0.5 acre of the cover type.

[4] The average operating elevation for the purposes of this analysis is based on the elevation (in ft) that is predicted to be inundated 50 % of the time (based on HH/LSM model predictions). This corresponds to about 282 ft.

[5] More recent inundation frequency calculations have place the average operating elevating elevation at 276-277 ft, but we have retained the ENTRIX value for consistency here.

[6] The 12-foot generalization was not discussed in the wetland delineation, because it was not relevant to the determination of jurisdictional waters. Although LiDAR sampling was carried out after the fieldwork for the wetland delineation was completed, the LiDAR data were used to define the water elevation lines in the delineation report. The purposes of the wetland delineation and of the EIR analysis are different—by its nature, the wetland delineation is charged with identifying the current extent of wetlands, while the EIR analysis is required to predict impacts. The latter requires a broader, more synoptic view of a changeable system, and a lower level of precision is inherent in this analysis. As stated earlier, the wetlands below 263 feet comprise 0.4 percent of the total wetlands delineated. This far exceeds the level of precision in any EIR analysis we are aware of, and in most comparisons is also expected to exceed the year-to-year variation in seasonal wetlands at Crystal Springs Reservoir.

However, some mapped lacustrine/unvegetated areas are situated above herbaceous wetland vegetation, suggesting that the inundation regime, rather than substrate, is limiting. For the elevation range (283 – 287 ft), which contains 4.4 acres of lacustrine/unvegetated habitat, inundation frequencies are predicted to increase from below 5% to above 5%. Using the assumed 50% of area having a slope of 0 to 8%, 2.2 acres are predicted to develop wetland vegetation and 2.2 acres are predicted to persist as lacustrine/unvegetated habitat. (see Notes 5 and 14, Table J-4).

R7. The lower elevational limit of woody upland vegetation is determined by maximum reservoir elevations. The mapped lower limit of existing woody upland vegetation is about 283 ft, which corresponds to an inundation frequency of about 5%. In general, woody upland vegetation at elevations with projected future inundation frequencies of less than 5% are predicted to be retained (287 – 292 ft; see Note 6, Table J-4), while woody upland vegetation at elevations with projected future inundation frequencies greater than 5% under the proposed project would be lost (below 287 ft; see Note 13, Table J-4).

R8. Grasslands are predicted to persist where inundation frequencies are 25% or less. Grassland cover was mapped at elevations as low as 279 – 280 ft, which corresponded to an inundation frequency of 25% under current operating conditions. Existing grasslands with projected future inundation frequencies of less than 25% (286 – 292 ft) are predicted to persist (see Note 7, Table J-4).

R9. Grasslands at elevations below the projected 25% inundation frequency are predicted to be converted entirely to wetland vegetation. Existing grasslands with predicted future inundation frequencies greater than 25% (up to 286 ft) under the proposed project are predicted to be lost. Areas currently supporting grasslands have sufficient soil development and water retention capacity to be capable of supporting wetland vegetation. Moreover, grassland cover is generally located on low-slope sites. Thus, all grassland habitats in the zone with a projected inundation frequency greater than 25% (below 286 ft) is predicted to be converted to wetland vegetation (see Note 12, Table J-4).

R10. Slope and inundation frequency determine whether upland habitats are converted to wetland habitats or to lacustrine/unvegetated. Observations during the wetland delineation surveys found that wetland habitats were generally present in areas with inundation frequencies of at least 5% and on slopes of 0 – 8%; steeper slopes often have rocky substrate and insufficient soil development to support wetland vegetation. Therefore, wetland habitats are predicted to form in newly-inundated areas with similar slopes under future with-project conditions. As described in the section on definition of the relevant data set, GIS data indicates that about 50% of the acreage in the affected area is defined as low slope. As a result, half of the acreage currently supporting woody upland vegetation in the elevation range 283 – 287 ft is predicted to develop wetland vegetation, while half is predicted to convert to lacustrine/unvegetated (see Note 13, Table J-4).

R11. The upper limit of wetland vegetation depends on wetland type. The upper limit of herbaceous wetland and riparian vegetation may be determined by hydrology associated with seeps, springs, creeks, and groundwater at elevations above the operating levels, as well as the elevation of reservoir waters themselves. Herbaceous wetland vegetation was found in significant amounts up to 290 ft elevation. Riparian vegetation was present in significant amounts up to 292 ft elevation, and was more abundant above the current average operating elevation than below it. By contrast, the upper limit of the inundation-dependent *Scirpus/Typha* community was distinct at about 283 ft, which corresponded to an inundation frequency of about 5% (see Note 14, Table J-4).

R12. Wetlands may be induced at elevations above the predicted maximum operating elevations, and their proportion is predicted to be similar to that above the current operating elevations. GIS data indicate that within the 5-foot elevation interval above the current maximum operating elevation (283 – 288 ft), wetland cover types occupy 51 acres in the 108 acres found in the elevation range, or about 47% of the total acreage. The wetland habitat here is supported by groundwater, seeps, and stream discharge into the reservoir, as well as proximity to the reservoir itself. Since groundwater, seeps and stream discharge features will rise under the proposed project because of increased operating elevations, it is predicted that some wetland habitat will form at commensurately higher elevations under future with-project conditions. In the 5-ft elevation range 287 – 292 ft above the proposed future maximum operating elevation, wetland vegetation currently occupies only 30 acres out of a total of 111 acres, or 28% of acreage. If wetlands are predicted to form proportional to the extent of wetlands in the interval above the current operating maximum, an additional approximately 22 acres of wetlands are predicted to form in what is currently 83 acres of uplands. Conservatively, 25% of uplands (both woody and grasslands) in the elevation range 287 – 290 ft are predicted to be converted to form 20.8 acres of induced wetlands under the proposed project (see Notes 15 and 16, Table J-4).

References

Briggs, David A. and Cameron, David S., Water Supply & Treatment Division Interoffice Memorandum regarding Operating Range of Crystal Springs Reservoir, Comparison of Observed and Modeled Data, and Refinement of HH/LSM Output for Crystal Springs Reservoir Storage and Elevation, May 8, 2009

Cowardin, L. M., V. Carter, F. Golet, and E. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. Washington, DC: US Department of the Interior, US Fish and Wildlife Service.

Entrix, Inc. 2006. Lower Crystal Springs Dam Improvements Project, Biological Resources Technical Report. Unpublished report prepared for the San Francisco Public Utilities Commission, October 2006.

Entrix, Inc./MSE Joint Venture (Entrix/MSE) 2007. Lower Crystal Springs Dam Improvements Project, San Mateo County, California, Wetlands Determination Report. Prepared for the San Francisco Public Utilities Commission. December.

Holland, R. F. 1986. Preliminary descriptions of the terrestrial natural communities of California. State of California, The Resources Agency, Nongame Heritage Program, Department of Fish and Game, Sacramento, California. 156pp.

Steiner, Daniel B., Memorandum on Lower Crystal Springs Dam Improvement Project Variant Operation, January 25, 2009

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Table 1: Summary of Raw GIS vegetation mapping data, by one-foot elevation increments

Elevation interval (ft)	Vegetation/ Land cover (in acres)													
	Coast live oak forest	Coastal sage scrub	Fluctuation Zone/ Lacustrine	Non-native grassland	Non-native woodland	Northern mixed chaparral	Open water	Riparian	Scirpus/ Typha	Herbaceous wetland	Developed land	Mixed evergreen forest	**TOTAL**	Area not attributed to cover type
294-295	0.0032			0.0084							0.001	0.1277	0.1403	63.5023
293-294	0.0033			0.0114				0.0000			0.0011	0.1523	0.1681	24.3915
292-293	0.0035	0.0000		0.0099				0.0001			0.0014	0.1629	0.1778	25.5590
291-292	3.1522	1.5095		1.0718	0.3061	0.0522	0.0140	1.2193	0.0001	0.1616	0.0266	2.2524	9.7658	13.8141
290-291	7.0714	3.7038		1.9769	1.3080	0.0526	0.0201	4.4487	0.0005	0.7723	0.0603	2.6975	22.1121	0.8627
289-290	6.2218	4.0981		2.0552	1.0465	0.0390	0.0229	4.8237	0.0009	1.2675	0.0534	2.5519	22.1809	0.7301
288-289	5.1647	3.8055		1.9875	0.8213	0.0338	0.0293	5.2406	0.0023	2.3896	0.0660	2.3461	21.8867	0.4597
287-288	4.6723	3.3601		2.1002	0.5174	0.0337	0.0382	6.4749	0.0284	1.9297	0.1090	2.1154	21.3793	0.4423
286-287	3.8510	3.0411	0.0001	2.2657	0.4815	0.0360	0.0493	7.4190	0.0460	1.5775	0.0804	1.9943	20.8419	0.4549
285-286	2.9841	2.8689	0.0011	2.8933	0.2493	0.0325	0.0698	8.4997	0.0579	1.6603	0.0509	1.9342	21.302	0.4739
284-285	2.4404	2.2569	0.0023	3.3947	0.1780	0.0251	0.1037	8.0228	0.3037	2.0444	0.0425	1.9350	20.7495	0.5064
283-284	0.8734	1.2028	0.3921	4.9343	0.0783	0.0069	3.6556	8.2165	0.3588	4.0425	0.0190	0.6332	24.4134	0.5943
282-283	0.0237	0.1336	0.2792	3.0448	0.0076		2.0564	6.8193	1.4616	6.1142	0.0058	0.0167	19.9629	0.2975
281-282	0.0095	0.0494	0.2863	2.0480	0.0051		3.2778	5.1276	1.8694	9.3615	0.0112	0.1342	22.18	0.4249
280-281	0.0016	0.0310	0.2181	1.0529	0.0043		3.2684	3.8409	2.7834	10.4235	0.0089	0.0563	21.6893	0.3820
279-280		0.0091	0.1567	0.6697	0.0037		3.4742	2.8041	2.8331	12.0538	0.0052	0.0161	22.0257	0.3778
278-279		0.0068	0.1597	0.3947	0.0024		3.4903	2.2340	2.0849	13.1536	0.0044	0.0099	21.5407	0.3585
277-278		0.0018	0.1449	0.1715	0.0017		3.6981	2.1690	1.7429	11.7205	0.0040	0.0082	19.6626	0.3618
276-277			0.1686	0.1037	0.0013		3.6880	1.6868	1.5267	11.4502	0.0037	0.0072	18.6362	0.3517
275-276	0.0004		0.1692	0.0665	0.0004		3.7804	1.0998	1.2088	11.9168	0.0035	0.0062	18.252	0.3536
274-275	0.0024		0.1715	0.0498	0.0000		3.9610	0.5461	0.9573	12.4694	0.0036	0.0057	18.1668	0.3531
273-274	0.0032		0.1674	0.0478			4.2267	0.3062	0.7789	12.1360	0.0036	0.0057	17.6755	0.3498
272-273	0.0032		0.1574	0.0500			4.3007	0.2270	0.9483	12.1406	0.0036	0.0058	17.8366	0.3564
271-272	0.0011		0.1566	0.0497			4.5318	0.1937	1.2689	10.4520	0.0037	0.0061	16.6636	0.3499
270-271	0.0003		0.1700	0.0521			4.7095	0.1562	0.7711	10.3838	0.0036	0.0063	16.2529	0.3493
269-270	0.0002		0.1429	0.0537			4.9935	0.1472	0.4873	11.8824	0.0035	0.0062	17.7169	0.3488
268-269	0.0002		0.1143	0.0558			5.4585	0.1647	0.2960	11.7596	0.0033	0.0056	17.858	0.3523
267-268	0.0001		0.0524	0.0606			6.7241	0.1998	0.2276	10.8331	0.0035	0.0118	18.113	0.3472
266-267			0.0606	0.0354			8.4006	0.2192	0.1596	9.8452	0.0039	0.0162	18.7407	0.3440
265-266			0.0708	0.0223			9.6260	0.1958	0.1163	10.5269	0.0038	0.0185	20.5804	0.3426
264-265			0.0887	0.0106			11.4037	0.0794	0.0802	8.2982	0.0036	0.0164	19.9808	0.3408
263-264			0.5871				12.9413	0.0098	0.0512	4.2713	0.0044	0.0123	17.8774	0.3418
262-263			0.8205				12.3777	0.0091	0.0402	2.1786	0.0067	0.0072	15.44	0.3377
261-262			0.7275				13.3980	0.0088	0.0219	1.0823	0.0069	0.0052	15.2506	0.3337
260-261			0.145				13.6976	0.0088	0.0046	0.5428	0.0053	0.0051	14.4092	0.3353
0-260			0.2128				860.851	1.1964	0.0005	0.6685	2.7926	2.1836	867.9054	37.1144
TOTAL:	36.4872	26.0784	5.8238	30.7489	5.0129	0.3118	1012.3382	83.815	22.5193	231.5102	3.4139	21.4754	**1479.535**	176.9961

Indicates data not relevant to analysis of proposed future reservoir operations

Table 2: Vegetation/Land Cover Data for LCSDI Impact Analysis of Increased Operating Levels

Elevation interval (ft, NGVD)	Vegetation/ Land cover (in acres)										
	Upland Forest			Upland Scrub		Upland Herbaceous	Aquatic	Wetland			TOTAL
	Coast live oak forest	Mixed evergreen forest	Non-native woodland	Coastal sage scrub	Northern mixed chaparral	Non-native grassland	Lacustrine/ Unvegetated	Riparian	Scirpus/ Typha	Herbaceous wetland	
291-292 [a]	14.7	2.3	0.3	2.1	0.1	1.7	0.2	2.0	0.0	0.2	23.6
290-291	7.1	2.7	1.3	3.7	0.1	2.0	0.0	4.4	0.0	0.8	22.1
289-290	6.2	2.6	1.0	4.1	0.0	2.1	0.0	4.8	0.0	1.3	22.1
288-289	5.2	2.3	0.8	3.8	0.0	2.0	0.0	5.2	0.0	2.4	21.8
287-288	4.7	2.1	0.5	3.4	0.0	2.1	0.0	6.5	0.0	1.9	21.3
286-287	3.9	2.0	0.5	3.0	0.0	2.3	0.0	7.4	0.0	1.6	20.8
285-286	3.0	1.9	0.2	2.9	0.0	2.9	0.1	8.5	0.1	1.7	21.3
284-285	2.4	1.9	0.2	2.3	0.0	3.4	0.1	8.0	0.3	2.0	20.7
283-284	0.9	0.6	0.1	1.2	0.0	4.9	4.0	8.2	0.4	4.0	24.4
282-283						3.0	2.5	6.8	1.5	6.1	20.0
281-282						2.0	3.8	5.1	1.9	9.4	22.2
280-281						1.1	3.6	3.8	2.8	10.4	21.7
279-280						0.7	3.7	2.8	2.8	12.1	22.0
278-279							4.1	2.2	2.1	13.2	21.5
277-278							4.0	2.2	1.7	11.7	19.7
276-277							4.0	1.7	1.5	11.5	18.6
275-276								1.1	1.2	11.9	14.2
274-275								0.5	1.0	12.5	14.0
273-274									0.8	12.1	12.9
272-273									0.9	12.1	13.1
271-272									1.3	10.5	11.7
270-271									0.8	10.4	11.2
269-270									0.5	11.9	12.4
268-269										11.8	11.8
267-268										10.8	10.8
266-267										9.8	9.8
265-266										10.5	10.5
264-265										8.3	8.3
263-264										4.3	4.3
TOTAL:	48.0	18.5	5.0	26.4	0.3	30.1	30.2	81.5	21.5	227.1	488.6

[a] The acreages of vegetation/land cover in the 291-292-foot contour interval were adjusted to incorporate 13.8 acres of area not attributed to cover type in the raw data presented in Table 1. The vegetation of this acreage was estimated using the GIS data for the mapped vegetation type in adjacent polygons, and the acreages were assigned to the vegetation type with the longest shared border.

Table 3. Vegetation Types by Elevation Compared to Current and Future-with-Project Inundation Frequencies

Elevation interval (ft, NGVD)	Vegetation/Land Cover (in acres)											Inundation frequency (%)	
	Upland Forest			Upland Scrub		Upland Herbaceous	Aquatic	Wetland			Total (acres)	Current (2001-2006)	Future with Project (2018)
	Coast live oak forest	Mixed evergreen forest	Non-native woodland	Coastal sage scrub	Northern mixed chaparral	Non-native grassland	Lacustrine/ Unvegetated	Riparian	Scirpus/ Typha	Herbaceous wetland			
291-292	14.7	2.3	0.3	2.1	0.1	1.7	0.2	2.0	0.0	0.2	23.6	0	0
290-291	7.1	2.7	1.3	3.7	0.1	2.0	0.0	4.4	0.0	0.8	22.1	0	0
289-290	6.2	2.6	1.0	4.1	0.0	2.1	0.0	4.8	0.0	1.3	22.1	0	0.5
288-289	5.2	2.3	0.8	3.8	0.0	2.0	0.0	5.2	0.0	2.4	21.8	0	0.9
287-288	4.7	2.1	0.5	3.4	0.0	2.1	0.0	6.5	0.0	1.9	21.3	0.0	1.5
286-287	3.9	2.0	0.5	3.0	0.0	2.3	0.0	7.4	0.0	1.6	20.8	0.0	15.8
285-286	3.0	1.9	0.2	2.9	0.0	2.9	0.1	8.5	0.1	1.7	21.3	0.1	29.7
284-285	2.4	1.9	0.2	2.3	0.0	3.4	0.1	8.0	0.3	2.0	20.7	1.5	37.3
283-284	0.9	0.6	0.1	1.2	0.0	4.9	4.0	8.2	0.4	4.0	24.4	4.5	41.4
282-283						3.0	2.5	6.8	1.5	6.1	20.0	11.4	45.1
281-282						2.0	3.8	5.1	1.9	9.4	22.2	16.0	56.3
280-281						1.1	3.6	3.8	2.8	10.4	21.7	20.2	60.1
279-280						0.7	3.7	2.8	2.8	12.1	22.0	25.8	61.3
278-279							4.1	2.2	2.1	13.2	21.5	33.9	68.8
277-278							4.0	2.2	1.7	11.7	19.7	42.6	79.1
276-277							4.0	1.7	1.5	11.5	18.6	50.8	86.4
275-276								1.1	1.2	11.9	14.2	56.7	91.5
274-275								0.5	1.0	12.5	14.0	60.7	91.7
273-274									0.8	12.1	12.9	65.0	99.6
272-273									0.9	12.1	13.1	68.7	100
271-272									1.3	10.5	11.7	75.0	100
270-271									0.8	10.4	11.2	78.1	100
269-270									0.5	11.9	12.4	81.4	100
268-269										11.8	11.8	85.1	100
267-268										10.8	10.8	86.7	100
266-267										9.8	9.8	91.8	100
265-266										10.5	10.5	93.8	100
264-265										8.3	8.3	94.7	100
263-264										4.3	4.3	97.0	100
TOTAL:	**48.0**	**18.5**	**5.0**	**26.4**	**0.3**	**30.1**	**30.2**	**81.5**	**21.5**	**227.1**	**488.6**		

PREDICTED CHANGES TO VEGETATION (AC)

71.1	Upland woody vegetation, predicted to remain as upland habitat, although may convert to other upland types such as grassland
27.1	Upland woody vegetation predicted to be converted to wetland (50%) and open water (50%)
12.1	Grassland, predicted to remain as grassland
18.0	Grassland, predicted to be converted to wetlands
4.3	Lacustrine/unvegetated, predicted to be converted to wetland (50%) and remain as lacustrine/unvegetated (50%)
25.9	Lacustrine/unvegetated, predicted to remain as lacustrine/unvegetated
70.9	Riparian, predicted to remain as riparian
10.5	Riparian, predicted to be converted to other wetlands
13.6	*Scirpus/Typha* , predicted to remain as *Scirpus/Typha*
7.5	*Scirpus/Typha* , predicted to be converted to other wetlands
0.5	*Scirpus/Typha* , predicted to be converted to open water
159.7	Herbaceous wetland, predicted to remain as herbaceous wetland
67.4	Herbaceous wetland, predicted to be converted to open water

Note: The inundation frequency data are from Table 5.12-3 and represent the percentage of time in a given year that a perimeter contour would be inundated. Current inundation frequencies represent historical daily data for the 60-month period from July 2001 to July 2006. Future with project inundation frequencies represent modeled data over the 984-month period from July 1920 to September 2002 based on monthly time steps, with adjustments to account for Crystal Spring Reservoir daily operating patterns.

Table 4: Summary of Predicted Impacts On Vegetation Due to Increased Normal Maximum Operating Levels

Status	Vegetation/Land cover (acres)										Total (acres)	Notes
	Upland Forest			Upland Scrub		Upland Herbaceous	Aquatic	Wetland				
	Coast live oak forest	Mixed evergreen forest	Non-native woodland	Coastal sage scrub	Northern mixed chaparral	Grassland	Lacustrine/ Unvegetated	Riparian	*Scirpus/ Typha*	Herbaceous wetland		
Existing	48.0	18.5	5.0	26.4	0.3	30.1	30.2	81.5	21.5	227.1	488.6	1. Habitat between 263 -292 ft is subject to changes in inundation frequency resulting from increased operating elevations Total = 488.6 acres. See R1 in text.
No Changes Predicted								70.9			70.9	2. Riparian cover above 279 ft will persist because inundation frequency will remain less than 61%. See R2 in text.
									13.6		13.6	3. *Scirpus/Typha* above 277 ft will persist because inundation frequency will remain less than 81%. See R3 in text.
										159.7	159.7	4. Herbaceous wetland above 270 ft will persist because it is within 12 feet of future average operating level. See R5 in text.
							28.1				28.1	5. Lacustrine/unvegetated between 276 – 292 ft will persist as lacustrine/unvegetated, except where inundation frequencies rise from below 5% to above 5% (4.3 ac in 283-287 ft). In this area, low slope areas (50% or 2.2 ac) are predicted to convert to wetland, while high slope areas (50% or 2.1 ac) will remain as lacustrine/unvegetated. See R6 in text; see Note 14 for other 50% of this acreage).
	53.3										53.3	6. Most woody upland vegetation between 287-292 ft will persist because inundation frequencies are predicted to remain <5%, but species composition may change (assume 75% of total 67.0 acres in this range). See R7; see also Note 15 for the other 25% of this acreage.
						9.1					9.1	7. Existing grasslands are found at elevations with up to 25% inundation frequency. Grasslands at elevations between 286-292 ft are predicted to persist because inundation frequency will be no more than 25%. See R8 in text.
Direct changes due to increase in maximum normal operating level								-7.7		7.7	0.0	8. Riparian cover between 274-278 ft will convert to other wetland due to increase in inundation frequency >61%. See R2 in text.
									-7.5	7.5	0.0	9. *Scirpus/Typha* between 270-277 ft will convert to other wetland where inundation frequency increases to >81% and depth is less than 12 ft below future average operating elevation. See R3 and R4 in text
							0.5		-0.5		0.0	10. *Scripus/ Typha* below 270 ft will convert to lacustrine/unvegetated because it will be more than 12 ft below the average operating level. See R3 and R5 in text.
							67.4			-67.4	0.0	11. Herbaceous wetland below 270 ft is predicted to be converted to lacustrine/unvegetated because it will be more than 12 ft below the average operating level. See R5 in text.
						-18.0				18.0	0.0	12. Grasslands between 279 - 286 ft are predicted to be converted to seasonal wetland due to predicted inundation frequency greater than 25%. See R9 in text.
	-10.1	-6.5	-1	-9.4	-0.1		13.6			13.5	0.0	13. Woody upland vegetation between 283 – 287 ft is predicted to be inundated > 5% of the time and therefore would not persist. Assume 50% will convert to wetland in low slope areas and 50% will convert to lacustrine/ unvegetated in high slope areas. See R10 in text.
							-2.2			2.2	0.0	14. Some lacustrine/unvegetated habitat between 283 – 287 ft will convert to wetland in low slope area because of increased inundation frequencies (assume 50% of total 4.3 acres). See R6 and R11 in text; see Note 5 for other 50% of this acreage.
Indirect changes due to induced wetland conditions	-9.5	-3.0	-1.0	-4.3	-0.1					17.8	0.0	15. Some woody upland vegetation between 287-292 ft will convert partially (25%) to wetland due to induced wetland conditions. See R12 in text; see Note 6 for other 75% of this acreage.
						-3.0				3.0	0.0	16. Some grassland between 286 -292 ft will convert partially (25%) to wetlands due to induced wetland conditions. See R12 in text; see Note 7 for other 75% of this acreage.
Final, post-project, acreage	28.4	9.0	3.0	12.8	0.2	9.1	109.5	73.8	13.5	229.3	488.6	Total Acres = 488.6
Net change from existing acreage	-19.6	-9.5	-2.0	-13.7	-0.2	-21.0	79.4	-7.7	-8.0	2.3	0.0	Net change Upland Forest: -31.1 acres Net change Upland Scrub: -13.8 acres Net change Grassland: -21.0 acres Net change Wetland: -13.5 acres

Attachment C: Mitigation and Monitoring Plans

The following documents are part of this Order but are not physically attached due to volume. They are available on the Internet via the following links:

- Adobe Gulch Grassland MMP
- Boat Ramp MMP
- Boat Ramp 95% Design Plans
- Sherwood Point Oak Restoration, Adobe Gulch Creek Wetland Creation, Skyline Quarry Wetland Restoration, and Skyline Boulevard Habitat Improvement MMP
- San Andreas Wetland MMP
- Upper San Mateo Creek MMP

Attachment D: Restoration and Revegetation Plan

The Conceptual Restoration and Revegetation Plan for the Lower Crystal Springs Dam Improvements Project is part of this Order but is not physically attached due to volume. It is available on the Internet via the following link:

- Conceptual Restoration and Revegetation Plan (Final), Lower Crystal Springs Dam Improvements Project

Attachment E: Long-Term Management Plan Outline

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