DRAFT
PROGRAMMATIC ENVIRONMENTAL ASSESSMENT/FONSI
INITIAL STUDY/MITIGATED NEGATIVE DECLARATION

Lower Calaveras River Anadromous Fish Barriers Improvement Project

Prepared by

FISHBIO Environmental

For

U.S. Fish and Wildlife Service and
Stockton East Water District

DRAFT FINDING OF NO SIGNIFICANT IMPACT
Lower Calaveras River Anadromous Fish Barriers Improvement Project

Fish passage has been identified as the primary limiting factor for salmon and steelhead in the Calaveras River. Therefore, there is a need to improve fish passage at multiple, artificial instream structures which will increase opportunities for steelhead and salmon to access the quality spawning and rearing habitat located above these migration impediments.

The Proposed Action consist of replacing or retrofitting up to 37[1] instream structures identified as passage impediments to salmon and steelhead trout in the lower Calaveras River below Bellota Weir (Appendix B); it is expected that salmonid population numbers will increase once passage opportunities are improved (Stillwater Sciences and FFC 2004). Secondarily, the Proposed Action will serve as a model restoration program designed to demonstrate that agricultural, governmental, environmental, and educational interests can work cooperatively together to foster sustainable fish populations without adversely affecting agricultural and municipal water supplies or land access.

A draft Programmatic Environmental Assessment/Initial Study (PEA/IS) was prepared that evaluates the potential environmental impacts, beneficial and adverse, associated with the Proposed Action and a No Action Alternative. The draft PEA/IS is attached for reference. In accordance with the National Environmental Policy Act of 1969, as amended, the U.S. Fish and Wildlife Service (USFWS) has found that the Proposed Action will not result in a significant adverse impact on the environment. Therefore, an Environmental Impact Statement (EIS) is not required.

The USFWS's finding that implementation of the proposed action will result in no significant impact to the quality of the human environment is supported by the following factors:

1. Aesthetics- The Proposed Action will not adversely impact visual resources because activities would be nearly indistinguishable from existing conditions since all modifications would occur at existing structures within the river channels and alignment of river channels will not be altered.
2. Land Use Planning and Agricultural Resources- The Proposed Action will not adversely impact land management or agricultural practices within San Joaquin County. Construction activities will be limited to areas within river channels.
3. Air Quality, Noise, Geology and Soils, Hazardous and Toxic Materials, Hydrology and Water Quality, and Transportation-Due to the short duration and location of proposed construction activities, minimal area of ground disturbance, and implementation of best management practices (BMP's), the Proposed Action will not have significant adverse

[1] Of the 46 structures rated ≥ 1, several are being addressed in separate processes and are not included as part of this Proposed Action, including the Old Calaveras River Headworks Facility, Bellota Weir, and eight structures above Bellota Weir. In addition, twelve of the 37 structures proposed for improvements are not under SEWD's jurisdiction and will require written landowner approval prior to implementation.

impacts on Air Quality, Noise, Geology and Soils, Hazardous and Toxic Materials, Hydrology and Water Quality, and Transportation.

4. Biological Resources- the Proposed Action will not result in any physical changes to the environment resulting in significant adverse impacts to biological resources. No listed species under USFWS jurisdiction will be affected. Stockton East Water District (SEWD) and the USFWS are completing Endangered Species Act (ESA) Section 7 informal consultation with the National Marine Fisheries Service (NMFS) on the Proposed Action. NMFS concurrence with SEWD's and USFWS' determination that the Proposed Action is not likely to adversely affect any special status species or critical habitats will be obtained prior to finalization of the PEA/IS and Finding of No Significant Impact (FONSI).
5. Cultural and Historical Resources- An inventory of the area of potential effects was conducted and USFWS will be entering into consultation with the California State Historic Preservation Office (SHPO) on a finding of no historic properties affected. USFWS will complete the Section 106 process prior to implementing the Proposed Action.
6. Mineral Resources- The absence of mining and mineral resource recovery sites in areas affected by construction and operation activities precludes any impact to this resource.
7. Population Growth and Housing-The Proposed Action consists of improving existing instream structures within river channels that are enclosed by levees, which will not directly or indirectly increase population growth and will not displace housing units or people.
8. Public Services and Utilities- The Proposed Action will not construct any new, or make physical alterations to governmental facilities (fire, police, school, park, or other public facilities), nor will it create the need for new or physically altered governmental facilities.
9. Recreation- Although levees within the project vicinity serve as an informal trail system for equestrian and hikers where residential development abuts the outer edges of the levees, the modifications to instream structures will not increase the recreational use of levees and will not necessitate the construction of new recreational facilities or the expansion of existing facilities.
10. Indian Trust Assets - The absence of Indian Trust Assets in areas affected by construction and operation activities precludes any impact to this resource.
11. Environmental Justice - Minority or disadvantaged populations or communities will not be adversely impacted by the Proposed Action.
12. Cumulative Effects - The Proposed Action will not contribute to a cumulatively significant adverse impact when added to other past, present and reasonably foreseeable future actions, given the short-term and temporary nature of construction actions associated with instream structure improvements.

DRAFT INITIAL STUDY/MITIGATED NEGATIVE DECLARATION

1.	**Project Title:**	Lower Calaveras River Anadromous Fish Barrier Improvement Project
2.	**Lead Agency Name and Address:**	Stockton East Water District, Post Office Box 5157, Stockton, CA 95205-0157
3.	**Contact Person and Phone Number:**	Mr. Kevin Kauffman, (209) 948-0333
4.	**Project Location:**	Lower Calaveras River, San Joaquin County, CA
5.	**Project Sponsor's Name and Address:**	Mr. Kevin Kauffman General Manager Stockton East Water District Post Office Box 5157 Stockton, CA 95205-0157 Ramon Martin Assistant Program Manager Anadromous Fish Restoration Program US Fish and Wildlife Service 4001 N. Wilson Way Stockton, CA 95205 Vicki Lake Habitat Restoration Coordinator California Department of Fish and Game Office of Spill Prevention and Response 1700 K Street, Suite 250 Sacramento, CA 95811
6.	**General Plan Designation:**	N/A
7.	**Zoning:**	Various
8.	**Description of Project:**	See attached PEA/IS.
9.	**Surrounding Land Uses and Setting:**	See attached PEA/IS.

10. **Other Public Agencies Whose Approval or Input May Be Needed:**

United States Fish and Wildlife Service, National Marine Fisheries Service, California Department of Fish and Game, Regional Water Quality Control Board (Central Valley Region), United States Army Corps of Engineers, San Joaquin County Flood Control, State Lands Commission, and State Historic Preservation Office

Environmental Factors Potentially Affected:

The environmental factors checked below would potentially be affected by this project (i.e., the project would involve at least one impact that is a "Potentially Significant Impact"), as indicated by the checklist in Appendix A of the draft Programmatic Environmental Assessment/Initial Study (PEA/IS).

☐ Aesthetics	☐ Agricultural Resources	☒ Air Quality
☒ Biological Resources	☒ Cultural Resources	☒ Geology/Soils
☒ Hazards and Hazardous Materials	☒ Hydrology/Water Quality	☐ Land Use/Planning
☐ Mineral Resources	☐ Noise	☐ Population/Housing
☐ Public Services	☐ Recreation	☒ Transportation/Traffic
☐ Utilities/Service Systems	☐ Mandatory Findings of Significance	

Determination:

On the basis of this initial evaluation:

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

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

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

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

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

Kevin Kauffman — Signature

7/31/2009 — Date

Kevin Kauffman — Printed Name

Stockton East Water District — For

DRAFT MITIGATED NEGATIVE DECLARATION
Lower Calaveras River Anadromous Fish Barriers Improvement Project

Project Description:
Fish passage has been identified as the primary limiting factor for salmon and steelhead in the lower Calaveras River. Therefore, there is a need to improve fish passage at multiple artificial instream structures which will increase opportunities for steelhead and salmon to access the quality spawning and rearing habitat located above these migration impediments.

The Proposed Action consist of replacing or retrofiting up to 37 instream structures identified as passage impediments to salmon and steelhead trout in the lower Calaveras River below Bellota Weir; it is expected that salmonid population numbers will increase once passage opportunities are improved (Stillwater Sciences and FFC 2004). Secondarily, the Proposed Action will serve as a model restoration program designed to demonstrate that agricultural, governmental, environmental, and educational interests can work cooperatively together to foster sustainable fish populations without adversely affecting agricultural and municipal water supplies or land access.

The Proposed Action is within the lower Calaveras River, an eastside tributary to the San Joaquin River, in San Joaquin County, California. The Proposed Action is in the reach of the lower Calaveras River between the San Joaquin River and Bellota (RM 25.1) via two fish passage routes: (1) the primary passage route which includes the Stockton Diverting Canal and Mormon Slough and (2) the secondary route which includes the Old Calaveras River channel.

Funding has been provided by the U.S. Fish and Wildlife Service's Anadromous Fish Restoration Program to implement at least one structural improvement (i.e., Budiselich Flashboard Dam) and additional funding may be provided for other structures, as fiscal year budgets allow.

Finding:
Although the project may have the potential to cause minor short-term impacts on air quality, biological resources, cultural resources, soils, hazardous materials, water quality, and traffic the measures that will be incorporated into the project to avoid significant impacts will lessen such impacts to less-than-significant levels (see attached Programmatic Environmental Assessment/Initial Study)

Basis for the Finding:
Based on the Programmatic Environmental Assessment/Initial Study prepared for this project, it was determined that there would not be significant adverse environmental effects resulting from implementing the Proposed Project. The Project is expected to achieve a net benefit to the environment by improving fish passage at multiple structures which will increase opportunities for steelhead and salmon to access quality spawning and rearing habitat located above existing migration impediments.

The Stockton East Water District finds that implementing the Proposed Project will have no significant environmental impact with incorporation of the identified mitigation measures.

This Mitigated Negative Declaration is filed pursuant to the California Environmental Quality Act Guidelines.

Kevin Kauffman, General Manager
Stockton East Water District

Date 7/31/2009

DRAFT PROGRAMMATIC ENVIRONMENTAL ASSESSMENT AND INITIAL STUDY

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1.0 INTRODUCTION

This draft Programmatic Environmental Assessment/Initial Study (PEA/IS) evaluates the potential environmental impacts associated with implementation of the Proposed Action, which is to replace and/or retrofit up to 37 artificial instream structures that are salmonid migration impediments in the lower Calaveras River. The PEA portion of this document is prepared pursuant to the National Environmental Policy Act, 42 U.S.C. §§ 4331 et seq. (NEPA), with the United States Fish and Wildlife Service (USFWS) serving as the federal lead agency. The IS portion of this document is prepared pursuant to the California Environmental Quality Act, California Public Resource Code §§21000 et seq. (CEQA), with the Stockton East Water District (SEWD) serving as the lead agency for the CEQA analysis. SEWD owns and/or maintains instream structures addressed by this PEA/IS analysis.

The Proposed Action is intended to improve fish passage at multiple artificial instream structures located throughout the lower Calaveras River, which will increase opportunities for steelhead and Chinook salmon to access quality spawning and rearing habitat located above migration impediments. The lower Calaveras River is an eastside tributary to the San Joaquin River that traverses three counties in California's Central Valley (i.e., San Joaquin, Calaveras and Tuolumne Counties)(Figure 1-1).

This PEA/IS evaluates the potential impacts from construction and maintenance associated with the following activities:

- Flashboard Dam Improvements
- Low Flow Crossing Improvements
- Bridge Apron Improvements

This PEA/IS identifies mitigation measures that have been incorporated into the project design to reduce project impacts to a less than significant level. The conclusion from the evaluation of this PEA/IS is that the Proposed Action, with mitigation incorporated, will not result in any significant direct or indirect impacts to the human environment.

1.1 Purpose and Need

The lower Calaveras River between New Hogan Dam (NHD; RM 42) and the confluence with the San Joaquin River has been designated as critical habitat for federally threatened Central Valley steelhead and as essential fish habitat for species of concern fall-run Chinook salmon. Above the Bellota Weir (RM 25.1), there are about 18 miles of quality spawning and rearing habitat for fall-run Chinook salmon and steelhead (Figure 1-1). There are two fish passage routes from the San Joaquin River to the reach above the Bellota Weir: (1) the primary route is through the Stockton Diverting Canal and Mormon Slough and (2) the secondary route is through the Old Calaveras River channel (OCC) (Figure 1-1).

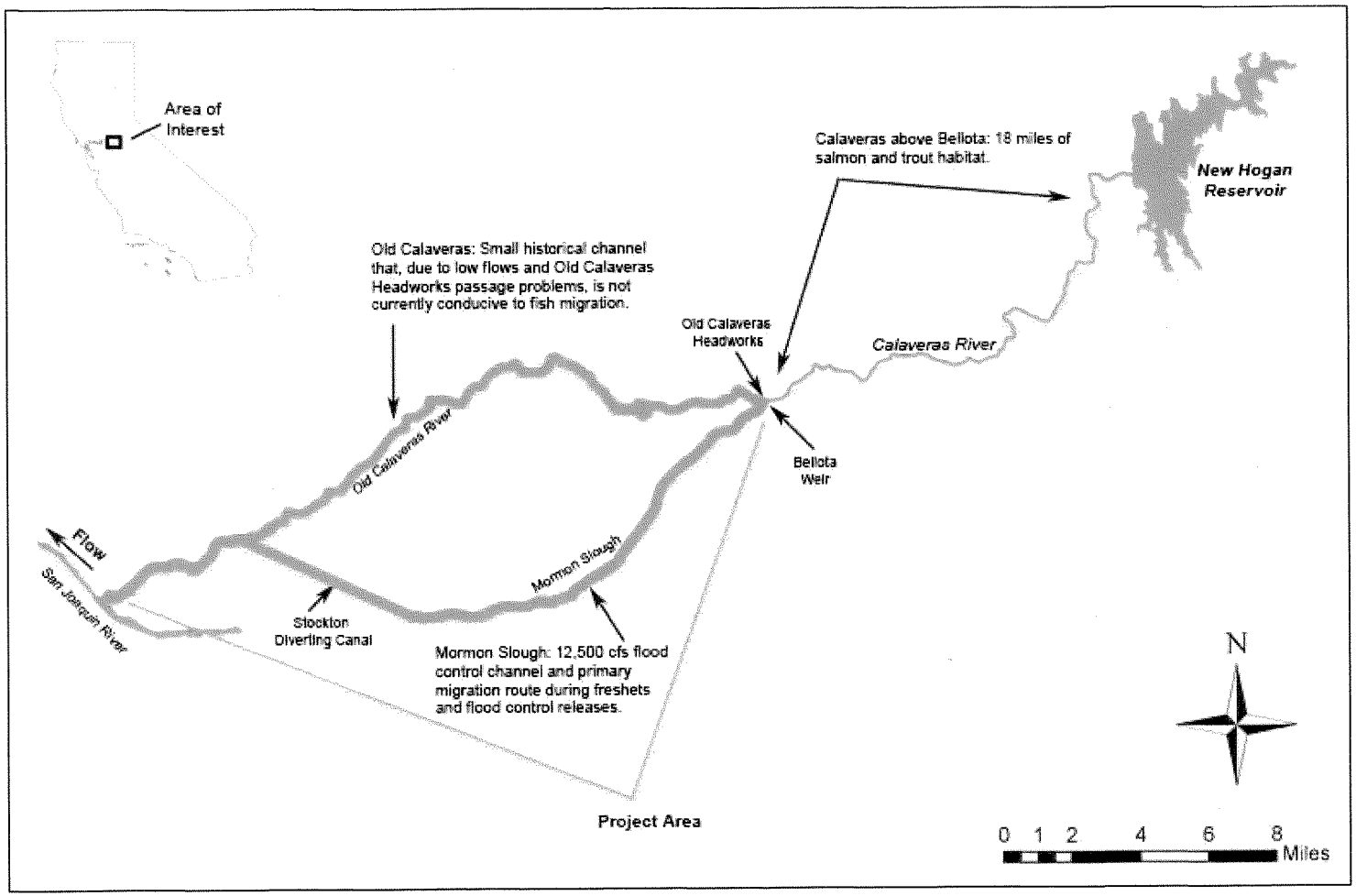

Figure 1-1. Lower Calaveras River Project location map.

According to a fish passage evaluation conducted by California Department of Water Resources (CDWR 2007), there are a total of 100 artificial instream structures in the lower Calaveras between NHD and the confluence, which are represented by five main types including: (1) flashboard dams, (2) low-flow road crossings without culverts, (3) road and low-flow road crossings with culverts, (4) permanent dams and weirs, and (5) vehicle, pedestrian, and railroad bridges (Figures 1-2a through 1-2j; Appendix B). Individual structures were scored according to their potential to impede or prevent fish passage based on structural (structure length; slope, width, or diameter of opening relative to the active channel width; outlet drop; elevation of the tailwater control relative to structure inlet, outlet, and pool invert; and whether the channel substrate is continuous over or through the structure) and hydraulic (flow depth, jump height, jump pool depth, and flow velocity) criteria (CDWR 2007). According to this scoring system, structure ratings ranged from zero to seven points with seven indicating the greatest potential to impair fish passage. Of the 100 structures evaluated, 48 structures were rated ≥ 1 (Appendix B).

Currently, salmon and steelhead opportunistically access and use the spawning and rearing reach whenever there are suitable passage conditions within the primary migration route. Due to instream structural impediments at multiple locations, unimpaired passage during migration periods is estimated to be <9% for adult Chinook, <22% for adult *O. mykiss*, and <30-50% for juvenile salmonids (CDWR 2007). As such, fish passage has been identified as the primary limiting factor for salmonids in the Calaveras River. Therefore, there is a need to improve fish passage at multiple structures which will increase opportunities for steelhead and salmon to access the quality spawning and rearing habitat located above these migration impediments.

The primary purpose of the Proposed Action is to replace or retrofit up to 37[2] instream structures identified as passage impediments to salmon and steelhead trout in the lower Calaveras River below Bellota Weir (Appendix B); it is expected that salmonid population numbers will increase once passage opportunities are improved (Stillwater Sciences and FFC 2004). Secondarily, the Proposed Action will serve as a model restoration program designed to demonstrate that agricultural, governmental, environmental, and educational interests can work cooperatively together to foster sustainable fish populations without adversely affecting agricultural and municipal water supplies or land access.

Due to the relatively high number of instream structures identified, it is anticipated that implementation will be ongoing for many years and that a priority implementation schedule is necessary to maximize benefits. Based on scores developed by CDWR (2007), three priority tiers were developed where those structures with the highest potential to impair fish passage were assigned to Tier 1, those with a moderate potential assigned to Tier 2, and those with the lowest potential assigned to Tier 3 (Appendix B), as follows:

1. Tier 1- structures with a score of five or above (nine structures including two in OCC);
2. Tier 2- structures with a score of three or four (15 structures including four in OCC);

[2] Of the 46 structures rated ≥ 1, several are being addressed in separate processes and are not included as part of this Proposed Action, including the Old Calaveras River Headworks Facility, Bellota Weir, and eight structures above Bellota Weir. In addition, twelve of the 37 structures proposed for improvements are not under SEWD's jurisdiction and will require written landowner approval prior to implementation.

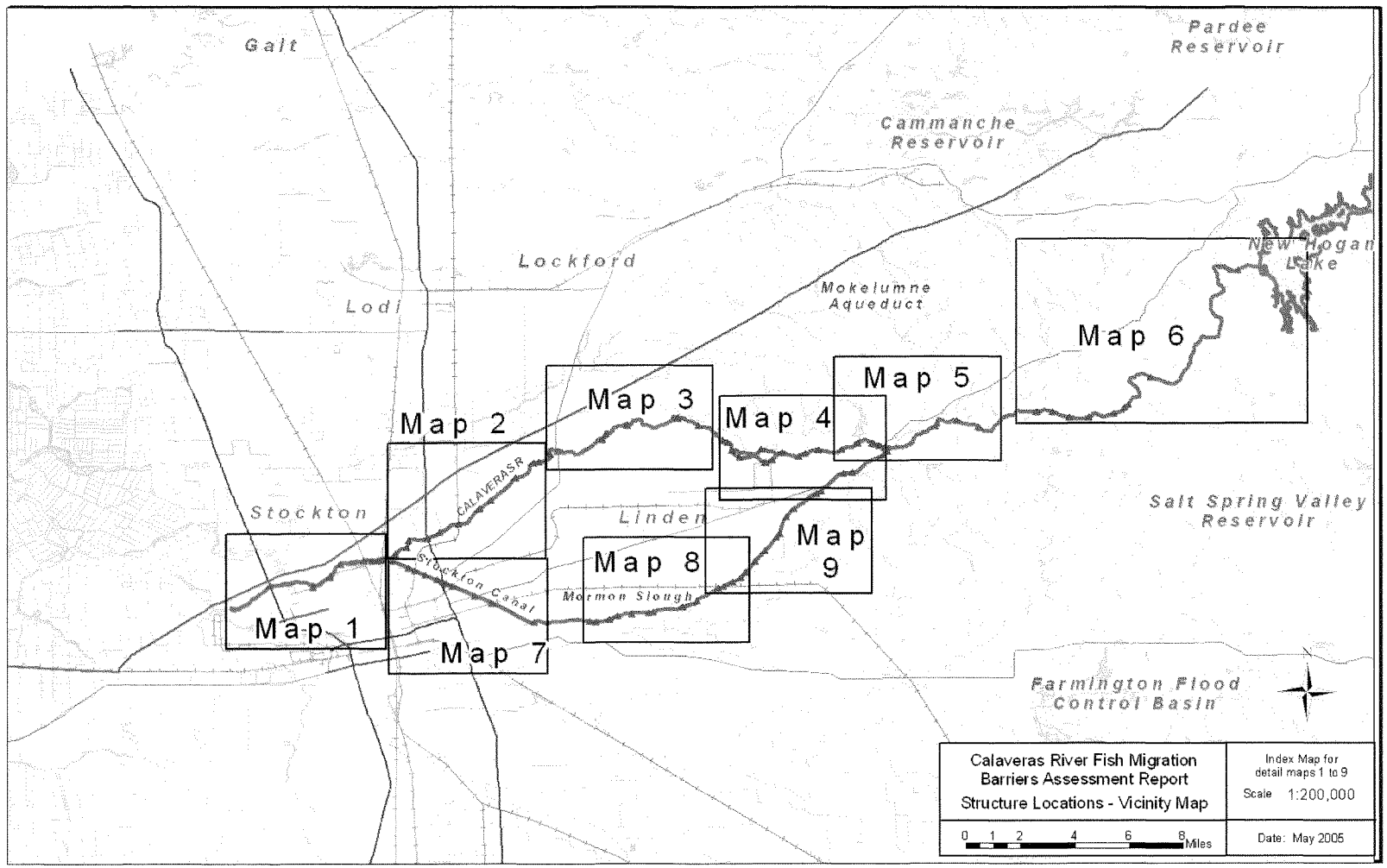

Figure 1-2a. Vicinity map of 100 artificial instream structures on the lower Calaveras River. Source: CDWR 2007.

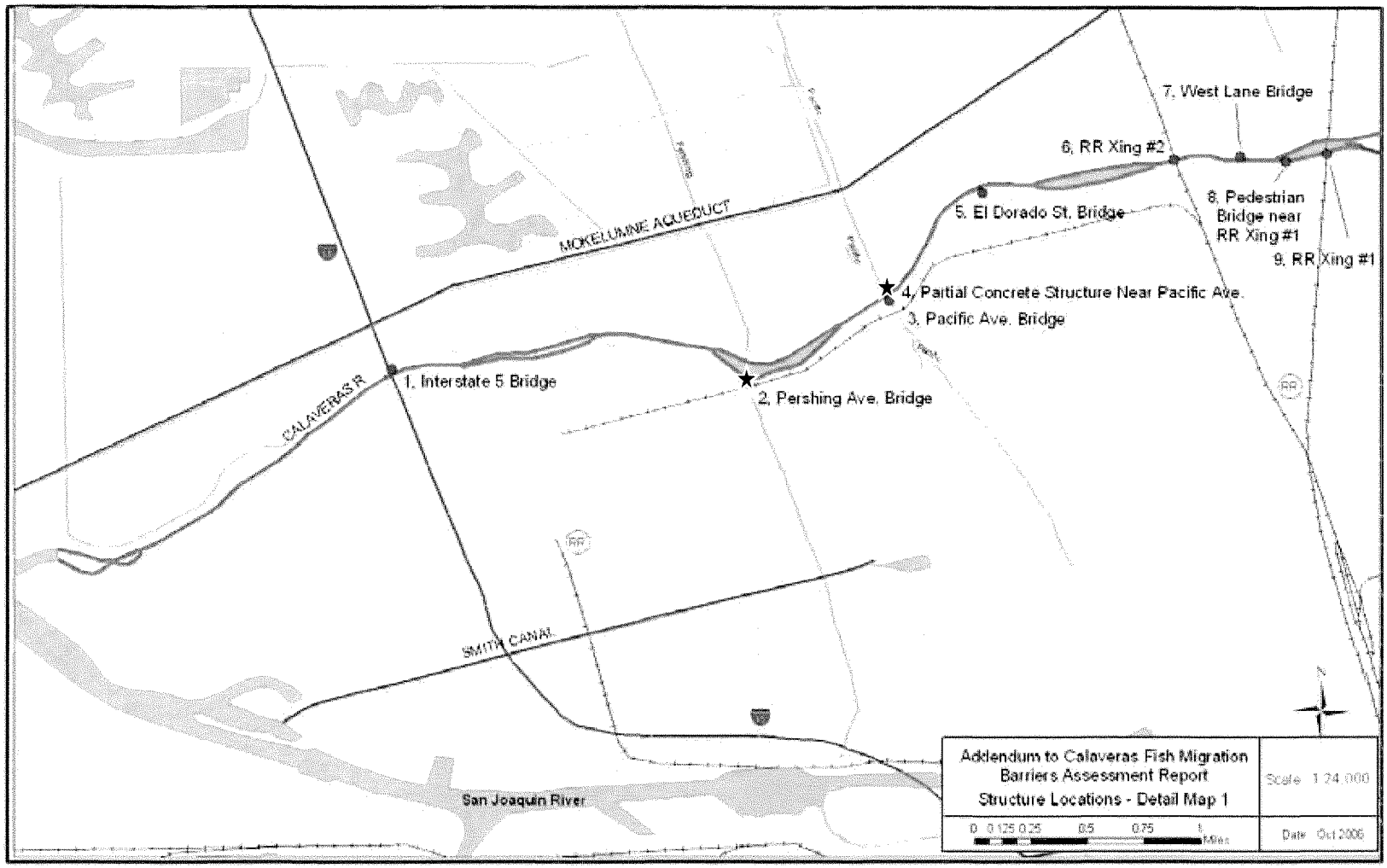

Figure 1-2b. Structures- Detail Map 1. Source: CDWR 2007. Stars added to indicate structures identified as potential fish passage impediments.

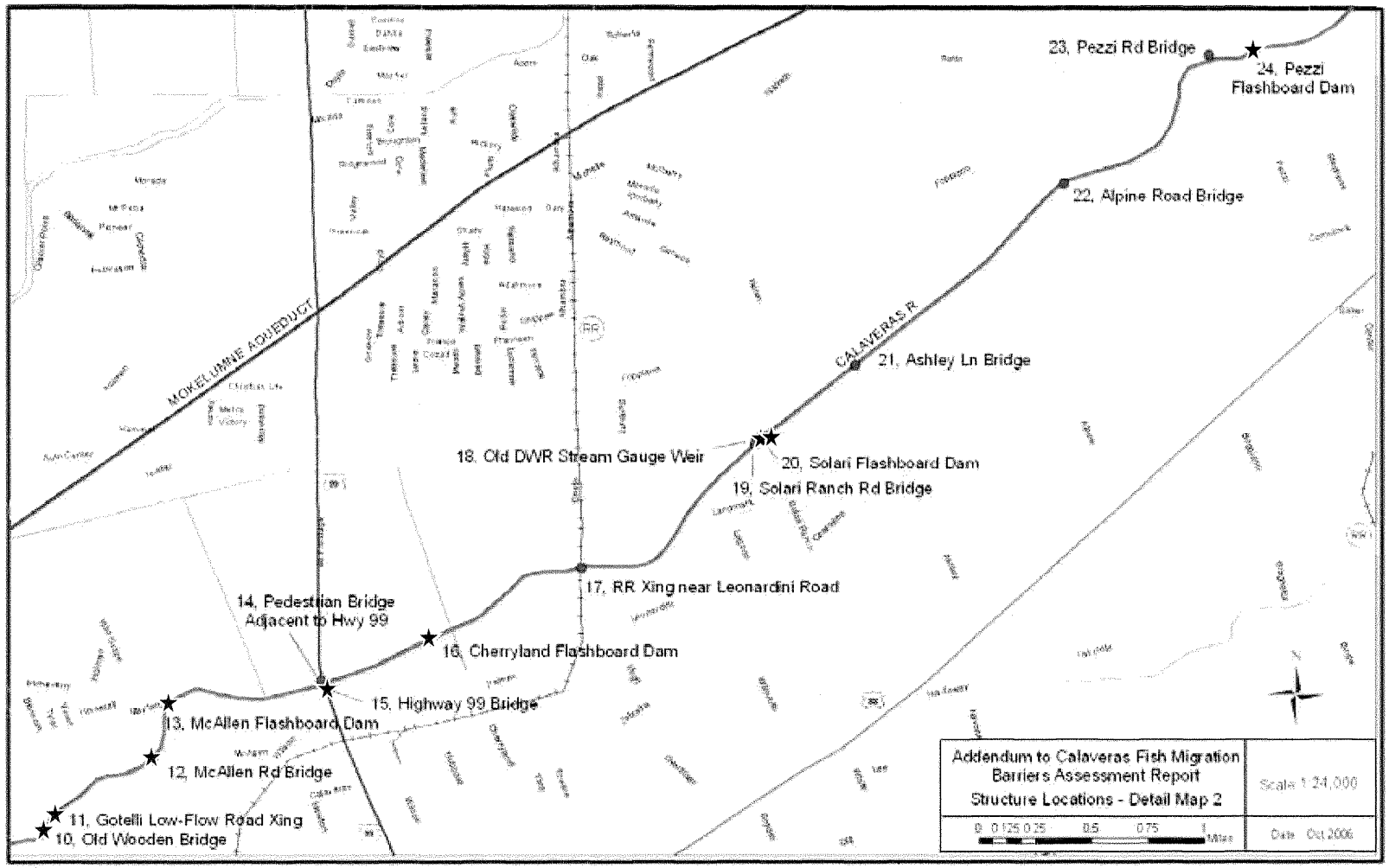

Figure 1-2c. Structures- Detail Map 2. Source: CDWR 2007. Stars added to indicate structures identified as potential fish passage impediments.

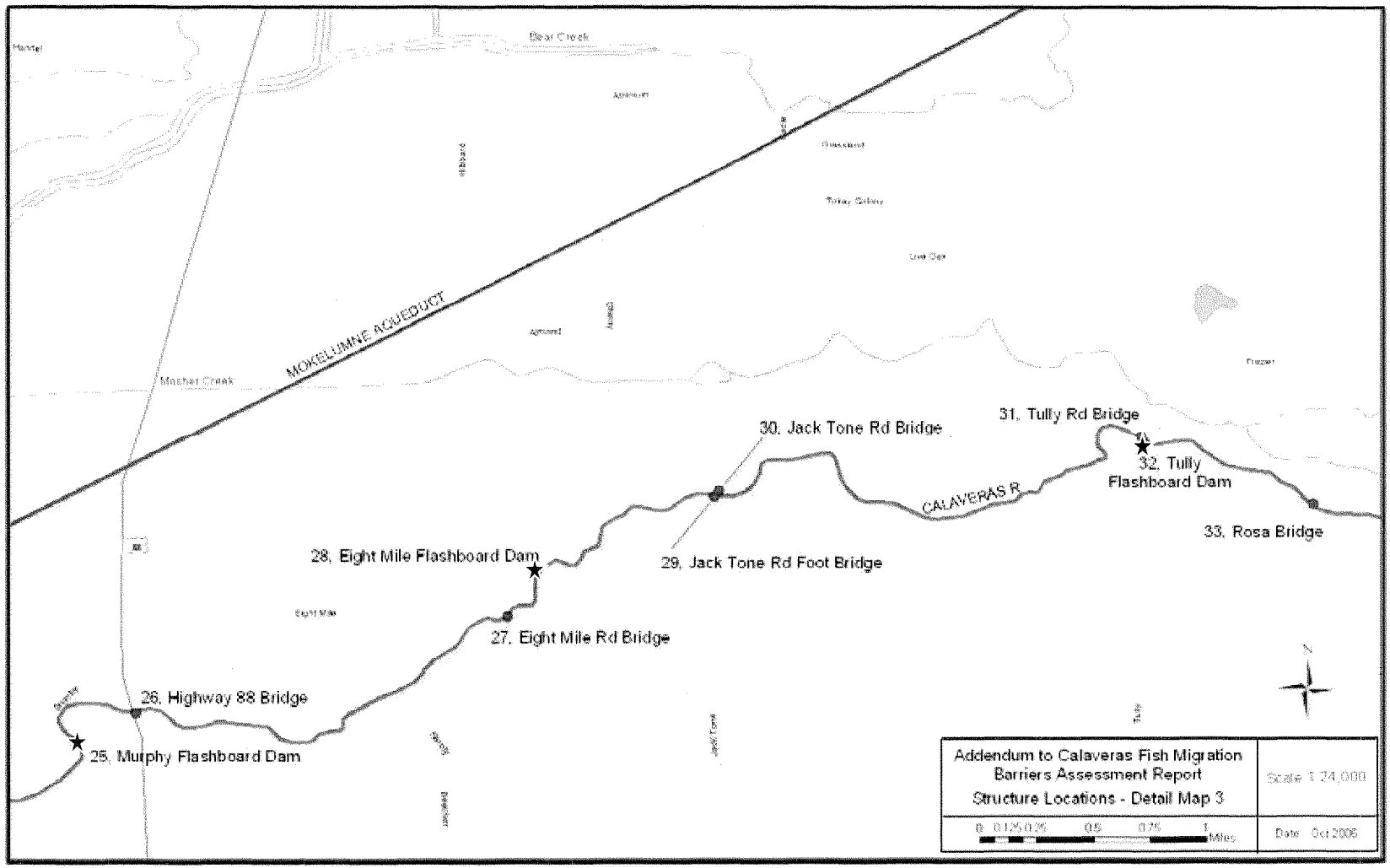

Figure 1-2d. Structures- Detail Map 3. Source: CDWR 2007. Stars added to indicate structures identified as potential fish passage impediments.

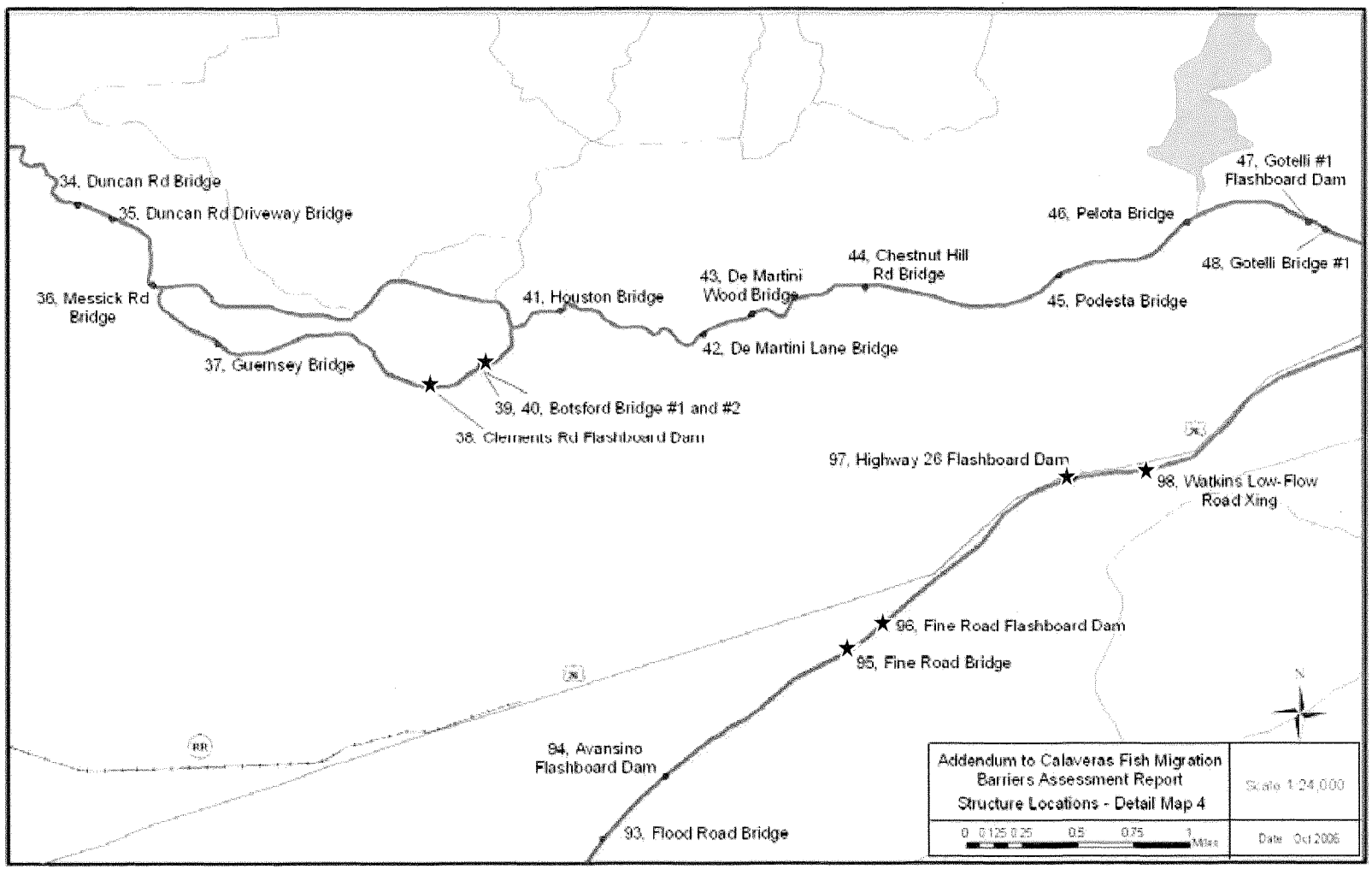

Figure 1-2e. Structures- Detail Map 4. Source: CDWR 2007. Stars added to indicate structures identified as potential fish passage impediments.

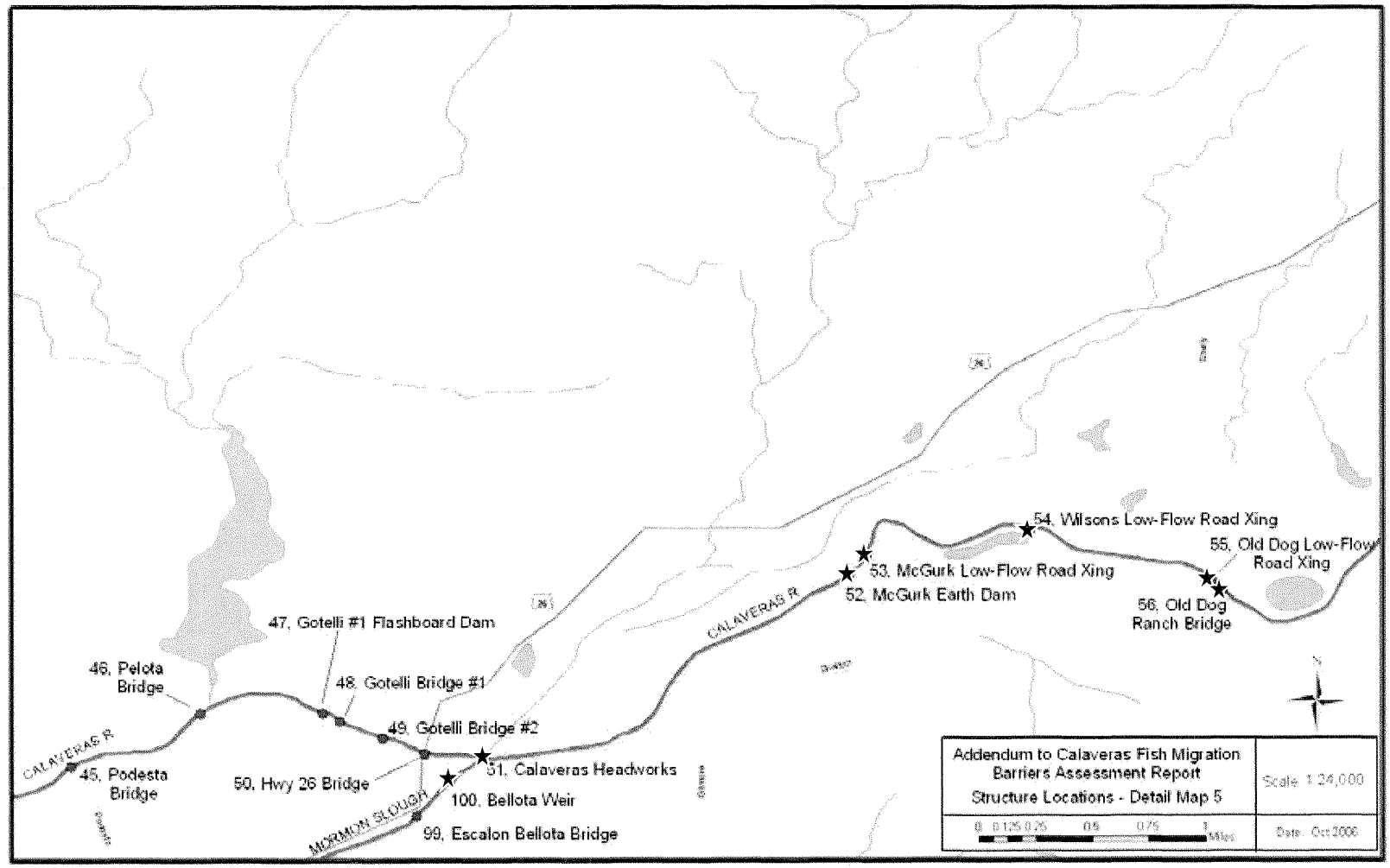

Figure 1-2f. Structures- Detail Map 5. Source: CDWR 2007. Stars added to indicate structures identified as potential fish passage impediments.

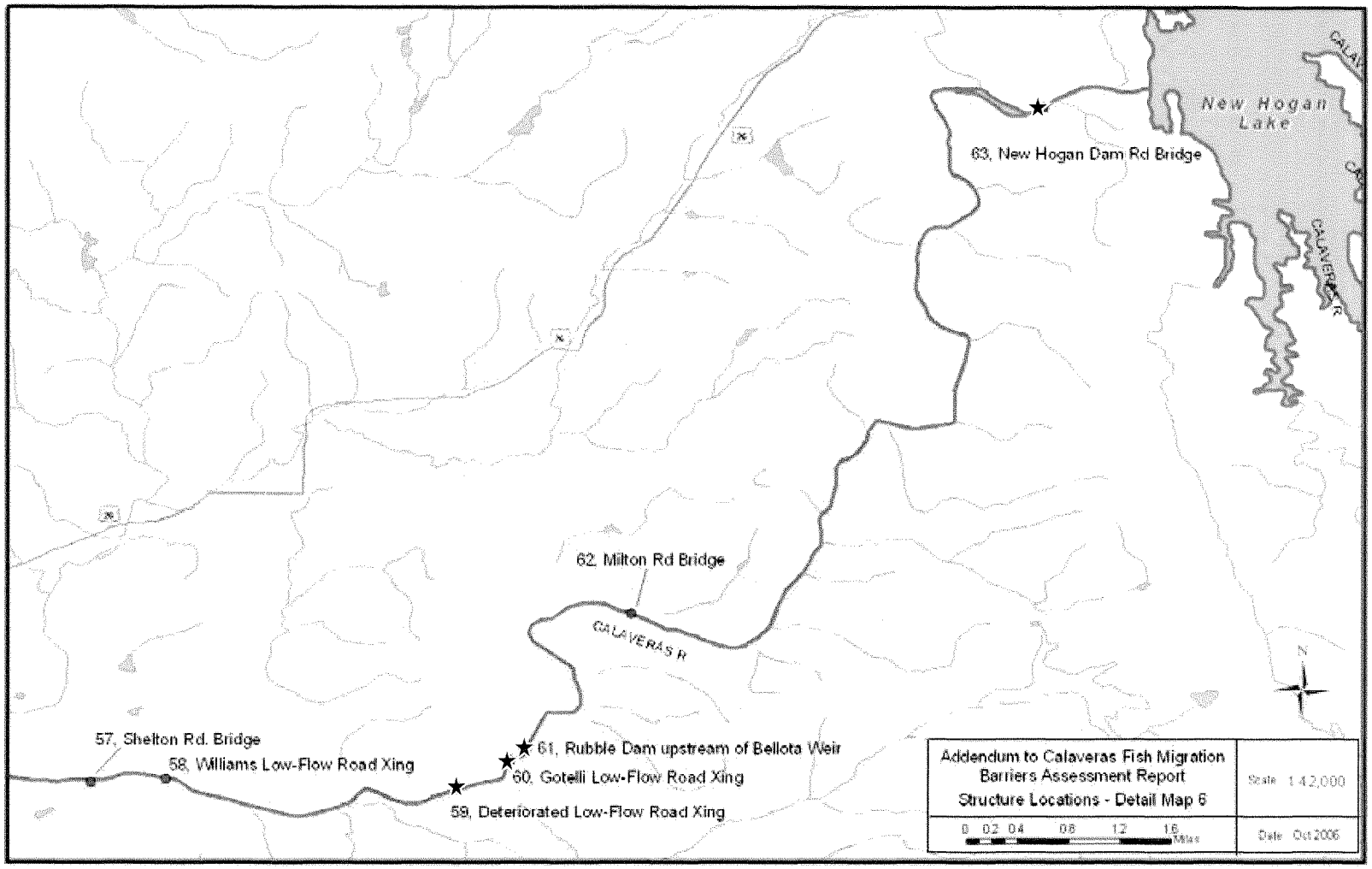

Figure 1-2g. Structures- Detail Map 6. Source: CDWR 2007. Stars added to indicate structures identified as potential fish passage impediments.

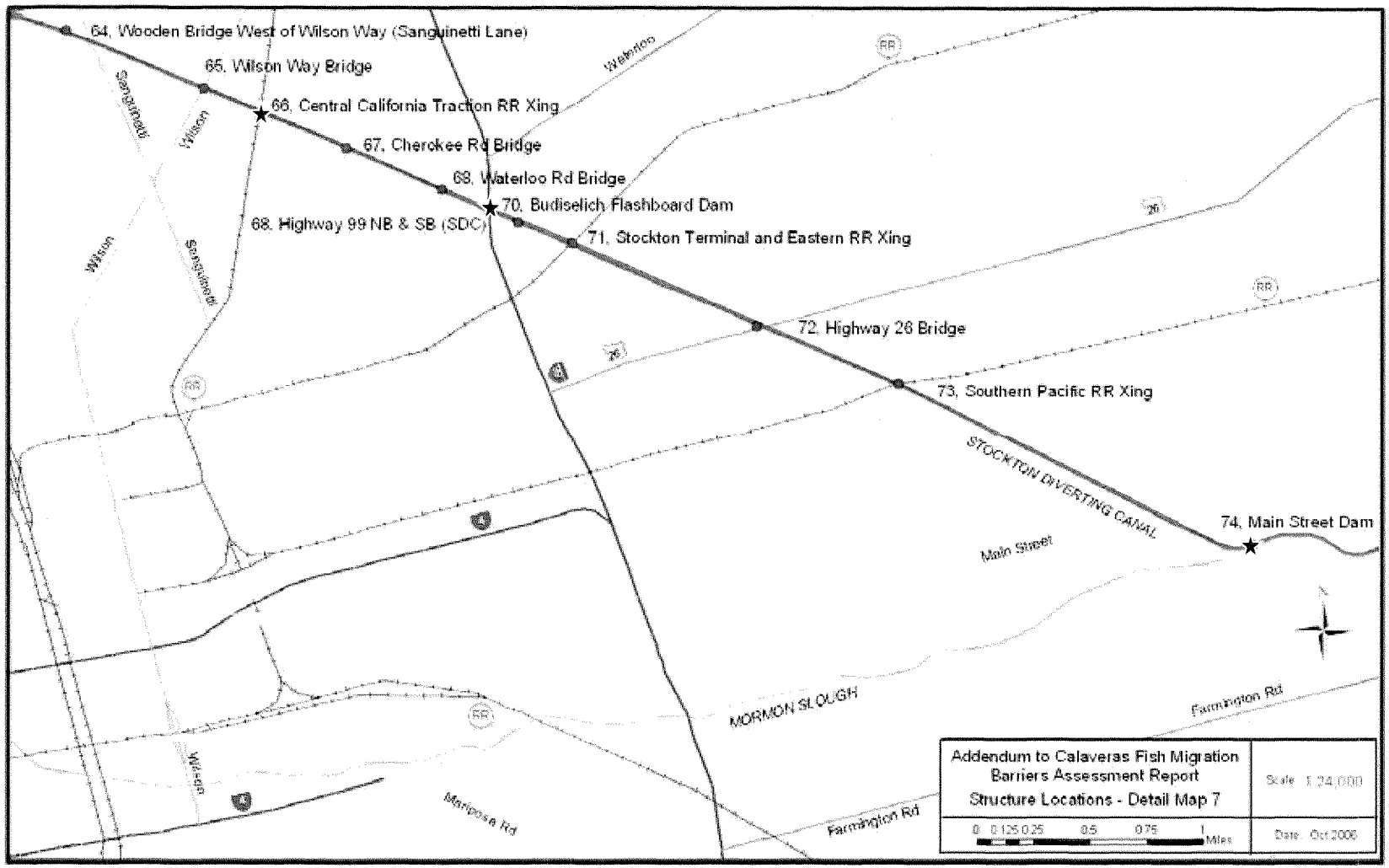

Figure 1-2h. Structures- Detail Map 7. Source: CDWR 2007. Stars added to indicate structures identified as potential fish passage impediments.

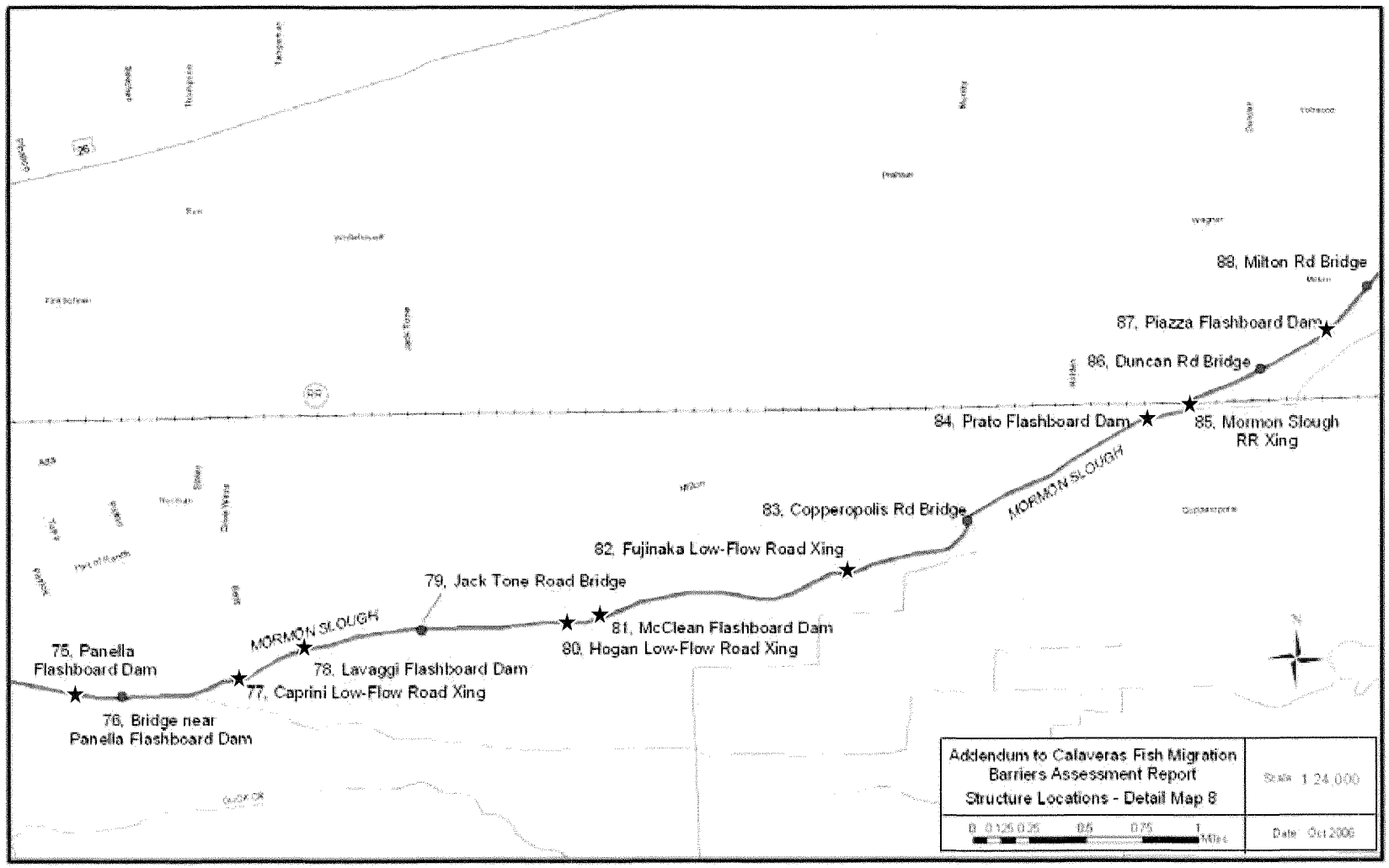

Figure 1-2i. Structures- Detail Map 8. Source: CDWR 2007. Stars added to indicate structures identified as potential fish passage impediments.

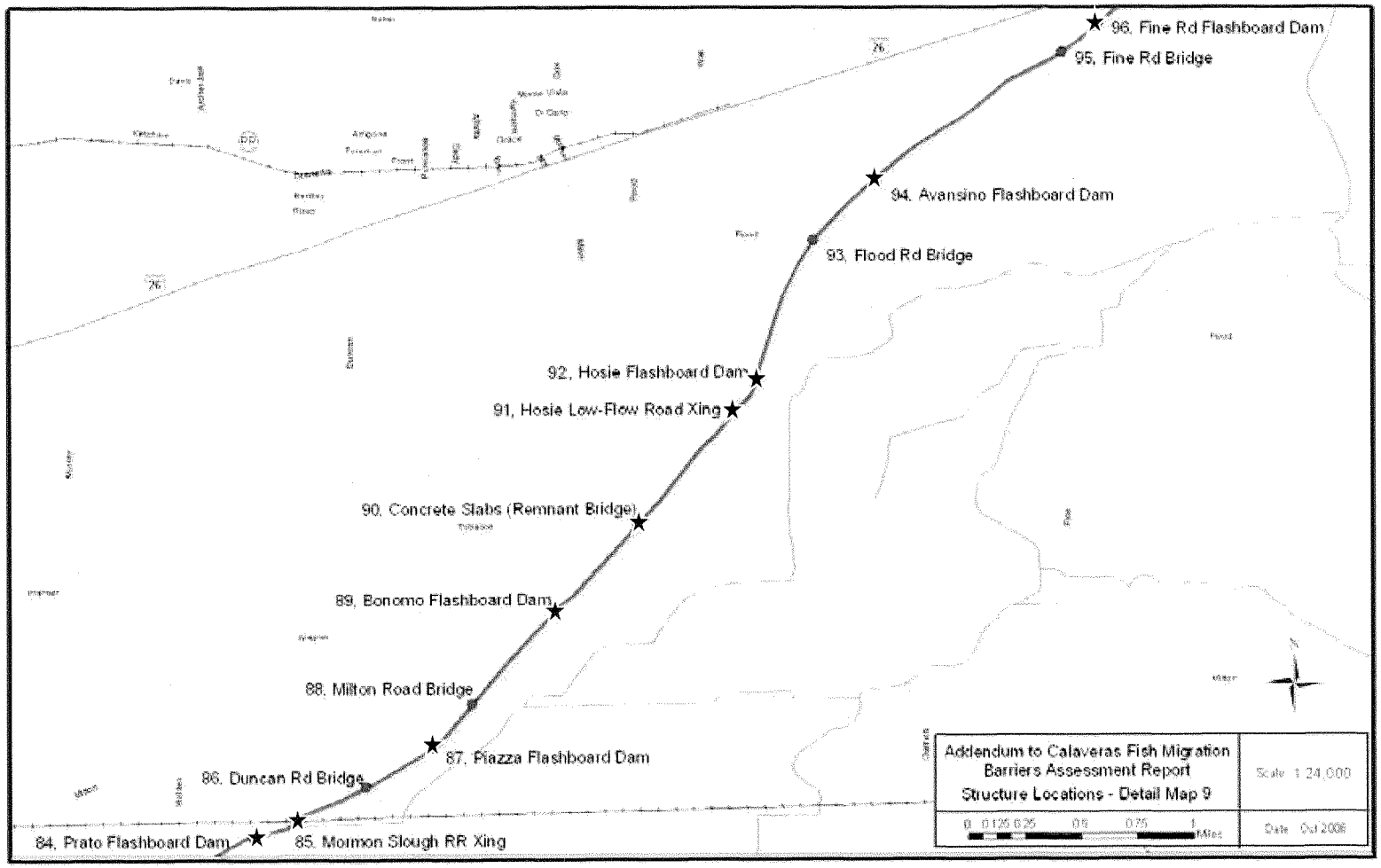

Figure 1-2j. Structures- Detail Map 9. Source: CDWR 2007. Stars added to indicate structures identified as potential fish passage impediments.

3. Tier 3- structures with a score of one or two (13 structures including nine in OCC)[3].

1.2 Link to Regional Water Management Programs

This Proposed Action is also directly tied to the objectives of the CALFED Bay-Delta Program and the Central Valley Project Improvement Act Anadromous Fish Restoration Program (AFRP), both through project funding and the primary project objective of improving the steelhead and salmon fishery.

1.2.1 CALFED Bay-Delta Program

The Proposed Action is explicitly linked to the CALFED ecosystem quality goals of achieving recovery of at-risk native species and maintaining and enhancing their populations by reducing conflicts between species protection and beneficial uses. In part, the objective of the CALFED Ecosystem Restoration Program (ERP) is to improve and increase aquatic habitat and improve ecological functions in the Bay-Delta watershed and its tributaries (e.g. Calaveras River) to support sustainable populations of valuable species. The lower stretches of the Calaveras River are important because it supports a rainbow trout fishery that, based on SEWD monitoring results, has produced occasional steelhead. As a result, a number of initiatives are being conducted to understand limiting factors and improve habitat and passage for anadromous fish in the lower Calaveras River.

CDWR's Fish Passage Improvement Program has identified numerous structures proposed for modification within the CALFED ERP geographic Scope (CDWR 2007). The CALFED ERP Plan states that "existing and potential spawning areas in the ERP focus area that are not obstructed by major reservoir dams, but 'are currently obstructed by other barriers, should be identified and action taken to restore anadromous fish spawning upstream (CALFED 2000)."

1.2.2 Central Valley Project Improvement Act

The Central Valley Project Improvement Act directed the Secretary of the Interior to establish a program to make reasonable efforts to at least double the natural production of anadromous fish in California's Central Valley streams. This direction resulted in the establishment of the AFRP and development of a restoration plan. The Project is driven by the overarching objective of contributing to the enhancement of anadromous salmonid populations dependent on the Calaveras River. Funding has been provided by the AFRP to implement at least one structural improvement (i.e., Budiselich Flashboard Dam) and additional funding may be provided for other structures, as fiscal year budgets allow.

1.3 Programmatic

The USFWS and SEWD have determined that the typical actions proposed for implementation, and for which an EA/IS is required, can be grouped and evaluated by type of action and location.

[3] Structures in the Old Calaveras River Channel may be reassigned to different tiers, because their implementation is dependent on whether a fish passage solution can be developed and implemented for the Old Calaveras Headworks Facility through a separate process.

These groups of actions can be evaluated in a PEA/IS for compliance with NEPA and CEQA and their implementing regulations without the need to develop and produce a time-consuming, stand-alone EA/IS for every action. The purpose of this document is to facilitate the USFWS and SEWD's compliance with NEPA and CEQA by providing a framework to address the impacts of proposed actions in a streamlined manner. This document also provides the public and decision-makers with the information required to understand and evaluate the potential environmental consequences of these actions.

When the USFWS and SEWD has determined that an EA/IS is required for a specific action, they will use this PEA/IS to determine what level of environmental analysis and documentation is required for the specific action to comply with NEPA and CEQA. If the alternatives, levels of analysis, and site-specific information of an action proposed for implementation are fully and accurately described in this PEA/IS, the USFWS and SEWD would prepare a memorandum documenting this determination. This memorandum would state that the USFWS and SEWD has reviewed the proposed action, alternatives, potential impacts (direct, indirect and cumulative), and mitigation and found them to be fully and accurately described by this PEA/IS and the PEA/IS FONSI and Mitigated Negative Declaration. The memorandum would include project designs and also summarize the mitigation measures described in the PEA/IS that are applicable and will be undertaken for the action. Therefore, no further documentation would be required to comply with NEPA and CEQA. A sample memorandum using a specific project scheduled to occur this fall is provided in Appendix C.

If the specific action is expected to (1) create impacts not described in the PEA/IS; (2) create impacts greater in magnitude, extent, or duration than those described in the PEA/IS; or (3) require mitigation measures to keep impacts below significant levels that are not described in the PEA/IS, then a Supplemental Environmental Assessment/Initial Study (SEA/IS) would be prepared to address the specific action. The SEA/IS would be tiered from this PEA/IS, in accordance with 40 CFR Part 1508.28, and CEQA Guidelines Sections 15063 (c)(3)(D) and 15152.[4] No specific actions related to this PEA/IS are expected to result in "likely to adversely affect any special status species or critical habitats" determinations. Any action that would lead to this determination would require a new EA/IS and consultation with NMFS.

Descriptions of the Proposed Action and No Action Alternative are provided in Section 2.

[4] Tiering refers to incorporating, by reference, the general assessments and discussions from this PEA/IS into a focused SEA. The SEA would focus on the particular effects of the specific action.

2.0 ALTERNATIVES

2.1 No Action Alternative

Under this alternative, SEWD would continue to maintain flashboard dam structures and low flow crossings in their current condition. Other structures (e.g., bridge aprons) would also continue to remain in their current condition. Artificial instream structures would continue to be potential impediments to salmon and steelhead passage under varying flow conditions. As in past years, salmonid stranding may occur.

2.2 Proposed (Preferred) Action/Project Description

Under this alternative, SEWD will replace or retrofit up to 37 instream structures that have been identified as potential passage impediments to salmon and steelhead trout in the lower Calaveras River below Bellota Weir via both the Mormon Slough/Stockton Diverting Canal and Old Calaveras River channel routes (Appendix B). Moreover, the Proposed Action will serve as a model restoration program designed to demonstrate that agricultural, governmental, environmental, and educational interests can work cooperatively together to foster sustainable fish populations without adversely affecting agricultural and municipal water supplies or land access. This secondary objective will be accomplished through landowner involvement, public outreach, and monitoring activities.

Due to the relatively high number of instream structures identified, it is anticipated that implementation of the Proposed Action will be ongoing for many years and that a priority implementation schedule is necessary to maximize benefits. Based on scores developed by CDWR (2007), three priority tiers were developed where structures with the highest potential to impair fish passage were assigned to Tier 1, those with a moderate potential assigned to Tier 2, and those with the lowest potential assigned to Tier 3 (Appendix B), as follows:

1) Tier 1- structures with a score of five or above (nine structures including two in OCC);
2) Tier 2- structures with a score of three or four (15 structures including four in OCC);
3) Tier 3- structures with a score of one or two (13 structures including nine in OCC)[5].

It is anticipated that construction may occur at up to five individual structures in any given year and priority tiers are provided as guidelines for scheduling implementation; however, in some cases scoring may not entirely "equate to the percentage of time when salmonids encounter unimpaired passage at a structure" and "scored structure lists [should] be used in concert with other factors, such as location in the watershed, landowner cooperation, cost of removing or modifying the structure, etc. to determine structure redesign priorities" (CDWR 2007). Therefore, individual structures within or between tiers will be selected each year through a prioritization selection process between SEWD, USFWS, California Department of Fish and Game (CDFG), CDWR, U.S. Army Corps of Engineers (USACE), and other relevant agencies and non-governmental organizations (e.g., Fishery Foundation of California). These

[5] Structures in the Old Calaveras River Channel may be reassigned to different tiers, because their implementation is dependent on whether a fish passage solution can be developed and implemented for the Old Calaveras Headworks Facility through a separate process. Structures not owned by SEWD may be reassigned to different tiers, because their implementation is dependent on receiving written landowner approval.

governmental agencies have committed to provide assistance in prioritizing individual structures for implementation, as well as in developing designs for each structure.

2.2.1 Construction Activities

Dependent on annual priorities determined through the prioritization selection process, funding and personnel availability, and permit approvals, up to five passage impediments could be replaced or retrofitted each year. Types of instream structures to be modified include: (1) flashboard dam bases, (2) low-flow road crossings without culverts, (3) road and low-flow road crossings with culverts, and (4) vehicle, pedestrian, and railroad bridges. Descriptions and photos of each instream structure are provided in Appendix D. Twenty five of the rated structures in the lower Calaveras River below Bellota are owned or operated and maintained by SEWD.

Due to the range of instream structure types, there are several different types of improvements that may be carried out at individual sites including

- complete or partial removal of the structure;
- channel reconstruction through removal or addition of rock rip-rap;
- installation of grade control structures (i.e., boulder weirs); and
- installation or replacement of culverts.

Regardless of the type of improvement(s) implemented, there are several conditions that will be met for a project to be covered under this PEA/IS including

- All projects will have a slope of no more than 5% with 3% generally being the norm;
- All projects will be designed/constructed to not cause a significant increase in flood flow elevations;
- HEC-RAS modeling will be used to confirm that channel capacity will not be affected;
- HEC-RAS modeling will be used to confirm that all fish passage design criteria are met; and
- Size ranges for construction elements (e.g., removal of concrete, riprap, soil, and construction footprint) for individual improvement types are identified in Table 1.

Activities for each of the structural improvements would consist of construction (clearing and grubbing, site staking, site grading, placement of materials), and structural operation and maintenance. Construction activities would be implemented during the non-irrigation season when the channel is "dry" (i.e., reach is dewatered and there is no connection between confluence and reach above Bellota) between October 15 and December 31 and would generally take up to three-four weeks to complete for each structure. The fall construction timeframe was chosen for the lower Calaveras River because it minimizes the potential for impacts to listed species by occurring outside of breeding and rearing periods for various species, as well as outside of salmonid migratory periods (i.e., flood control releases or freshet flows). Provisions will be made to allow migrating salmonids to bypass construction work areas in the channel in the event that unanticipated flood control releases or freshets occur.

Table 1. Construction elements for individual improvement types. Bold indicates range of typical amounts for most structures; parentheses indicate maximum amounts that may apply to one or more structures.

Improvement Type	Remove (cubic yards)				Import Fill/silt to 4' boulders (cubic yards)	Install Structural Elements	Construction Footprint (acres)
	Concrete	Riprap	Soil from Area near Structure	Sediment Upstream of Structure			
Flashboard Dams							
Remove structure and actively restore channel	**100-300** (1,000)	**300-1,000** (2,000)	**500-1,000** (2,000)	**500-2,000** (10,000)	-	-	**1-3** (5)
Remove structure and let nature restore channel				-			**0.5-1** (2)
Leave as is and provide passage over structure by constructing a roughened channel with drop structures downstream	-	**200-500** (1,000)	**1,500-2,500** (4,000)		**1,500-2,500** (4,000)		
Cut notch, construct roughened channel with drop structures downstream, and restore channel upstream	**50-100** (150)	**100-200** (300)	**500-1,000** (2,000)	**500-2,000** (10,000)	**400-700** (1,500)		**1-3** (5)
Cut notch, construct roughened channel with drop structures downstream, and let nature restore channel				-			**0.2-0.5** (1)
Flow Road Crossings (With or without culverts)							
Remove structure and actively restore channel	**100-300** (1,000)	**300-1,000** (2,000)	**500-1,000** (2,000)	**500-2,000** (10,000)	-	-	**1-3** (5)
Remove structure and let nature restore channel				-			**0.5-1** (2)
Remove old crossing, provide new culvert, and actively restore channel				**500-2,000** (10,000)		New culvert: width up to 48' (bank to bank), height up to 12' (top of culvert to top of strip footings), and length up to 12' (upstream end to downstream end); Strip footings (2) will be concrete (up to 3' wide X 5' deep X 12' long = 13.3 cubic yards)	**1-3** (5)
Remove old crossing, provide new culvert, and let nature restore channel				-			**0.2-0.5** (1)

Improvement Type	Remove (cubic yards)				Import Fill/silt to 4' boulders (cubic yards)	Install Structural Elements	Construction Footprint (acres)
	Concrete	Riprap	Soil from Area near Structure	Sediment Upstream of Structure			
Bridges with concrete foundations or riprap across the channel							
Remove structure and actively restore channel	**500-1,000** (4,000)	**300-1,000** (2,000)	**500-1,000** (2,000)	**500-2,000** (10,000)	-	-	**1-3** (5)
Remove structure and let nature restore channel				-			**0.5-1** (2)
Remove structure/install full span bridge/actively restore channel				**500-2,000** (10,000)		Construct full-span bridge: (1) Excavate for abutments – generally 200 – 400 but up to 600 cubic yards of soil; (2) Compacted backfill- generally 150 – 250 but up to 500 cubic yards; (3) Concrete for abutments – generally 75 – 100 but up to 150 cubic yards	**1-3** (5)
Remove structure, install full bridge, and passively let nature restore channel				-	-		**0.5-1** (2)
Remove part of structure, install partial-span bridge, and actively restore channel	**500-1,000** (2,000)	**200-500** (1,000)	**250-500** (1,000)	**500-2,000** (10,000)		Reinforce piles or add new piles to ends of partial span (may include pile driving or concrete pouring – up to 100 cubic yards)	**1-3** (5)
Remove part of structure, install partial-span bridge, and let nature restore channel				-			**0.5-1** (2)
Leave as is and provide passage over foundation structure by constructing a roughened channel with drop structures downstream	-		**1,500-2,500** (4,000)		**1,500-2,500** (4,000)	-	
Cut notch, construct roughened channel with drop structures downstream, and restore channel upstream	**50-100** (300)	**100-200** (300)	**500-1,000** (2,000)	**500-2,000** (10,000)	-		**1-3** (5)
Cut notch, construct roughened channel with drop structures downstream, and let nature restore channel				-	**400-700** (1,500)		
Remove Riprap	-	**300-1,000** (2,000)	-	-	**300-1,000** (2,000)		**0.2-0.5** (1)

General construction activities at each site (i.e., establishing staging areas; preparing the sites; constructing new features; demobilizing and cleaning up), operation and maintenance, and implementation tiers are described in sections below.

2.2.1.1 Establishing Staging Areas

Prior to construction, equipment would be brought to locations near the construction sites. Each site would most likely need approximately one to five acres to accommodate construction and materials staging. Open, lightly vegetated areas immediately adjacent to the construction footprint would be used.

The staging areas would be used to store materials and equipment. Typical staging area items would include backfill materials, cranes, backhoes, compressors, and tools.

The staging areas would also be used for construction crew parking. Generally, as many as 10 construction workers per site could be required at the height of construction. Staging areas would be fenced to keep the general public out of the construction area.

2.2.1.2 Preparing the Sites

After the sites are dewatered, construction crews would begin removing the existing features. Work could include concrete demolition, and minor excavation; equipment such as excavators and jackhammers may be used. Demolition materials would be taken to a landfill that accepts construction debris. Soil excavated from the construction areas would be taken offsite to a landfill for use as cover soil or to existing fill-placement areas. Other materials (e.g., rip-rap) may be re-used at the Project site. These activities would be subject to applicable permits and local, state, and federal laws, and debris and un-recyclable dredged materials disposed of at legal, permitted disposal sites.

2.2.1.3 Demobilizing and Cleaning Up

Construction equipment would be moved to the staging areas, from which it would be trucked back to the contractor's storage yard. Site alterations caused by construction staging would be restored to pre-construction conditions to the extent possible and pursuant to BMPs.

2.2.1.4 Operation and Maintenance

Descriptions of ongoing operation and maintenance of facilities are provided in this document for context only. These are ongoing actions that will not change as a result of artificial instream structure improvements and therefore are not evaluated as part of this PEA/IS.

Flashboard dams are installed seasonally at flashboard dam base locations to assist irrigation diversions. The target start and end date for each year's irrigation season is on or around April 15 and October 15, respectively. Generally, if air temperatures are consistently high (approximately 80°F or above) and precipitation is low in the weeks prior to mid-April, water users may begin to make requests for earlier water deliveries. SEWD then installs flashboard dams where needed,

and flows from New Hogan are increased in order to meet the demand. The start date can also be moved back if enough precipitation to curb the irrigation demand is received, although delays longer than one week are not typical.

Railroad crossings and road bridge crossings are normally utilized year-round for their intended purpose. Low-flow road crossings are primarily used for agriculture operations and are normally used year-round by private landowners and SEWD personnel unless they are submerged and unsafe.

Pursuant to an existing Memorandum of Understanding with CDFG (CDFG and SEWD 2003), maintenance activities would continue to take place primarily in the spring and fall during the non-irrigation season. Activities would include removing and replacing stop logs and removing accumulated sediment and debris. During the irrigation season, SEWD would visit the site at regular intervals and remove debris, as needed. Staff would use pike poles and a crane, if necessary, to remove loose debris.

2.2.1.5 Tier 1

Tier 1 consists of nine structures with five located in Mormon Slough, two in Stockton Diverting Canal, and two in the Old Calaveras River channel (Appendix D). Two structures are owned by local railroad companies and would require written approval prior to final designs and implementation. CDWR has prepared preliminary designs for three representative structures within this Tier (i.e., Central California Traction Railroad Crossing, Hosie Low Flow Crossing, and Caprini Low Flow Crossing; CDWR 2007) and final designs for one flashboard dam structure (i.e., Budiselich Flashboard Dam; CDWR [In Press]) (Table 2**Error! Reference source not found.**).

Table 2. Initial Representative Fish Barrier Structures in Tier 1

Barrier	Location RM	Property Owner	Structure Type	Proposed Design
Budiselich Flashboard Dam (BFBD)	7.5	SEWD	Flashboard Dam, shallow depth, steep slope	Rock ramp fishway and boulder weirs
Central California Traction Railroad Crossing (CCTRC)	6.5	CCTR	Bridge with footing apron, shallow depth	Install 7 grade control structures (i.e. boulder weirs)
Hosie Low Flow Crossing (HLFC)	18.7	SEWD	Concrete low flow road with no culverts, Riprap	Install new culvert and remove riprap
Caprini Low Flow Crossing (CLFC)	12.7	SEWD	Low flow road crossing, 3-3ft diameter culverts, velocity	Replace culverts install grade control structures

It should be noted that both preliminary and final designs have been prepared based on CDFG's and NMFS' design criteria and recommendations for boulder weir step pool fishway for adult and juvenile salmonids identified in *Design of Fish Passage Solutions* (CDWR [In Press]).

Budiselich Flashboard Dam improvements are scheduled for construction in fall 2009. Therefore, specific details for Budiselich Flashboard Dam along with final designs are provided in Appendix C. These details and designs are provided in the format of a programmatic

memorandum described in section 1.3. This format will be used for all individual structural improvements.

For the three structures that have preliminary designs developed, brief descriptions for proposed improvements along with preliminary design plans are provided in Appendix E. Final design specifications for these three structures as well as the other five Tier 1 structures will be developed in accordance with the prioritization selection process and would be submitted as part of a programmatic memorandum as described in section 1.3 (see Appendix C for example memorandum).

2.2.1.6 Tier 2

Tier 2 consists of fifteen structures with ten located in Mormon Slough, four in the Old Calaveras River channel, and one in the lower mainstem Calaveras River (Appendix D). One structure is owned by San Joaquin County and would require written approval prior to final designs and implementation. Preliminary and final designs would be developed through the prioritization selection process and final designs would be submitted as part of a programmatic memorandum as described in section 1.3 (see Appendix C for example memorandum).

2.2.1.7 Tier 3

Tier 3 consists of thirteen structures with three located in Mormon Slough, nine in the Old Calaveras River channel, and one in the lower mainstem Calaveras River (Appendix D). Four structures are owned by either private landowners or San Joaquin County and would require written approval prior to final designs and implementation. Preliminary and final designs would be developed through the prioritization selection process and final designs would be submitted as part of a programmatic memorandum as described in section 1.3 (see Appendix C for example memorandum).

2.2.2 Monitoring and Public Outreach Activities

Monitoring will be conducted to document effectiveness of fish passage improvement efforts and the response of salmonids to restoration. Both functional and structural parameters will be monitored throughout the migration season in the year before (to determine baseline numbers and variability) and after construction at representative structures. Flow velocities and channel area will be measured via flow meters and top set wading rods. Physical monitoring will address the effectiveness of barrier modifications in meeting passage design criteria. Biological monitoring will involve assessment of fish passage and strandings. Ideally, passage and stranding events at each barrier, relative to the number of salmonids present in the system, before and after project construction will be compared.

The collaboration of agricultural, municipal, non-profit, and academic organizations along with state and federal agencies provides the capacity for a multi-pronged approach to community education and outreach. Existing outreach and educational tools implemented by SEWD and FISHBIO (e.g., direct mail newsletters, public workshops, and at a previously established website the www.calaverasriver.com) will continue to be used as needed to inform and educate

public stakeholders regarding the Proposed Action's goals and performance. The website will contain information pertaining to the Proposed Action's goals, schedule, and results; and provide recognition of project partners and their roles, as well as sources of funding and other support provided. During at least the first phase of implementation, college-level education will be achieved through the development of curricular materials related to the project for use in the University of Pacific (UOP) courses and through the monitoring process. In collaboration with the non-profit Fishery Foundation of California and FISHBIO, UOP undergraduate researchers will be paired with fishery professionals for on-the-ground monitoring activities. The undergraduates will receive college credit for their research efforts and will have the opportunity to strengthen their own communication skills while contributing to the outreach component of the Proposed Action by presenting their work at public schools, local festivals, and undergraduate research symposia. Results of this project are expected to be disseminated to the scientific community through reports and journal articles.

2.2.3 Best Management Practices

SEWD has developed Best Management Practices (BMP) to reduce environmental consequences associated with construction of artificial instream structures (Table 3).

Table 3. Best Management Practices

No.	Resource	Best Management Practices
1	Air Quality	All requirements of San Joaquin Valley Air Pollution Control District (SJVAPCD) Rules 8011 and 8021 would be adhered to and any permits or training needed for construction activities and pump operation would be obtained.
2	Air Quality	Open burning of construction waste would not be allowed.
3	Air Quality	Project participant would use reasonably practicable methods and devices to control, prevent, and otherwise minimize atmospheric emissions or discharges of air contaminants.
4	Air Quality	Visible emissions from diesel-powered equipment would be controlled.
5	Air Quality	Equipment and vehicles that show excessive emissions of exhaust gases due to poor engine adjustments or other inefficient operating conditions would not be operated until corrective repairs or adjustments were made.
6	Air Quality	Vehicles and equipment used in construction and maintenance of the Project would maintain appropriate emissions control equipment and be permitted, if required.
7	Air Quality	Construction would follow the recommended measures outlined in the project site's dust control plan. Measures include watering and other approved suppressing agents for limiting dust generation during construction.
8	Air Quality	Fill material storage piles would include dust-control measures such as water.
9	Air Quality	Ground surfaces outside of bankfull channel, which have been significantly disturbed, would be seeded to prevent wind dispersion of soil, as needed.
10	Air Quality	Removal of vegetation and ground disturbance would be limited to the minimum area necessary to complete construction activities. Vegetative cover would be maintained in appropriate areas to reduce dust.

No.	Resource	Best Management Practices
11	Air Quality	Regular watering of exposed soils and unpaved access roads would be conducted during the construction period.
12	Air Quality	Grading activities would cease during periods of high winds (greater than 25 miles per hour [mph] averaged over one hour).
13	Air Quality	Trucks transporting loose material would be covered or maintain at least two feet of freeboard and not create any visible dust emissions.
14	Cultural Resources	Before construction, all construction personnel would be instructed on the protection of cultural resources. SEWD would instruct construction workers that cultural resources might be present at the Project site. They would be trained to stop work near any discovery, and notify SEWD's GM of their discovery. The GM would stop work to confirm if the resource could be avoided and consult with a qualified archeologist.
15	Cultural Resources	Known significant cultural resources would be fenced and a minimum distance maintained for work disturbances.
16	Cultural Resources	Should human remains be discovered during excavation, SEWD shall cease construction and notify and consult with the county coroner's office and the Native American Heritage Commission.
17	Hazardous Materials	Hazardous materials would not be drained onto the ground, into streams, or into drainage areas.
18	Hazardous Materials	All construction waste, including trash and litter, garbage, other solid waste, petroleum products, and other potentially hazardous materials, would be removed to a disposal facility authorized to accept such materials.
19	Hazardous Materials	Waters or soils contaminated with construction material would be disposed of in a suitable location to prevent discharge to surface waters.
20	Hazardous Materials	Vehicles would be inspected and maintained to reduce the potential for leaks or spills of oils, grease, or hydraulic fluids.
21	Hazardous Materials	Hazardous materials would not be stored at the Project sites.
22	Hazardous Materials	No vehicles would be refueled at the Project sites.
23	Vegetation and Wildlife	To prevent the spread of noxious weed, equipment will be rinsed prior to changing work areas within the Project site. The rinse water will be disposed of through the sanitary sewer system.
25	Vegetation and Wildlife	On completion of the work, disturbed areas left in a condition that would facilitate natural or appropriate vegetation, provide for proper drainage, and prevent erosion.
27	Special-Status Species	Construction activities associated with replacement or retrofit of artificial instream structures would be conducted between October 15 and December 31 when the channel is "dry" (i.e., reach is dewatered and there is no connection between confluence and reach above Bellota). This timeframe would be outside the breeding seasons for the giant garter snake, Swainson's hawk, and burrowing owl; and it would be outside salmonid migration conditions which occur under flood control releases or freshet flows.
28	Special-Status Species	For special-status plants, pre-construction surveys would be conducted within 250 feet of the Project area. If special-status plants are observed on the Project site they would not be disturbed, the appropriate agency (CDFG or USFWS) would be consulted to avoid impacts to special-status plants.

No.	Resource	Best Management Practices
29	Special-Status Species	For burrowing owl, a qualified biologist would survey the area, including a 500-foot buffer zone, around the proposed project boundary no more than 14 days prior to the initiation of construction activities.
30	Special-Status Species	During the non-breeding season (September 1 through January 31), burrowing owls occupying the Project site may be evicted by passive relocation with concurrence from CDFG (SJMSCP 2000).
31	Special-Status Species	If passive relocation of burrowing owls is warranted, a qualified biologist would observe the area for 2 to 3 weeks to determine the occupied burrows to be destroyed.
32	Special-Status Species	For giant garter snake, a qualified biologist will conduct preconstruction surveys 24-hours prior to construction activities. If a snake is encountered during construction, activities shall cease until appropriate corrective measures have been completed or it has been determined that the snake will not be harmed.
33	Special-Status Species	On completion of the work, disturbed areas would be left in a condition that would facilitate natural or appropriate vegetation, provide for proper drainage, and prevent erosion.
34	Special Status-Species and Noise	Vehicles traveling to and from the recharge basin would be restricted to existing access roads on-site traveling no more than 15 mph.
35	Fisheries	Artificial instream structure improvements shall be designed according to criteria in *Design of Fish Passage Solutions* (CDWR [In Press]).
36	Fisheries	Construction activities associated with replacement or retrofit of artificial instream structures would be conducted between October 15 and December 31 when the channel is "dry" (i.e., reach is dewatered and there is no connection between confluence and reach above Bellota). This time period would be outside salmonid migration conditions (i.e., flood control releases or freshet flows). Provisions must be made to allow migrating salmonids to bypass construction work areas in the channel in the event that unanticipated flood control releases or freshets occur
37	Fisheries	Monitor water turbidity levels during instream construction activities according to a Section 401 water quality permit.
38	Fisheries	Prepare an erosion control plan (and a stormwater pollution prevention plan, if applicable).
39	Water Quality	Hazardous materials would not be drained onto the ground, recharge cells, the instream channel, or into drainage areas. All waste, including trash and litter, garbage, other solid waste, petroleum products, and other potentially hazardous materials, would be removed to a disposal facility permitted to accept such materials.
40	Water Quality	Construction materials would not be stockpiled or deposited near the Project Sites where they could be washed away by high water or storm runoff or can encroach, in any way, upon the watercourse.
41	Water Quality	Fueling, cleaning, and maintenance of equipment would not be allowed except in designated areas located as far from the instream channels as possible.
42	Water Quality	Spill equipment would be present and easily accessible when refueling the diesel engine for the pump.
43	Water Quality	Grading activities would implement erosion and sediment control measures.
44	Water Quality	SEWD would prepare a construction SWPPP and implement appropriate measures.
45	Land Use	Construction operations would be conducted to prevent unnecessary destructing, scaring, or defacing of the natural surroundings to preserve the natural landscape to the extent practicable.
46	Noise	Construction would be restricted to the hours between 6:00 a.m. and 9:00 p.m.

No.	Resource	Best Management Practices
47	Soils	In construction areas where ground disturbance is substantial or where recontouring is required, surface restoration would occur.
48	Soils	Any vehicles used during operation and maintenance would drive on existing levees.
49	Soils	Compaction of soil would be minimized by limiting the areas requiring heavy equipment during construction.
50	Traffic	Preparation and implementation of a haul route access plan would minimize potential conflicts between construction activities and general traffic.

3.0 AFFECTED ENVIRONMENT/ENVIRONMENTAL SETTING AND ENVIRONMENTAL CONSEQUENCES

The NEPA and CEQA baseline typically encompass physical environmental conditions in the vicinity of the project, as they exist at the time environmental analysis is commenced, representing the impacts of past and present actions. CEQA Guidelines Section 15125(a); *American Rivers*, 201 F.3d at 1199.

This section discusses the existing environment in the study area and identifies environmental resources that may be affected by the Proposed Action. Section 3.1 discusses the environmental setting. Section 3.2 discusses the environmental resources that were found to have no effect while preparing the CEQA checklist (Appendix A) and were eliminated from further detailed analysis. Sections 3.3 through 3.9 include each of the environmental resources that were considered to potentially have an effect and were analyzed to determine whether there would be any significant effects. Effects for these environmental resources assume that the BMPs specified in Table 3 are fully implemented.

3.1 Environmental Setting

The project area includes the lower Calaveras River bellow Bellota via the Old Calaveras River channel and Mormon Slough/Stockton Diverting Canal routes. This area consists of three distinct reaches as described below:

- Reach 1- The Old Calaveras River Channel (Calaveras mainstem river mile 5.9 to Old Calaveras river mile 26) was historically the mainstem of the river, but has been a secondary channel since flows were primarily directed into Mormon Slough in 1933. It is characterized by a narrow channel with ample, but mostly non-native, vegetative cover and large instream woody debris consisting of agricultural trees and non-native invasive plant species, such as Himalayan Blackberry and Arundo. Non-native species often grow across the channel and function as fish passage barriers. The Old Calaveras River becomes more channelized with less cover as it reaches the valley floor. The substrate in the upper third of this reach consists of sand and silt with limited gravel and cobble and the lower two thirds of the reach consist of mostly sand silt and clay. This reach has nine flashboard dam foundations where flashboards are installed during the irrigation season and 71 small privately owned diversions which may be operated during the irrigation season. In addition, there are two head gates and multiple bridge structures.

- Reach 2- The Mormon Slough/Stockton Diverting Canal (Calaveras mainstem river mile 5.9 to Mormon Slough/Stockton Diverting Canal river mile 25.1) is now the principal channel and fish migration route instead of the historic Old Calaveras River channel. Mormon Slough was modified by the US Army Corps of Engineers in 1969 to convey additional floodwater around the City of Stockton and is currently maintained as a flood control channel. As part of the modification, the lower slough has been closed by a levee just east of Stockton, and the flows are diverted back into the lowermost Calaveras River through the Stockton Diverting Canal. This reach is comprised of a wide channel with steep, mostly degraded and irregularly contoured banks having little to no cover. The channel substrate consists of compacted clay, sand and silts with limited gravel and areas with concrete or rock riprap. According to CH2M Hill (2006), "Mormon Slough is sparsely vegetated with immature willows (*Salix* spp.), cattails (*Typha angustifolia*), cottonwoods (*Populus* spp.), immature valley oak (*Quercus lobata*), and an abundance of nonnative species. Fruit and walnut orchards line both sides of the slough (USFWS 1989b)." It has little natural riparian cover due to the maintenance practices of the San Joaquin County Flood Control and Water Conservation District (SJCFC and WCD) which prevent the growth of shrubs and trees larger than one inch in diameter. This reach has 12 flashboard dam foundations where flashboards are installed during the irrigation season and 63 small privately owned diversions which may be operated during the irrigation season. In addition, there are two low flow road crossings and multiple bridges and railroad trestles.
- Reach 3- Junction of Old Calaveras River/ Stockton Diverting Canal to Confluence (Calaveras mainstem river miles RM 0 to RM 5.9). The upper end of this reach begins where the narrow, low capacity Old Calaveras River Channel joins with the much wider, higher capacity channel of the Stockton Diverting Canal. The channel continues to exhibit the same characteristics of steep levee banks confining a wide low gradient streambed with little natural riparian cover due to SJCFC and WCD maintenance practices. The river shows signs of tidal influence within about four miles of the confluence with the San Joaquin River Stockton Deep Water Channel. There are multiple bridges and railroad trestles in this reach.

These reaches are within designated critical habitat for Central Valley steelhead and essential fish habitat for fall-run Chinook salmon. These reaches do not contain good salmonid habitat but function as migration corridors to areas above Bellota where good spawning and rearing habitat exists.

3.2 Resources Eliminated from Detailed Analysis

The sections below were eliminated from further detailed analysis because they would not be affected by the Proposed Action.

3.2.1 Aesthetics

The Proposed Action would take place within river channels that are enclosed by levees and are not within view of nearby residences or within view of a scenic vista. Activities would be nearly indistinguishable from existing conditions since all modifications would occur at existing

structures within the river channels and alignment of river channels will not be altered. Structural modifications will be visually and aesthetically compatible with their surroundings, and designed and constructed in a manner that is consistent with the current use and character of existing structures. Therefore, there will be no significant impact to views surrounding the Lower Calaveras Creek and Mormon Slough, to scenic resources, to the visual character or quality of the site and its surroundings, and to views as a result of increased light or glare; and a detailed aesthetic analysis for the Project is not warranted.

3.2.2 Agricultural Resources

The Proposed Action would take place at existing structures that are located within either a previously modified floodway channel (Mormon Slough/ Stockton Diverting Canal channel) or within a previously modified river channel (Old Calaveras River channel). The Mormon Slough/ Stockton Diverting Canal channel was modified by the USACE to provide a 12,500 cfs flood control capacity, but under natural conditions, Mormon Slough flowed southwesterly about 20 miles to the harbor at Stockton. As part of the modification, the lower slough was closed by a levee just east of Stockton and flows diverted back into the lowermost Calaveras River [sic] through the Stockton Diverting Canal (USACE 1981). The Old Calaveras River channel was historically the mainstem of the river but has been a secondary channel since 1934 when the Linden Irrigation District built the Old Calaveras Headworks Facility and flows were primarily directed into Mormon Slough (Crow 2006). Activities would improve fish passage at flashboard dam locations, while maintaining the ability of flashboard dams to service irrigation diversions. Since structural improvements would occur within floodway and river channels, he proposed Project would not have the potential to convert prime farmland, unique farmland, or farmland of statewide importance to non-agricultural uses, nor to conflict with agricultural zoning or with a Williamson Act contract. Therefore, there will be no significant impact to farmland and a detailed agricultural resources analysis for the Project is not warranted.

3.2.3 Land Use and Planning

The Proposed Action would take place within river channels (Mormon Slough/ Stockton Diverting Canal and Old Calaveras River channel) that are enclosed by levees. Construction associated with the Project does not have the potential to divide an established community or conflict with any applicable land use plan, habitat conservation plan or natural community conservation plan. Therefore, there will be no significant impact to land use and a detailed land use and planning analysis for the Project is not warranted.

3.2.4 Mineral Resources

The Proposed Action would take place within river channels (Mormon Slough/ Stockton Diverting Canal and Old Calaveras River channel) that are enclosed by levees. No mineral resource recovery sites are delineated and no mining occurs within this area. Also, SEWD does not have contracts with parties for instream mineral rights (e.g., sand and gravel mining permits) that would be affected by or could affect any of the Project activities. Therefore, there will be no significant impact to mineral resources and a detailed mineral resource analysis for the Project is not warranted.

3.2.5 Noise

The Proposed Action would take place at instream structures that are generally located in sparsely populated areas and are at least 250 feet away from the nearest residential or business facilities. While a temporary increase in noise is expected to be generated by equipment, vehicles, and personnel during construction activities, this impact would be temporary in nature and would be limited to typical construction equipment (e.g., backhoe, bulldozer, grader, loader, scraper, truck) noise levels which range from 80-89 dBA 50 feet from source (FTA 2006). Based on basic sound level drop-off rate of 6.0 dBA per doubling of distance, noise levels at 300 feet would range from 65-74 dBA. Construction would only be conducted from Mondays- Saturdays between 6:00 a.m. and 9:00 p.m., and noise associated with temporary construction activities during this timeframe is specifically exempt from San Joaquin County noise standards. In addition, instream structures are not located within an airport land use plan area, or, where such a plan has not been adopted, within two miles of a public airport or public use airport and do not expose people residing or working in the project area to excessive noise levels. They are also not located vicinity of a private airstrip and do not expose people residing or working in the project area to excessive noise levels. Therefore, there will be no significant impact associated with noise and a detailed noise analysis for the Project is not warranted.

3.2.6 Population and Housing

The Proposed Action consists of improving existing instream structures within river channels that are enclosed by levees, which will not directly or indirectly increase population growth and will not displace housing units or people. Therefore, there will be no significant impact to population or housing and a detailed population and housing analysis for the Project is not warranted.

3.2.7 Public Services

The Proposed Action consists of improving existing instream structures within river channels that are enclosed by levees. The Proposed Action will not construct any new, or make physical alterations to governmental facilities (fire, police, school, park, or other public facilities), nor will it create the need for new or physically altered governmental facilities. Therefore, there will be no significant impact to governmental facilities and a detailed public services analysis for the Project is not warranted.

3.2.8 Recreation

The Proposed Action consists of improving existing instream structures within river channels that are enclosed by levees. Although levees serve as an informal trail system for equestrian and hikers where residential development abuts the outer edges of the levees, the modifications to instream structures will not increase the recreational use of levees and will not necessitate the construction of new recreational facilities or the expansion of existing facilities. Therefore, there will be no impact to recreation and a detailed recreation analysis for the Project is not warranted.

3.2.9 Socioeconomics

The Proposed Action would take place within river channels that are enclosed by levees and there would be no impacts to businesses, minority populations, or other interests. Therefore, there will be no impact to socioeconomics and a detailed socioeconomic analysis for the Project is not warranted.

3.2.10 Environmental Justice

Executive Order 12898 (February 11, 1994) mandates Federal agencies to identify and address disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations. This Proposed Action would not be expected to disproportionately affect low-income, minority, or subsistence populations in the project area. Therefore, there will be no impact to environmental justice and a detailed environmental justice analysis for the Project is not warranted.

3.2.11 Indian Trust Assets

Indian Trust Assets (ITAs) are legal interests in property or rights held in trust by the United States for Indian tribes or individuals. Trust status originates from rights imparted by treaties, statutes, or executive orders. The Proposed Action will not affect ITAs because none exist within the study area and a detailed ITA analysis for the Project is not warranted

3.3 Air Quality

Setting. Emissions of particulate matter or visible emissions are regulated by the San Joaquin Valley Air Pollution Control District (SJVAPCD) under Regulation 6 "Particulate Matter and Visible Emissions." Specifically, visible particulate emissions are prohibited where the particulates are deposited on real property other than that of the person responsible for the emissions and cause annoyance.

Non-attainment Area for Federal $PM_{2.5}$ and PM_{10} Standards. The proposed project is within a non-attainment area for federal $PM_{2.5}$ and PM_{10} standards (Table 4). Therefore, per 40 CFR Part 93 analyses are required for conformity purposes. However, the EPA does not require hot-spot analyses, qualitative or quantitative, for projects that are not listed in section 93.123(b)(1) as an air quality concern. It was determined that the proposed project will not contribute to a $PM_{2.5}$ or PM_{10} hot spot that will cause or contribute to a violation of the federal $PM_{2.5}$ or PM_{10} standards.

Table 4. Attainment Status of Criteria Pollutants in the San Joaquin Valley

POLLUTANT	FEDERAL STANDARDS	STATE STANDARDS
Ozone - 1 hour	No Federal Standard	Non-attainment/Extreme
Ozone - 8 hour	Non-attainment/Serious	Non-attainment
PM_{10}	Non-attainment/Serious	Non-attainment
$PM_{2.5}$	Non-attainment	Non-attainment
CO - San Joaquin County	Unclassified/Attainment [1]	Attainment

POLLUTANT	FEDERAL STANDARDS	STATE STANDARDS
NO_2	Unclassified/Attainment	Attainment
Sulfur Dioxide	Unclassified	Attainment
Lead	*No Designation	Attainment
Hydrogen Sulfide	*No Federal Standard	Unclassified
Sulfates	*No Federal Standard	Attainment
Visibility Reducing Particles	*No Federal Standard	Unclassified

Source: San Joaquin Valley Air Pollution Control District, October 2006. www.valleyair.org

Naturally Occurring Asbestos (NOA). Asbestos is a term used for several types of naturally occurring fibrous minerals that are a human health hazard when airborne. Asbestos can be released from serpentinite and ultramafic rocks when the rock is broken or crushed. At the point of release, the asbestos fibers may become airborne, causing air quality and human health hazards. The project is located in San Joaquin Valley, which is among 58 counties listed as potentially containing Serpentine and Ultramafic Rock. Serpentinite may contain chrysotile asbestos, especially near fault zones. Ultramafic rock, a rock closely related to serpentinite, may also contain asbestos minerals.

Odorous Emissions. In addition to the criteria pollutants, concern about odorous compounds has increased in recent years. Odorous compounds include those that can be detected by the human olfactory system, such as hydrogen sulfide and other sulfurous compounds. Odorous emissions are typically regulated by local air districts under nuisance prohibitory rules. Because odor is generally a subjective phenomenon that affects people differently, development of odor emissions standards has proven impractical. Therefore, regulators have relied on a "nuisance" standard (i.e., number of odor complaints received during an "odor episode") to assist in enforcing control of odorous emissions.

Potential Effects.

Potential Effect AIR 1—Air Quality Plan—**Less than Significant.** Limited vehicle emissions associated with the proposed conservation measures would be similar to what occurs today under existing conditions. Therefore, while the project site is located within a non-attainment area for federal ozone and PM, $PM_{2.5}$ and PM_{10} standards, such limited emissions would not affect the implementation of the applicable air quality plan.

Potential Effect AIR 2—Fugitive Dust and Equipment Exhaust—**Less than Significant with Mitigation Incorporated.** Air pollutant emissions associated with the proposed project would occur over the short term from construction and periodic maintenance, such as fugitive dust from repairing/replacing the earthen dams and equipment exhaust associated with heavy equipment used for this construction. In the context of existing practices, the small disturbance areas, moist soils, and brief nature of the work, the emissions from the maintenance activities will be negligible.

Because of its short duration, health risks from construction emissions of diesel particulate would result in a less than significant impact. No new, long-term regional emissions would result from implementation of the proposed project.

Implementation of BMPs (Mitigation Measure AIR-2) would reduce impacts to a less-than-significant level.

Potential Effect AIR 3—Naturally Occurring Asbestos (NOA)—**No Impact.** Serpentinite and ultramafic rocks have been commonly used for unpaved gravel roads, landscaping, fill projects and other improvement projects in some localities. Asbestos may be released to the atmosphere due to vehicular traffic on unpaved roads and during grading for various construction projects. Proposed project areas do not contain known deposits. Therefore, there would be no impact.

Potential Effect AIR 4—Sensitive Receptors—**Less than Significant with Mitigation Incorporated.** Only a few project sites (< 5) are within the vicinity of residential areas and none are near schools and hospitals. In the context of existing practices, the small disturbance areas, moist soils, and brief nature of the work, the emissions from the maintenance activities will be negligible.

Because of its short duration, health risks from construction emissions of diesel particulate would result in a less than significant impact. No new, long-term regional emissions would result from implementation of the proposed project.

Implementation of BMPs (Mitigation Measure AIR-2) would reduce impacts to a less-than-significant level.

Potential Effect AIR 5—Odors—**No Impact.** Implementation of the proposed project would not create objectionable odors affecting a substantial number of people or subject people to objectionable odors. Therefore, there would be no impact.

Summary of Environmental Effects. Less than Significant with Mitigation Incorporated.

Mitigation.

Mitigation Measure AIR-2—Fugitive Dust and Equipment Exhaust. Compliance with San Joaquin Valley Air Pollution Control District (SJVAPCD) Rules and Regulations during construction will reduce construction-related air quality impacts from fugitive dust emissions from construction, grading and quarrying operation and construction equipment emissions to a less than significant impact when performing maintenance and construction activities. These regulations include the following BMPs:

- Cover all trucks hauling soil, sand, and other loose materials.
- Apply water three times daily, or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas and staging areas at construction sites.

3.4 Biological Resources

Setting. The Project Area includes the lower Calaveras River via both the Old Calaveras River channel and the Mormon Slough/Stockton Diverting Canal routes. This area consists of three distinct reaches in the river as described previously.

There are a number of special-status species that have been documented to occur or have the potential to occur in the lower Calaveras River watershed (Table 5). Some of these species occupy riparian habitats and may occur near the various artificial instream structures proposed for improvements.

Although the historic use of the Calaveras River by salmonids is uncertain, Central Valley steelhead and fall-run Chinook salmon are currently able to opportunistically access the reach between Bellota and New Hogan for spawning whenever adequate naturally occurring migration flows are available and no structural barriers are installed (i.e., flashboard dams). Current upstream and downstream migration opportunities are generally limited to occasions between November and early April when passage conditions with the Project Area are created by substantial precipitation events that result in flood control releases and/or runoff (i.e., freshet) events below the dam. In many years, precipitation events resulting in passage conditions do not begin until December or January because rainfall from initial storm events is generally absorbed into the ground through infiltration and run-off does not occur until the ground becomes saturated.

The Project Area is in close proximity to row crops, orchards, and savannah grassland. Croplands and orchards provide foraging habitat for sensitive wildlife species, including Swainson's hawk (*Buteo swainsoni*) and burrowing owls (*Athene cunicularia*). Various species (e.g., ground squirrels, black-tailed jackrabbits, and alligator lizards) have been observed during previous field surveys near the Project Area (unpublished data). The presence of ground squirrel and other medium-sized mammal burrows indicates that burrowing owls may occur adjacent to the Project Area. Nearby large trees provide good roosting and nesting habitat for Swainson's hawk. Nearby row crops, orchards, and savannah grassland may provide foraging habitat for special status birds, such as burrowing owls, loggerhead shrike, greater sandhill crane, and Swainson's hawk. The project area provides habitat for a diversity of plant and wildlife species; however, continual vegetation removal activities associated with SEWD operations have disturbed portions of the various habitats and reduced their quality.

Migratory birds within the Project area are protected by the Migratory Bird Treaty ACT (MBTA; Title 16, United States Code, § 703-712) which was implemented through various treaties and conventions between the United States, Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. The law was enacted in 1918 and was last amended in 1989. Pursuant to the Act, taking, killing, or possessing migratory birds is unlawful. Bird species protected by the MBTA that were observed near the Project Area on January 3, 2006 (unpublished data) include: Canada goose (*Branta Canadensis*), mallard (*Anas platyrhynchos*), great blue heron (*Ardea herodias*), great egret (*Casmerodius albus*), American kestrel (*Falco sparverius*), American coot (*Fulica americana*), killdeer (*Charadrius vociferous*), great yellowlegs (*Tringa melanoleuca*), mourning dove (*Zenaida macroura*), burrowing owl (*Athene*

Table 5. Special-status species potentially located within the lower Calaveras River.

Common Name	Scientific Name	Status Federal/State/CNPS	Primary Habitat and Critical Seasonal Periods	Likelihood for Occurrence at Project Sites
Birds				
Tricolored blackbird	*Agelaius tricolor*	—/SC/—	Foraging occurs in grassland and agricultural fields. Seeks cover in emergent wetland vegetation such as cattails, tule, and bulrush. Breeding season is mid-April to late July.	**Moderate**. Some foraging habitat is found adjacent to Project sites. Construction would occur outside of breeding season.
Great egret	*Ardea alba*	—/SA/—	Foraging occurs along the margins of estuaries, lakes, and slow-moving streams, on mudflats and salt ponds, irrigated croplands and pastures, and riparian habitat. Breeding season generally March to July.	**Moderate.** Foraging habitat is found within and adjacent to Project sites. Construction would occur outside of breeding season.
Great blue heron	*Ardea Herodias*	—/SA/—	Typically found in shallow estuaries and fresh and saline emergent wetlands. Less common along riverine shores, in croplands, and pastures. Breeding season is February to August.	**Moderate.** Some foraging habitat found adjacent to Project sites. Construction would occur outside of breeding season.
Burrowing owl	*Athene cunicularia*	—/SC/—	Habitat includes open grassland with fossorial mammal burrows, often associated with ground squirrels. Use small mammal burrows for cover and natal dens. Breeding season is February through August.	**Moderate.** Foraging habitat is found adjacent to Project sites. Construction would occur outside of breeding season.
Golden eagle	*Aquila chrysaetos*	*	Grasslands, deserts, savannahs, and early successional stages of forest and shrub habitats. Breeding season is late January through August.	**Moderate**. Some foraging habitat is found adjacent to Project sites. Construction would occur outside of breeding season.
Ferruginous hawk	*Buteo regalis*	*	Grasslands, grassland/agricultural, and desert scrub habitats. Breeding season is April through August. Uncommon winter resident and migrant in Central Valley.	**Low.** Emigrates from area in fall/winter when construction will occur.

Common Name	Scientific Name	Status Federal/State/CNPS	Primary Habitat and Critical Seasonal Periods	Likelihood for Occurrence at Project Sites
Swainson's hawk	*Buteo swainsoni*	—/T/—	Typical habitat is open desert, grassland, or cropland near water containing scattered, large trees or small groves. Breeding season is late March to late August. Primarily spring/summer migrant to the Central Valley; migrates to Central and South America in the fall/winter.	**Low.** Emigrates from area in fall/winter when construction will occur.
Northern harrier	*Circus cyaneus*	—/SC/—	Found in meadows, grasslands, open rangelands, desert sinks, fresh and saltwater emergent wetlands; seldom found in wooded areas. Breeding season is from April through August.	**Moderate.** Some foraging habitat found adjacent to Project sites. Construction would occur outside of breeding season.
Western yellow-billed cuckoo	*Coccyzus americanus occidentalis*	C/E/—	Forage predominantly in Fremont cottonwood stands and upland areas. Breeding season is from late May through August.	**Moderate.** Some foraging habitat is found adjacent to Project sites. Construction would occur outside of breeding season.
Yellow warbler	*Dendroica petechia brewsteri*	—/SC/—	Found in a variety of sparse to dense woodland and forest habitats during migration season. Usually arrives in California in April, and mostly gone by October.	**Low.** Emigrates from area in fall/winter when construction will occur.
White-tailed kite	*Elanus leucurus*	—/SFP/—	Small raptor that nests in isolated trees in dry grass savannahs, meadows, and oak woodlands or trees along marsh edges. Breeds from February through September.	**Moderate.** Some foraging habitat is found adjacent to Project sites. Construction would occur outside of breeding season.
California horned lark	*Eremophila alpestris actia*	*	Frequents grasslands and other open habitats with low, sparse vegetation. Breeds from March through July.	**Moderate.** Some foraging habitat is found adjacent to Project sites. Construction would occur outside of breeding season.
Merlin	*Falco columbarius*	*	Frequents coastlines, open grasslands, savannahs, woodlands, lakes, wetlands, edges, and early successional stages. Uncommon winter migrant from September to May.	**Low.** Uncommon in area in fall/winter when construction will occur.

Common Name	Scientific Name	Status Federal/State/CNPS	Primary Habitat and Critical Seasonal Periods	Likelihood for Occurrence at Project Sites
Greater sandhill crane	*Grus canadensis tabida*	—/SFP/—	Winters primarily in the Sacramento and San Joaquin valleys, where it frequents annual and perennial grassland habitats, moist croplands with rice or corn stubble, and open, emergent wetlands. Migration is rapid and direct during September/October and in March/April; some overwinter.	**Moderate.** Some foraging habitat is found adjacent to Project sites. Construction would occur outside of breeding season.
Yellow-breasted chat	*Icteria virens*	—/SC/—	Frequents dense, brushy thickets and tangles near water, and thick understory in riparian woodland. Usually arrives in April and departs by late September for wintering grounds in Mexico and Guatemala.	**Low.** Emigrates from area in fall/winter when construction will occur.
Loggerhead shrike	*Lanius ludovicianus*	—/SC/—	Prefers open habitats with scattered shrubs, trees, posts, fences, utility lines, or other perches. Breeding season is March through August.	**Moderate.** Some foraging habitat is found adjacent to Project sites. Construction would occur outside of breeding season.
California black rail	*Laterallus jamaicensis coturniculus*	—/T/—	Found in salt and freshwater marshes. Usually found in immediate vicinity of tidal sloughs. Breeding season is March through August.	**Low.** Limited preferred habitat in Project Area. Construction would occur outside of breeding season.
Osprey	*Pandion haliaetus*	*	Lives near bodies of water, like lakes, rivers, marshes. Breeding season is March through August.	**Moderate.** Some foraging habitat is found adjacent to Project sites. Construction would occur outside of breeding season.
Yellow-headed blackbird	*Xanthocephalus xanthocephalus*	—/SC/—	Forages in emergent vegetation, along moist shorelines, and in nearby grasslands and croplands, preferably near water or on moist ground. Breeding season is mid-April through July.	**Moderate.** Some foraging habitat is found adjacent to Project sites. Construction would occur outside of breeding season.

Common Name	Scientific Name	Status Federal/State/CNPS	Primary Habitat and Critical Seasonal Periods	Likelihood for Occurrence at Project Sites
Amphibians and Reptiles				
California tiger salamander	*Ambystoma californiense*	T/SC/—	Restricted to grasslands and low foothill regions with aquatic sites for breeding (primarily vernal pools and ephemeral ponds; occasionally constructed stock ponds). Other habitats include valley-oak woodland.	**None.** Suitable breeding habitat (ephemeral ponds, etc.) is not present at Project sites.
California red-legged frog	*Rana aurora draytonii*	T/SC/—	Highly aquatic- spends most of life in water. Occurs in the vicinity of quiet, permanent pools of streams, marshes, and occasionally ponds.	**None.** Suitable breeding habitat (permanent pools, etc.) is not present at Project sites.
Giant garter snake	*Thamnophis gigas*	T/T/—	Prefers freshwater marsh and low-gradient streams. Has adapted to drainage canals and irrigation ditches. Uses burrows and soil crevices in uplands during winter dormant period. Breeding period March through April.	**Low.** Some foraging habitat is found within and adjacent to Project sites. Construction would occur outside of breeding season.
Plants				
Alkali milk-vetch	*Astragalus tener var. tener*	—/—/1B	An annual member of the pea family. The habitat for this species is grassy alkaline flats and vernally moist meadows at elevations below 500 feet.	**Low.** Presumed to exist in only three counties (Merced, Solano, and Yolo) and presumed extirpated from a single location in the Stockton West quad in San Joaquin County.
San Joaquin spearscale	*Atriplex joaquiniana*	—/—/1B	Occurs in the broad flood basins of the valley floor and on alluvial fans associated with the major streams draining from the inner Coast Ranges foothills. It is generally found at low elevations, but has been collected up to 1,055 feet above sea level.	**Low.** Regular maintenance of the channels for flood control likely prevents plants sensitive to disturbance from becoming established.
Round-leaved filaree	*California macrophylla*	—/—/1B	Occurs in grasslands on friable clay soils most often between 200-2,000 feet. It has been found in non-native grassland on clay soils with relatively low cover of annual grasses.	**None.** Suitable habitat (annual grassland) is not present at the Project sites.

Common Name	Scientific Name	Status Federal/State/CNPS	Primary Habitat and Critical Seasonal Periods	Likelihood for Occurrence at Project Sites
Slough thistle	*Cirsium crassicaule*	—/—/1B	Annual herb that occurs in shadscale scrub, freshwater wetlands, and wetland-riparian communities. Native and endemic to California.	**Low.** Regular maintenance of the channels for flood control likely prevents plants sensitive to disturbance from becoming established.
Palmate-bracted bird's-beak	*Cordylanthus palmatus*	E/E/1B	Hemiparasitic annual that is restricted to seasonally flooded, saline-alkali soils in lowland plains and basins at elevations of less than 500 feet. Grows primarily along the edges of channels and drainages.	**Low.** Regular maintenance of the channels for flood control likely prevents plants sensitive to disturbance from becoming established.
Recurved larkspur	*Delphinium recurvatum*	—/—/1B	Perennial herb occurs in seasonal alkali wetlands of chenopod scrub, grassland, and montane woodland communities, typically on valley bottoms on heavy clay alkali soils.	**Low.** Regular maintenance of the channels for flood control likely prevents plants sensitive to disturbance from becoming established.
Delta button-celery	*Eryngium racemosum*	—/E/1B	Herbaceous perennial in the carrot family. Found in areas adjacent to rivers and streams where periodic flooding occurs, typically in alkaline clays.	**Low.** Regular maintenance of the channels for flood control likely prevents plants sensitive to disturbance from becoming established.
Wooly rose-mallow	*Hibiscus lasiocarpus*	—/—/2	Perennial herb (rhizomatous) that occurs along waterways of the Delta, habitat includes marshes and swamps. Most populations are very small consisting of only a few individuals.	**Low.** Regular maintenance of the channels for flood control likely prevents plants sensitive to disturbance from becoming established.
Delta tule pea	*Lathyrus jepsonii var. jepsonii*	—/—/1B	Perennial herb occurs along stream banks and in freshwater-marsh habitat.	**Low.** Regular maintenance of the channels for flood control likely prevents plants sensitive to disturbance from becoming established.
Mason's lilaeopsis	*Lilaeopsis masonii*	—/—/1B	Perennial herb in the carrot family. Found in marshes, swamps, riparian scrub from sea level to 25 feet elevation.	**Low.** Regular maintenance of the channels for flood control likely prevents plants sensitive to disturbance from becoming established.
Sanford's arrowhead	*Sagittaria sanfordii*	—/—/1B	Perennial herb in the arrowhead family. Endemic to California. Associated with shallow freshwater marsh and swamp communities.	**Low.** Regular maintenance of the channels for flood control likely prevents plants sensitive to disturbance from becoming established.

Common Name	Scientific Name	Status Federal/State/CNPS	Primary Habitat and Critical Seasonal Periods	Likelihood for Occurrence at Project Sites
Suisun Marsh aster	*Symphyotrichum lentum*	—/—/1B	Perennial herb occurs in freshwater-marsh, brackish-marsh, and along the banks of sloughs and watercourses.	**Low.** Regular maintenance of the channels for flood control has likely prevented plants sensitive to disturbance from becoming established.
Wright's trichocoronis	*Trichocoronis wrightii var. wrightii*	—/—/2	Annual member of the aster or sunflower family that occurs in marshes and swamps, riparian areas, and vernal pools.	**None.** Presumed extirpated from all known localities in the Central Valley, including a single occurrence from the Lathrop quad.
Greene's tuctoria	*Tuctoria greenei*	E/R/1B	Annual herb in the grass family that occurs in large and relatively deep vernal pools.	**None.** No suitable habitat (vernal pools) is present.
Mammals				
Pallid bat	*Antrozous pallidus*	—/SC/—	Occupies grasslands, shrublands, and woodlands. Needs drinking water. Day roosts are in caves, crevices, mines, and occasionally in hollow trees and buildings.	**Low.** Woodlands and buildings may provide roost sites. Suitable foraging habitat (open ground) is present adjacent to the Project Area.
San Joaquin pocket mouse	*Perognathus inornatus inornatus*	—/SA/—	Inhabits arid grasslands, savannahs, desert-shrub associated with sandy washes, and dry open weedy ground. In the San Joaquin Valley, they are found in low densities in grassland-blue oak savannahs up to 1,500 feet.	**Low.** Suitable habitat exists at the site; however, there are no CNDDB occurrences within several miles of the Project Area.
Riparian brush rabbit	*Sylvilagus bachmani riparius*	E/E/—	Found both in old-growth riparian forest (primarily valley oak (Quercus lobata), and riparian communities dominated by thickets of willows (Salix spp.), and other successional trees and woody plants.	**None.** Only known populations are confined to Caswell Memorial State Park on the Stanislaus River and along an overflow channel of the San Joaquin River.
San Joaquin kit fox	*Vulpes macrotis mutica*	E /T/—	Historically found in several San Joaquin Valley native plant communities including Valley Sink Scrub, Valley Saltbush Scrub, Upper Sonoran Subshrub Scrub, and Annual Grassland.	**None.** The Project Area is outside of the species documented range. CNDDB reports six occurrences in southeast San Joaquin County; however, none have been documented within several miles of the Project Area.

Common Name	Scientific Name	Status Federal/State/CNPS	Primary Habitat and Critical Seasonal Periods	Likelihood for Occurrence at Project Sites
Invertebrates				
A vernal pool andrenid bee	*Andrena subasta*	*	Solitary, ground-nesting bees that occur in upland areas near vernal pools. The bees forage during the middle of the day. The flight period for females range from late February to late April, male flight period is unknown.	**None.** No suitable habitat (vernal pools) present.
Vernal pool fairy shrimp	*Branchinecta lynchi*	T/—/—	Local resident. Associated with ephemeral swales and vernal pools in grassland communities. Cysts hatch and shrimp become active when pools fill during the winter rainy season.	**None.** No suitable habitat (seasonal wetlands or vernal pools) present.
Midvalley fairy shrimp	*Branchinecta mesovallensis*	—/SC/—	Endemic but distribution poorly understood. Associated with vernal pools, vernal swales, and other ephemeral water features. Habitat requirements similar to other local fairy shrimp species but tend to be in more shallow pools.	**None.** No suitable habitat (seasonal wetlands or vernal pools) present.
Valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	T/—/—	Endemic with patchy distribution. Valley elderberry longhorn beetles are completely dependent on their host plant, the elderberry shrub. Adult active period is from March to June.	**None.** No suitable habitat (elderberry shrub) present.
Vernal pool tadpole shrimp	*Lepidurus packardi*	E/—/—		**None.** No suitable habitat (elderberry shrub) present.
California linderiella	*Linderiella occidentalis*	—/SC/—	Local resident. Associated with vernal pools in grassland communities. These pools are often formed in rock depressions. Cysts hatch and shrimp become active when pools fill during the winter rainy season.	**None.** No suitable habitat (seasonal wetlands or vernal pools) present.
Moestan blister beetle	*Lytta moesta*	*	Poorly known species that are parasitic on ground nesting bees. Habitat includes annual grassland, foothill woodland, and saltbrush scrub. Historical distribution includes Kern, Tulare, Fresno, Madera, Santa Cruz, and Stanislaus counties.	**None.** No suitable habitat present.

Common Name	Scientific Name	Status Federal/State/CNPS	Primary Habitat and Critical Seasonal Periods	Likelihood for Occurrence at Project Sites
Fish				
Green sturgeon	*Acipenser medirostris*	—/T/—	Anadromous species using both freshwater and saltwater habitat. Known to forage in estuaries and bays. Begin entering freshwater in late February and spawn in March-July.	**None.** Construction will occur outside of potential migration timeframe.
Delta smelt	*Hypomesus transpacificus*	T/T/—	Spends most of its life in the Sacramento–San Joaquin estuary. Spawns in shallow, fresh or slightly brackish water upriver from the mixing zone, including in the Sacramento River, Mokelumne River system, Cache Slough region, San Francisco Bay Delta, and Montezuma Slough area.	**None.** Delta smelt are not known to occur in the lower Calaveras River.
Central valley Steelhead trout	*Oncorhynchus mykiss*	T/SC/—	Anadromous species using freshwater, estuarine, and saltwater habitat. Migration potentially occurs under freshet or flood control releases during November through March. Lower Calaveras River is designated critical habitat for this species.	**Low.** Construction is proposed for periods when the channel is projected to be "dry" (no flood control releases or freshets) and steelhead would not have access to the Project Area. Low potential that flows would occur which could attract low numbers of steelhead into the Project Area.
Central Valley Chinook salmon, winter-run and spring-run	*Oncorhynchus tshawytscha*	E/E/— T/T/—	Anadromous species using freshwater, estuarine, and saltwater habitat. Migration potentially occurs from January through May.	**None.** Construction will occur outside of potential migration timeframe.
Central Valley Chinook salmon, fall/late fall-run	*Oncorhynchus tshawytscha*	SC/—/—	Anadromous species using freshwater, estuarine, and saltwater habitat. Migration potentially occurs under freshet or flood control releases during November through December. Lower Calaveras River is designated Essential Fish Habitat for this species.	**Low.** Construction is proposed for periods when the channel is projected to be "dry" (no flood control releases or freshets) and salmon would not have access to the Project Area. Low potential that flows would occur which could attract low numbers of steelhead into the Project Area.
Sacramento splittail	*Pogonichthys macrolepidotus*	SC/—/—	Typically found in estuarine environments. Also adapted to slow moving rivers, sloughs, and alkaline lakes.	**Low.** Sacramento splittail may enter the tidally influenced area of the lower Calaveras River during winter of very wet years.

Common Name	Scientific Name	Status Federal/State/CNPS	Primary Habitat and Critical Seasonal Periods	Likelihood for Occurrence at Project Sites

Sources:

Federal Endangered and Threatened Species 7½ minute quads available (May 2009) at: http://www.fws.gov/sacramento/es/spp_lists/auto_letter.cfm. State Special Status Species [Quads: Stockton East, Stockton West, Lodi South, Waterloo, Linden, Peters] available (May 2009) at http://imaps.dfg.ca.gov/viewers/cnddb_quickviewer/app.asp.

Key to Status Codes:

Federal Status:

C: Candidate for listing
E: Endangered
T: Threatened

State Status:

E: Endangered
T: Threatened
SC: California species of special concern
SFP: State fully protected
SA: Special animal
R: Rare species

CNPS- California Native Plant Society Status:

1B = Rare, threatened or endangered in California and elsewhere and are rare throughout their range. According to CNPS, all of the plants constituting List 1B meet the definitions of Sec. 1901.
2 = Rare in California, but not elsewhere.

* Watch List or Species of Local Concern

cunicularia), Say's phoebe (*Sayornis saya*), loggerhead shrike (Lanius ludovicianus), American crow (*Corvus brachyrhynchos*), American pipit (*Anthus rubescens*), savannah sparrow (*Passerculus sandwichensis*), white-crowned sparrow (*Zonotrichia leucophrys*), golden-crowned sparrow (*Zonotrichia atricapilla*), red-winged blackbird (*Agelaius phoeniceus*), western meadowlark (*Sturnella neglecta*), Brewer's blackbird (*Euphagus cyanocephalus*), and house finch (*Carpodacus mexicanus*).

Potential Effects.

Potential Effect BIO 1—Special-Status Non-Salmonid Species and Vegetation—**Less than Significant Impact/Less than Significant Impact with Mitigation Incorporated**. Construction at these structures is not expected to have a significant adverse effect on any of these species due to lack of suitable habitat within the Project Area or due to the time period for implementation which is outside sensitive breeding periods. However, if maintenance activities associated with the operations of these facilities require the removal of riparian vegetation the potential for negative effects on vegetation and species associated with such habitat should be addressed.

Implementation of BMPs (Mitigation Measures BIO-1a and BIO-1b) would reduce impacts to a less-than-significant level.

Potential Effect BIO 2—Steelhead and Salmon— **Less than Significant Impact/Less than Significant Impact with Mitigation Incorporated**. Construction at these structures is not expected to have a significant adverse effect on steelhead and salmon due to the time period for implementation which is scheduled to occur during periods when the channels are "dry" and salmonids would not have access to Project sites. However, in the event that a freshet(s) occur during construction activities which attract salmonids into the Project Area, take could occur due to fish being injured or killed by heavy equipment operation, passage delay or blockage, turbidity could increase for short periods of time just downstream of Project sites, or erosion and sedimentation could occur.

Implementation of BMPs (Mitigation Measures BIO-2a through BIO-2d) would reduce impacts to a less-than-significant level.

Potential Effect BIO 3—Policies/Ordinances/Plans—**No Impact.** Structures are not located within areas where local policies or ordinances protecting biological resources (e.g. a tree preservation policy or ordinance) are established. Therefore, there would be no impact.

Potential Effect BIO 4—Habitat Conservation/Natural Community Plans—**No Impact.** Potential impacts to biological resources from instream construction and maintenance activities at existing structures in the lower Calaveras River have already been considered and authorized under the *San Joaquin County Multi-Species Habitat Conservation and Open Space Plan* (SJCOG 2000). Therefore, the Proposed Action is consistent with provisions of this existing plan and there would be no impact.

Mitigation.

Mitigation Measure BIO-1a—Special-Status Non-Salmonid Species. Conduct pre-construction surveys for special status species prior to disturbing riparian vegetation. If special status species

are identified, confer with the biologist to quantify and determine impacts and prescribe feasible mitigation measures.

Mitigation Measure Bio-1b—Disturbance of Riparian and Wetland Habitats. To the extent possible, impacts to areas of riparian vegetation and wetlands would be avoided wherever possible. Where temporary disturbance of riparian and wetland areas could not be avoided during construction, native vegetation would be planted to restore the habitat after construction. A detailed survey of riparian habitat and wetlands would be conducted according to USACE requirements (USACE 1987) prior to construction. To avoid impacts to wetland habitat to the extent possible, exclusion zones would be established with 50-foot buffers surrounding wetlands. The zones would be marked with temporary fencing to prevent accidental impacts to wetlands from equipment and personnel. Permits will be obtained for Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act through the USACE. The permits would include mitigation requirements for impacts to wetlands. It is assumed that losses would be mitigated according to the following criteria:

- Temporary riparian and wetland impacts would be mitigated at the site of the temporary impact at a 1:1 ratio.
- Permanent riparian and wetland impacts would be mitigated at a 3:1 ratio for the affected area.
- Temporary riverine impacts would naturally return to pre-project conditions after construction is complete.
- Operation of the fish ladders would offset permanent losses of riverine habitat.

The acreage of riparian and wetland habitat affected would be derived from final design drawings. SEWD will work with CDFG, USFWS, and USACE to identify appropriate locations for riparian habitat creation. Prior to construction, a revegetation plan would be developed by the contractor for temporarily disturbed construction sites. The revegetation plan would incorporate seeding and planting of native species that would resist invasion by noxious weeds. A monitoring plan would be developed and implemented to assess the success of mitigation measures for impacts to vegetation and special-status species. Plantings on the revegetation and compensation sites would be monitored during the growing season (March through September) to determine growth rates for 3 years from the date of transplant or planting. Management of the site would include an effort to gradually reduce the mitigation site's reliance on irrigation, such that the site could sustain itself on natural hydrology. A yearly report including dates of watering, growth rates, cover rates, and mortality figures would be submitted to the USFWS. Monitoring could be curtailed after 3 years if success were demonstrated. Success would be considered achieved when plant cover of the mitigation site is at least 80 percent of the pre-project cover, and vegetative composition of the dominant (less than 20 percent of the cover) and characteristic (typical, regularly occurring in the habitat but not dominant) species exceeds 80 percent of that which was present at the impact site). Monitoring of special-status plant mitigation sites could be curtailed after 3 years if overall survival rates of seeded, planted, or transplanted plants exceeded 80 percent of projected survival rates.

Mitigation Measure Bio-2a—Steelhead and Salmon—Direct Loss of Juveniles During Construction. Construction will be scheduled for periods when fish do not have access to Project

areas (i.e., during periods when flood control releases and freshets are not projected to occur). However, provisions must be made to allow migrating salmonids to bypass construction work areas in the channel in the event that unanticipated flood control releases or freshets occur.

Mitigation Measure Bio-2b—Steelhead and Salmon—Fish Passage Delay or Blockage. Construction will be scheduled for periods when fish do not have access to Project areas (i.e., during periods when flood control releases and freshets are not projected to occur). However, provisions must be made to allow migrating salmonids to bypass construction work areas in the channel in the event that unanticipated flood control releases or freshets occur.

Mitigation Measure Bio-2c—Steelhead and Salmon. Increased Turbidity Impacts. Monitor water turbidity levels during instream construction activities. Monitoring would ensure that increases in turbidity over background conditions would not exceed levels specified by the Central Valley Water Board. SEWD will obtain a Section 401 water quality permit with the Central Valley Water Board which requires preparation of an erosion control plan and/or a stormwater pollution prevention plan (SWPP).

Mitigation Measure Bio-2d—Steelhead and Salmon—Sedimentation Impacts to Salmonid Life Stages. An erosion control plan (and a SWPP, if applicable) will be prepared through the Section 401 permitting process the Central Valley Water Board. At a minimum, the plan would meet the requirements of the Central Valley Water Board and would contain the following types of BMPs:

- Complete revegetation and stabilization of disturbed soils in the project footprint, including stream banks.
- Placement of interceptor ditches to direct water away from the tops of cut-and-fill slopes.
- Implementation of Central Valley Water Board-approved BMPs for sediment catch basins or traps to prevent sediment from being transported away from construction sites. These would be designed to minimize impacts to riparian, wetland, and open-water areas. Traps to be considered could include filter berms, straw-bale barriers, filter inlets, vegetative filter strips, culvert risers, coir and straw logs, and other erosion control BMPs as approved by the Central Valley Water Board.
- Provisions of the erosion control plan and SWPPP (if required) would be included in conditions of the Streambed Alteration Agreement pursuant to Sections 1600-1606 of the Fish and Game Code.

3.5 Cultural Resources

Setting. A cultural and paleontological study of the entire lower Calaveras River from New Hogan Dam to the confluence was prepared previously for SEWD in support of a separate permit application with NOAA Fisheries (unpublished data). This study was conducted at a programmatic level and was based on previous cultural resources and paleontological studies conducted within and adjacent to the project area. The record search indicated only a very small portion of the project area has been systematically surveyed for cultural resources.

Archaeological Sites. According to Werner (1990), the surface below the Mormon Slough, until the construction of the levees, had been subjected to repeat post-Pleistocene flooding. As a

result, the surface of the ground has been constantly changed by the addition of new alluvium. Archaeological sites, even those dating back a few thousand years, will likely be buried. Only the most recent sites will be located on the modern surface.

Previous research by Gilbert (1990) included a record search conducted by the Central California Information Center at California State University, Stanislaus. Gilbert (1990) lists 21 prehistoric archaeological sites and one built environment site previously recorded in the lower Calaveras River: there are seven sites characterized as food processing locations (CA-CAL-4, CA-CAL-21, CA-CAL-50, CA-CAL-778, CA-CAL-779, CA-CAL-859, and CA-CAL-1076); two lithic scatters (CA-CAL-862 and CA-CAL-1086); two quarry sites (CA-CAL-1077 and CA-CAL-1085); one rock shelter (CA-CAL-52); seven sites contain midden (CA-CAL-21, CA-CAL-51, CA-CAL-884, CA-CAL-1180, CA-SJO-17, CA-SJO-75, and CA-SJO-98); two prehistoric sites that aren't clearly defined (CA-SJO-7 and CA-SJO-16); and a historic building site (CA-CAL-799H).

Settlement pattern data from other locations indicate that the favored locations for prehistoric village sites were at low elevations on the flat valley floor and terraces near the rivers and main tributaries. In contrast to Calaveras sites with locations on flats or terraces adjacent to the Calaveras River, the San Joaquin County sites have been previously identified on the valley floor along Mormon Slough.

Archival research conducted by Gilbert (1990) indicates the following historic-period cultural resources are present in the project vicinity: the settlement of Bellota; two transportation-related resources (the old Stockton and Mokelumne Hill Road and Fisher's Bridge); and many homesteads. Additional mining sites, roadhouse locations, river crossings, cemeteries, agricultural settlements, and Chinese sites may be in the project vicinity.

Cultural Resources – Historical Setting. Mining, farming, and ranching were historically the main activities in the project area, with many of the early gold seekers turning to farming and stock raising after leaving the gold fields. Portions of the old Stockton and Mokelumne Hill Road, the main route between Stockton and the gold camps, lie within the project area. In 1850, there were 17 public houses within 24 miles of Stockton along this road (Thompson and West 1968:109).

Settlements. One historic-period town, Bellota, is within the project vicinity. Bellota was named after the Spanish word for acorn (Gudde 1969:25). The town has always been associated with ranching and farming. Hog raising was undertaken because of the abundance of acorns used as feed. Also, the largest cherry orchard in the world was situated here, run by the Podesta family.

The town, originally called Fisher's Bridge, grew after a toll bridge was built by William B. Fisher across an arroyo that ran between Mormon Slough and the Calaveras River (Hoover et al. 1966:375-376). A concrete bridge at the junction of Linden and Escalon-Bellota roads now occupies the location of the original toll bridge. Remains of Fisher's Hotel, constructed in 1861, can be found in the town (Hillman and Covello 1985:194-195).

Homesteads. Numerous homesteads existed in the project area (Gilbert 1990). Information and illustrations of some of them can be found in Elliott's (1885) *Calaveras County Illustrated and*

Described, Elliott and Moore's (1881) *History of Stanislaus County*, and Thompson and West's (1968) *History of San Joaquin County*.

Mining Activities. The nearest historic mining activities occurred between the towns of Jenny Lind and Milton in western Calaveras County, which is not within the project vicinity.

Railroads. Portions of the old Stockton and Copperopolis Railroad route fall within the project area, shown as "Old Railroad Grade/Jeep Trail" on the 1962 USGS *Valley Springs, Calif.* and *Jenny Lind, Calif.* 7.5-minute topographic maps. It was built to connect Stockton with Copperopolis, the principal copper-producing community in the United States in the early 1860s. Construction began in Stockton in 1870 with 500 to 600 Chinese employed as laborers. By 1871 the line reached Milton, about five miles south of Jenny Lind. By then, the copper boom was on the decline so the railroad was never extended to Copperopolis. In 1888, it was consolidated with the Southern Pacific Railroad. Service was discontinued in 1940 (Demarest 1954; Smith 1954; Limbaugh and Fuller 1980).

Cemeteries. The nearest, known cemetery is a Chinese cemetery that lies about one mile south of Jenny Lind, which is not within the project vicinity.

Paleontological Setting. An online fossil locality search was done in January 2007, using the Berkeley Natural History Museums (BNHM) online database, specifically data from the University of California Museum of Paleontology (UCMP), Berkeley. The project area spans a range of geologic units including Jurassic, Cretaceous, and Tertiary of the Sierra Foothills, to the Quaternary alluvial deposits of the Sacramento Valley. The fossil locality search and a literature review revealed a total of six fossil localities: five localities lie within approximately 10 miles of the project area and one vertebrate fossil locality lies within the project area. Fossil specimens from these localities include mammoths and elephants (Order Proboscidea), horse (Family Equidae), rodents (Order Rodentia), birds (Class Aves), rabbits (Order Lagomorpha), and amphibians (Class Amphibia). These fossils only represent a few examples of the vertebrate fossil taxa commonly found in similarly aged sediments. The locality within the project area, identified within the Mormon Slough area of San Joaquin County, represents Late Pleistocene Rancholabrean land mammal fossils. These fossils include horse (Equidae *Equus*) and mammoth (*Mammuthus columbi*), and are found in Pleistocene sandstone. All six fossil localities are located in geologic units that are represented in the project area, and are considered paleontologically sensitive.

Potential Effects.

Potential Effect CULT 1— Historic/Archaeological/Paleontological Resources—**Less than Significant Impact with Mitigation Incorporated.** The project area is sensitive for both prehistoric and historic-period archaeological sites. Settlement pattern data from previous cultural resources studies of the area indicate that the favored locations for prehistoric village sites were at low elevations on the flat valley floor and terraces near rivers and main tributaries. Historic-period archaeological resources in the project area can include, but are not limited to, settlements/homesteads, transportation-related resources, mining-related resources, cemeteries, and river crossings.

Proposed Action activities (excavation) would result in less-than-significant effects to cultural resources because BMPs would be implemented (Mitigation Measure CULT-1).

Potential Effect CULT 3— Human Remains—**No Impact/Less than Significant Impact with Mitigation Incorporated**. The likelihood of finding human remains is low, particularly since no formal cemeteries were identified within the project area, so no impacts are anticipated.

However, there is a potential that human remains associated with settlements/homesteads within the vicinity but not interred in cemeteries could be uncovered during excavation. Proposed Action activities (excavation) would result in less-than-significant effects to cultural resources because BMPs would be implemented (Mitigation Measure CULT-2).

Summary of Environmental Effects. Less than Significant with Mitigation Incorporated.

Mitigation.

Mitigation Measure CULT-1a— Historic/Archaeological/Paleontological Resources. Before construction, all construction personnel would be instructed on the protection of cultural resources. SEWD would instruct construction workers that cultural resources might be present at the Project site. They would be trained to stop work near any discovery, and notify SEWD's GM of their discovery. The GM would stop work to confirm if the resource could be avoided and consult with a qualified archeologist.

Mitigation Measure CULT-1ba— Historic/Archaeological/Paleontological Resources. Known significant cultural resources would be fenced and a minimum distance maintained for work disturbances.

Mitigation Measure CULT-2— Human Remains. Should human remains be discovered, SEWD shall cease construction and notify and consult with the county coroner's office and the Native American Heritage Commission.

3.6 Geology/Soils

Setting. The Project Area is within the lower Calaveras River in the San Joaquin Valley. Most of the soils located in the San Joaquin Valley consist of sand, silt, loamy clay alluvium, peat, and other organic sediments. These soils are the result of long-term natural soil deposition and decomposition of marshland vegetation. The Project Area is located in an area of relatively flat terrain with a slight slope towards Bellota to the west. Surface elevations range from about 11 feet mean sea level (msl) on the eastern boundary at the confluence with the San Joaquin RIver to about 156 feet msl in the western boundary near Bellota. Soils in the area are classified as predominantly the Jacktone-Hollenbeck-Stockton Series (NCSS 1992). These soils are an association of clay to clay loam soils with a clay hardpan 1.5 to 3 feet below the surface.

Jacktone clay consists of alluvium derived from mixed rock sources. This soil is somewhat poorly drained, however, drainage has been improved by levees and reclamation projects. Typically the surface layer is very dark gray and dark gray clay about 28 inches thick. The

underlying material to a depth of 34 inches is a light gray clay loam. The next layer is a light gray strongly cemented to indurated hardpan about three inches thick. The upper nine inches of the substratum is a yellowish brown loam. Depth to hardpan ranges from 20 to 40 inches.

Hollenbeck clay consists of deep to duripan, moderately well drained soils that formed in alluvium from mixed rock sources. Hollenbeck soils are on basin rims and interfan basins. Permeability is slow. Typically, the surface layer is dark grayish brown and brown clay about 32 inches thick. The upper 23 inches of the subsoil is dark grayish brown clay. The lower part to a depth of 60 inches is a dark grayish brown, strongly cemented hardpan.

Stockton clay is formed in alluvium from mixed rock sources. The soil is somewhat poorly drained. Typically the surface layer is dark gray about 29 inches thick. The underlying material to a depth of eight inches is also dark gray clay. The next layer is a light brownish gray and grayish brown clay loam to a depth of five inches. The lower part to a depth of 60 inches is a variegated dark grayish brown and dark brown, weakly cemented to strongly cemented hardpan. Depth to hardpan ranges from 40 to 60 inches.

The Alquist-Priolo Earthquake Fault Zoning Act of 1972 (prior to January 1, 1994 called the Alquist-Priolo Special Studies Zones Act – CCR, Title 14, Section 3600) sets forth the policies and Criteria of the State Mining and Geology Board that governs the exercise of governments' responsibilities to prohibit the location of developments and structures for human occupancy across the trace of active faults. The policies and criteria are limited to potential hazards resulting from surface faulting or fault creep within Earthquake Fault Zones. Faults within the region include the Melones, Bear Mountain, Midway, Black Butte, Patterson Pass, Tesia Fault, San Andreas, Hayward, Calaveras, Midland, Green Valley-Concord, or Stockton Fault, Carson Valley Faults. The most likely sources of seismic hazards are from the San Andreas, Hayward, Calaveras, Midland, Green Valley-Concord, or Tracy-Stockton Faults.

Potential Effects.

Potential Effect GEO 1— Geologic Hazards—**Less than Significant Impact**. Instream structures are located in areas that are seismically active and subject to shaking from earthquakes that may occur along a number of regionally significant faults. The proposed project involves the modification of instream structures, and these structures could fail during seismic shaking. However, these structures are not located in areas where persons would be exposed to increased risks and the potential for landslides, debris flows, swelling or collapsible soils, or other damaging geologic hazards is low. Because these events are highly improbable and would occur during a given short interval, and because improvements associated with the proposed project would not increase hazards to levels significantly above current conditions, these impacts do not cross a threshold of environmental significance.

Potential Effect GEO 2— Soil Erosion—**Less than Significant with Mitigation Incorporated.** Construction activities (e.g., excavation) have the potential to cause soil erosion and increased turbidity. However, this impact would not be substantial and would be controlled through construction BMPs as identified below.

Implementation of BMPs (Mitigation Measure GEO-2a and GEO-2b) would reduce impacts to a less-than-significant level.

Potential Effect GEO 3— Unstable or Expansive Soil—**No Impact**. Instream structures are not located in areas of unstable or expansive soils. Therefore, there would be no impact.

Potential Effect GEO 4— Wastewater— **No Impact**. Instream structures are not located in areas where wastewater facilities are or will be located. Therefore, there would be no impact.

Summary of Environmental Effects. Less than Significant with Mitigation Incorporated.

Mitigation.

Mitigation Measure GEO-2a—Soil Erosion. To avoid or minimize impacts related to increased erosion and sedimentation, an erosion control plan will be developed which, at a minimum, would contain the following BMPs:

- Supervisory construction personnel would be informed of environmental concerns, pertinent laws and regulations, and final rehabilitation specifications and design.
- Environmental protection measures would be enforced in the field during construction.
- Interception ditches would be provided to direct water away from the tops of cut-and fill slopes.
- Small sediment catch basins or traps would be provided to prevent sediment from being transported away from development sites. The locations and sizes of these basins would be designed to minimize impacts to riparian and wetlands areas. Types of sediment traps to be considered include filter berms, straw-bale barriers, filter inlets, vegetative filter strips, and culvert risers.
- Disturbed soils would be revegetated and stabilized. Reseeding and mulching work would be performed following completion of the project. If erosion control practices were not installed 1 year after completion, exposed soils could require additional treatment following seasonal rains and subsequent erosion.
- Non-noxious weed competition would be discouraged and control noxious weeds would be controlled.
- Details regarding seed material, fertilizer, and mulching would be provided. The seed material would include native plant species and be approved by a revegetation specialist or erosion control specialist. Special emphasis would be given to native plant assemblages characteristic of the site prior to construction.

Mitigation Measure GEO-2b— Increased Turbidity. If applicable (i.e., there is flowing water), SEWD will monitor turbidity levels upstream and downstream of the point of construction activities, as required by the Central Valley Water Board. Measurements would be taken four times daily when construction activities potentially have the greatest water quality impact. If turbidity increases exceeded 20 percent, actions would be implemented immediately to reduce and maintain turbidity below the 20 percent level. Actions could include use of suspended silt curtains, cessation of construction activities, or reduction of construction activities until turbidity standards are achieved.

3.7 Hazards and Hazardous Materials

Setting. The Project Area includes the lower Calaveras River via both the Old Calaveras River channel and the Mormon Slough/Stockton Diverting Canal routes. There is no evidence of hazardous wastes, pesticides, herbicides and fertilizer, solid waste, drums and containers, underground or aboveground storage tanks at Project sites.

Potential Effects.

Potential Effect HAZ-1—Transport/Use/Disposal of Hazardous Materials—**No Impact.** Petroleum products such as diesel fuel, oil, and unleaded gasoline are the primary hazardous materials associated with construction equipment that may be used within the Project site. There would be no significant hazard to the public or the environment through the routine transport, use, or disposal of these hazardous materials. Therefore, there would be no impact.

Potential Effect HAZ-2—Potential Spills of Hazardous Materials—**Less than Significant with Mitigation Incorporated.** There is a low potential that a release of hazardous material may occur during construction activities. Petroleum products such as diesel fuel, oil, and unleaded gasoline are the primary hazardous materials associated with construction equipment that may be used within the Project sites.

Implementation of BMPs (Mitigation Measure HAZ-1) would reduce impacts to a less-than-significant level.

Potential Effect HAZ-3—School Proximity to Hazardous Materials—**No Impact.** Project sites are not located within one-quarter mile of an existing or proposed school. Therefore, there would be no impact.

Potential Effect HAZ-4—Pre-existing Hazardous Materials—**No Impact.** Project sites are not located within areas identified pursuant to Government Code Section 65962.5. Therefore, there would be no impact.

Potential Effect HAZ-5—Airport/Airstrip Safety Hazard—**No Impact.** Project sites are not located within areas that may affect public airport, public use airport, or private airstrips. Therefore, there would be no impact.

Potential Effect HAZ-6—Emergency Response/Evacuation Plan—**No Impact.** Construction equipment will access Project sites via levee roads and will not impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan. Therefore, there would be no impact.

Potential Effect HAZ-7—Wildland Fire—**No Impact.** Project sites are located primarily in rural areas that can be susceptible to wildfires. Construction will occur at existing instream structures and there will be little additional exposure to wildfire as a result. Therefore, there would be no impact.

Summary of Environmental Effects. Less than Significant with Mitigation Incorporated.

Mitigation.

Mitigation Measure HAZ-2—Potential Spills of Hazardous Materials. A hazardous materials management and spill prevention plan will be developed and implemented that will contain, at a minimum, the following BMPs:

- Hazardous materials would not be drained onto the ground, into streams, or into drainage areas.
- All construction waste, including trash and litter, garbage, other solid waste, petroleum products, and other potentially hazardous materials, would be removed to a disposal facility authorized to accept such materials.
- Waters or soils contaminated with construction material would be disposed of in a suitable location to prevent discharge to surface waters.
- Vehicles would be inspected and maintained to reduce the potential for leaks or spills of oils, grease, or hydraulic fluids.
- Hazardous materials would not be stored at the Project site.
- No vehicles would be refueled at Project sites.

3.8 Hydrology/Water Quality

Setting. The Project Area includes the lower Calaveras River via both the Old Calaveras River channel and the Mormon Slough/Stockton Diverting Canal routes.

Underlying the project area is a vast underground water basin, or aquifer, that extends north and south through the Central Valley. The thickness of the alluvial aquifer ranges from around 100 feet on the eastern end of San Joaquin County to over 3,000 feet on the southwestern end; the thickness underlying the Stockton area is approximately 1,000 feet. Over the last 20 to 30 years, pumping for municipal, industrial and agricultural uses in eastern San Joaquin County has exceeded the basin's sustainable yield and caused groundwater elevations to decline by 40 to 60 feet. This situation has reduced the groundwater's long term reliability as a water source. It has also allowed for saltwater to intrude into the groundwater basin diminishing its quality and usefulness for agricultural and domestic uses in the region.

Stream Flows. The Lower Calaveras River in the project area is highly regulated with most of the water derived from upland sources stored in the New Hogan Reservoir. Calaveras River streamflow is diverted at Bellota upstream of the project area and carried by Mormon Slough west to Stockton Diverting Canal, which rejoins the Lower Calaveras River west of SR 99.

Flows resulting from release at New Hogan Dam during the flood control season are determined by the USACE. Releases occur when the water level rises above the top of the water supply pool and into the flood control pool. During the flood control season, the USACE operates the reservoir based on the USACE Water Control Plan, which includes a Flood Control Diagram and portions of a Water Control Manual.

During the winter and spring months, the impoundment of water in New Hogan Reservoir for flood control and conservation storage has resulted in changes to the natural hydrograph. Similar

to other impoundments, the magnitude and duration of peak flow events have been reduced, which can affect the ability of adult and juvenile salmonids to migrate as often and as quickly as under historical flow conditions. Due to the extreme flashiness of the rain-driven system, the USACE needs to maintain a relatively large flood encroachment space throughout much of the flood control season so precipitation events during December through March often trigger the need for flood control releases. Although flows occur year-round between New Hogan and Bellota, flows can recede to very low or non-existent levels in both Mormon Slough and the Old Calaveras River channel between flood control releases and/or storm events.

The Old Calaveras River Headworks Facility (Headworks Facility) consists of four buried culverts at the channel invert equipped with slide gates to control the flow of water into the Old Calaveras River channel. During periods when the Podesta Reservoir, a privately owned off stream facility located approximately one mile downstream of the Headworks Facility, (not included as part of the Districts' covered activities) is spilling or when there are flood control releases from New Hogan, the Headworks Facility slide gates are closed to prevent flooding in the Old Calaveras River channel. These slide gates are opened during the irrigation season to provide water for agricultural diverters along the channel, and during periods when natural inflows are available between November and June for groundwater recharge. Flows diverted for groundwater recharge are limited to approximately 15 cfs in order to conserve water by preventing flows in the Old Calaveras River channel from reaching the confluence with the main stream.

Water Supply. The Calaveras River, a tributary to the Sacramento-San Joaquin Delta, serves as an important source of water for agricultural and municipal uses in Calaveras and San Joaquin counties. Continued water supply will be a critical issue as SEWD and Calaveras County Water District seek to maintain the flow requirements necessary to maintain ecological functioning for listed steelhead while continuing to serve their agricultural and municipal customers. To augment existing supplies, SEWD currently conducts groundwater recharge operations in the Old Calaveras River channel and other designated recharge sites whenever conditions allow. This program was developed in response to studies which have indicated that long-term groundwater pumping in excess of natural replenishment in eastern San Joaquin County has lowered groundwater levels, allowing the intrusion of saline water into portions of the aquifer. Saline intrusion is expected to continue, if groundwater overdraft is allowed to persist, causing an irretrievable loss of the groundwater resource and economic losses to urban and agricultural areas dependent on the groundwater.

Surface water is provided via a river system that has been modified by impoundments and diversion channels. The New Hogan Reservoir provides flood control along the Calaveras River and helps to meet the needs of the Districts as water suppliers. Water is delivered to the Old Calaveras River channel via the Headworks; Mosher Creek via a small headworks control structure; Potter Creek via Potter Creek intake pumps or outlets from the Bellota or Peters Pipeline; and Mormon Slough via Bellota Weir slide gates. When water supplies are exceptionally low, these channels are mostly dry and agricultural customers, who typically rely on diverting water from the river, resort to pumping groundwater to meet their irrigation demands.

Potential for flooding. There are three basic types of potential flood hazards associated with the project area: stream-side overbank flows; areas of flat terrain with slow surface drainage; and inundation due to structural dam failure. Flooding may occur in the project area from heavy rainfall with saturated soils, levee failure, dam failure, and localized drainage problems.

Most of the Calaveras River and associated floodplain in the project area are within the 500-year floodplain as identified by FEMA. Much of the project area is subject to 100-year flood events (e.g., a flood level that may be expected to occur once every 100 years or to have a 1 percent chance of occurring in any given year) that could result in overbank flow of the Calaveras River and the Mormon Channel. Flood potential can also be affected by land development and associated alteration of natural vegetative cover. Areas of concentrated development can contribute significantly to increased runoff as a result of the increase in impervious surface areas. Removal of natural vegetation without new groundcover planting can have similar effects. Large scale alteration of vegetation as a result of wildland fires can also increase flood potential.

Existing flood protection in the project area is provided by a system of District levees along stream channels designed to contain and convey 100-year flood flows within the channels of the Mormon Slough and Old Calaveras River channel

Water Quality.

A surface water sample was collected from the Stockton Diverting Canal in 2006 (unpublished data). Based on laboratory analysis, no volatile organic compounds (VOCs), chlorinated herbicides, organochlorine pesticides and polychlorinated biphenyls (PCBs), pesticides, or nitrogen/phosphorus were reported above their respective detection limits, except where noted below. One detection of Simazine (a pesticide) was reported at a concentration of 1.5 µg/L, less than its maximum contaminant level (MCL) of 4 µg/L. Constituents detected above their MCLs included total iron and manganese. Analytical data was available from the Calaveras River at Bellota where most of the flow of the Calaveras River is diverted into Mormon Slough and is the upstream source for the Stockton Diverting Canal. Water samples collected at this station in 2007 and 2008 did not contain VOCs at concentrations that exceeded reporting limits. Inorganic detections in 2007 and 2008 were compared to Federal and California MCLs 8 and did not exceed the comparison criteria.

Potential Effects.

Potential Effect HYDO-1—Water Quality—**No Impact/Less than Significant Impact with Mitigation Incorporated.** Construction activities will typically occur when the channels are already dry (either naturally or due to flow blockage by installation of uppermost flashboard dam or closure of slide gates) so there would be no impacts to water quality.

In the event that an unanticipated freshet or flood release occurs during construction, temporary increases in turbidity or sedimentation may occur.

Implementation of BMPs (Mitigation Measures HYDRO-1a through HYDRO-1f) would reduce impacts to a less-than-significant level. Moreover, the duration of any activities at a project site, even when considered cumulatively will generally only occur for less than four weeks in any given year.

Potential Effect HYDO-2—Groundwater Supplies—**No Impact.** The proposed project will not deplete groundwater supplies or interfere substantially with groundwater recharge. Therefore, there would be no impact.

Potential Effect HYDO-3—Drainage Pattern — **Less than Significant Impact.** The proposed project will be contained within the existing creek alignment. The covered and future covered activities will not substantially alter the existing drainage patterns, alter the course of the lower Calaveras River (via both the Old Calaveras River channel and Mormon Slough/Stockton Diverting Canal routes), or increase the rate or amount of surface runoff in a manner that would result in flooding.

Potential Effect HYDO-4—Structures—**No Impact.** The proposed project would not place housing in the 100-year flood hazard area. Structures are pre-existing and improvements will be designed according to USACE and FEMA standards so that they do not result in impedance or re-direction of flood flows. Therefore, there will be no impact.

Potential Effect HYDO-5—Levee—**No Impact.** The proposed project would not affect the integrity of levees within the vicinity. Therefore, there will be no impact.

Potential Effect HYDO-6—Inundation—**No Impact.** The proposed project would not contribute to inundation by seiche, tsunami, or mudflow. Therefore, there will be no impact.

Summary of Environmental Effects. Less than Significant with Mitigation Incorporated.

Mitigation.

Mitigation Measure HYDO-1a—Water Quality. Hazardous materials would not be drained onto the ground, recharge cells, the instream channel, or into drainage areas. All waste, including trash and litter, garbage, other solid waste, petroleum products, and other potentially hazardous materials, would be removed to a disposal facility permitted to accept such materials.

Mitigation Measure HYDO-1b—Water Quality. Construction materials would not be stockpiled or deposited near the Project Sites where they could be washed away by high water or storm runoff or can encroach, in any way, upon the watercourse.

Mitigation Measure HYDO-1c—Water Quality. Fueling, cleaning, and maintenance of equipment would not be allowed except in designated areas located as far from the instream channels as possible.

Mitigation Measure HYDO-1d—Water Quality. Spill equipment would be present and easily accessible when refueling the diesel engine for the pump.

Mitigation Measure HYDO-1e—Water Quality. Grading activities would implement erosion and sediment control measures.

Mitigation Measure HYDO-1f—Water Quality. SEWD would prepare a construction SWPPP and implement appropriate measures.

3.9 Transportation/Traffic

Setting. The Project Area includes the lower Calaveras River via both the Old Calaveras River channel and the Mormon Slough/Stockton Diverting Canal routes. Access to these areas by vehicles transporting materials (e.g., boulders, gravel, concrete culverts) and construction equipment (e.g., backhoes) is via a small portion of local roads and the remainder is via levees roads.

Potential Effects.

Potential Effect TRANS-1—Traffic Increase—**Less than Significant with Mitigation Incorporated.** Project sites are generally located in rural areas. General transportation patterns in these areas are typical of lightly populated rural communities. Roads are used by residents, recreationists, and commercial trucks. A temporary increase in the number of trucks (used to transport gravel and rock material from landscape facilities to construction sites) is expected and could result in delays on the local roadway system. However, this increase would be minimal and would occur for a short duration (i.e., three to four weeks).

Implementation of BMPs (Mitigation Measure TRANS-1) would ensure impacts are reduced to a less-than-significant level.

Potential Effect TRANS-2—Level-of-Service Standard—**No Impact**. The Project will not exceed the level-of-service standard established by the San Joaquin County Congestion Management Plan. Therefore, there would be no impact.

Potential Effect TRANS-3—Air Traffic Patterns—**No Impact**. The Project will not result in a change in air traffic patterns. Therefore, there would be no impact.

Potential Effect TRANS-4—Increase Hazards—**No Impact**. The Project will not increase the risk of hazards or change uses of roadways or cause incompatible uses to occur. Therefore, there would be no impact.

Potential Effect TRANS-5—Emergency Access/Parking Capacity—**No Impact**.

The Project construction activities will be associated with levee roads and the staging area will be located in an existing industrial yard so the Project will not result in inadequate emergency vehicle access to service areas or inadequate parking capacity. Therefore, there would be no impact.

Potential Effect TRANS-6—Alternative Transportation—**No Impact**.

The Project will not cause conflicts with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks). Therefore, there would be no impact.

Summary of Environmental Effects. Less than Significant with Mitigation Incorporated

Mitigation.

Mitigation Measure—TRANS-1—Traffic Increase. Preparation and implementation of a haul route access plan would minimize potential conflicts between construction activities and general traffic.

3.10 Utilities and Service Systems

Setting. The Project Area includes the lower Calaveras River via both the Old Calaveras River channel and the Mormon Slough/Stockton Diverting Canal routes.

Potential Effects.

Potential Effect UTIL-1—Wastewater—**No Impact.** The Project is limited to modifications of existing instream structures. These structures do not have any wastewater demands, nor do they create a need for wastewater facilities. Therefore, there would be no impact.

Potential Effect UTIL-2—Stormwater—**No Impact**. The Project is limited to modifications of existing instream structures. These structures do not have any stormwater demands, nor do they create a need for stormwater drainage. Therefore, there would be no impact.

Potential Effect UTIL-3—Water Supplies—**No Impact**. The Project is limited to modifications of existing instream structures. These structures do not have any water supply demands, nor do they create a need for new or expanded water supply entitlements. Therefore, there would be no impact.

Potential Effect UTIL-4— Landfill—**Less than Significant with Mitigation Incorporated.** Solid waste (e.g., concrete, dirt/fill, rocks) may be generated during excavation at Project sites.

Implementation of BMPs (Mitigation Measure UTIL-4) would reduce impacts to a less-than-significant level.

Summary of Environmental Effects. Less than Significant with Mitigation Incorporated.

Mitigation.

Mitigation Measure UTIL-4—Landfill. SEWD will design and implement a Construction-Demolition Recycling Plan to comply with the City of Stockton's Construction and Demolition (C&D) Recycling Program which requires recycling of at least 50% of the materials generated by a Project. This C&D Recycling Program is designed to be in compliance with the State of California's requirement that all cities divert 50% of their waste materials from landfills (AB 939). Compliance with this permit will reduce the amount of solid waste that will be disposed in a landfill.

3.11 Comparison of Impacts

Error! Reference source not found.Error! Reference source not found. below is a comparison of the impacts of the proposed action and alternatives.

Table 6. Comparison of Impacts among Alternatives

Alternative	Is Need and Purpose Satisfied?	Principle Environmental Effects	Feasibility
Proposed Action	Yes. This is the preferred alternative because it will improve salmonid passage opportunities, which will allow salmonid population abundance to increase.	Benefits from improvement of fisheries habitat through the construction of fish passage improvements. Community involvement will create a better understanding of the need for and benefits of better fishery conditions.	Yes
Alternative 1: No Action	No. Would not improve fish passage conditions; there would continue to be numerous fish passage impediments.	No reductions in harm to listed and species of concern species would occur.	Impracticable because of unresolved conflict with ESA.

4.0 CUMULATIVE EFFECTS

Cumulative impacts are defined as environmental effects that are greater in magnitude, extent, or duration than the direct and indirect effects of the proposed action when combined with the effects of other current and future actions, regardless of the proponent. Cumulative effects are those that result from incremental impacts of a project when added to other past, present, and reasonably foreseeable future actions. Cumulative effects can result from individually minor, but collectively significant actions that take place over a period of time. The following project may contribute to cumulative effects:

Levee Maintenance and Repair. A large-scale levee maintenance project is currently underway along the SDC and adjacent to the project area. Levee maintenance and repairs may involve placement of clean quarry stone or rip-rap products, repairs to levee banks, and weed abatement.

The Proposed Action and the listed activities above may have cumulative effects on steelhead and fall-run Chinook salmon using reaches below Bellota as a migration corridor. These projects involve similar activities which would be coordinated so that cumulative impacts would be minimal.

In the future, cumulative impacts will be considered when making determinations regarding the compatibility of this PEA/IS for specific structures. If cumulative impacts would be created, then they will be evaluated in an SEA/IS. If no cumulative impacts would be created, a programmatic memorandum (as described in section 1.3) would state that cumulative impacts were found to be fully and accurately described by this PEA/IS and the PEA/IS FONSI and Mitigated Negative

Declaration. Therefore, no further documentation would be required to comply with NEPA and CEQA.

5.0 CONSULTATION/COORDINATION/PUBLIC INVOLVEMENT

This PEA/IS has been prepared in accordance with the requirements of NEPA and CEQA. Reclamation is also complying with other applicable laws including the Clean Water Act of 1977, Clean Air Act of 1970, Endangered Species Act, Fish and Wildlife Coordination Act, National Historic Preservation Act of 1966, Executive Order 11988 - Flood Plain Management, Executive Order 11990 - Protection of Wetlands, and the Council of Environmental Quality Memorandum - Analysis of Prime or Unique Farmlands.

Pursuant to CEQA, this draft PEA/IS and Negative Declaration are being circulated for a 30-day public review period through the State Clearinghouse. The review period will begin in July 2009. Furthermore, this public review period fulfills the early public review requirements of Executive Order 11988 regarding any plans or proposals for Federal actions in floodplains.

6.0 CONCLUSIONS

The Proposed Action consists of replacing or retrofitting up to 37[6] instream structures identified as passage impediments to salmon and steelhead trout in the lower Calaveras River below Bellota Weir (Appendix B). BMPs would be used to minimize effects from the Proposed Action. Design criteria are based on CDFG's and NMFS' design criteria and recommendations for boulder weir step pool fishway for adult and juvenile salmonids identified in *Design of Fish Passage Solutions* (CDWR [In Press]) to avoid impacts to special-status fisheries. The Proposed Action would not result in significant effects on the environment.

The USFWS and SEWD have made a preliminary determination that a FONSI/ Mitigated Negative Declaration is appropriate for the Proposed Action and that preparation of an EIS/EIR is unnecessary. A final determination for a FONSI/ Mitigated Negative Declaration would be made after the public review period and when all comments have been addressed in the Final PEA/IS.

7.0 LIST OF PREPARERS

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[6] Of the 46 structures rated ≥ 1, several are being addressed in separate processes and are not included as part of this Proposed Action, including the Old Calaveras River Headworks Facility, Bellota Weir, and eight structures above Bellota Weir. In addition, twelve of the 37 structures proposed for improvements are not under SEWD's jurisdiction and will require written landowner approval prior to implementation.

8.0 REFERENCES

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APPENDIX A.

CEQA CHECKLIST

for

PROGRAMMATIC ENVIRONMENTAL ASSESSMENT/INITIAL STUDY- LOWER CALAVERAS RIVER ANADROMOUS FISH BARRIERS IMPROVEMENT PROJECT

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
I. AESTHETICS. Would the project:				
a. Have a substantial adverse effect on a scenic vista?	☐	☐	☐	☒
b. Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings along a scenic highway?	☐	☐	☐	☒
c. Substantially degrade the existing visual character or quality of the site and its surroundings?	☐	☐	☐	☒
d. Create a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area?	☐	☐	☐	☒

a-d. See main document pages 27-28 for a brief explanation regarding the effects determination for each question.

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
II. AGRICULTURAL RESOURCES. In determining whether impacts on agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Department of Conservation. Would the project:				
a. Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒
b. Conflict with existing zoning for agricultural use or conflict with a Williamson Act contract?	☐	☐	☐	☒
c. Involve other changes in the existing environment that, due to their location or nature, could result in conversion of Farmland to non-agricultural use?	☐	☐	☐	☒

a-c. See main document page 28 for a brief explanation regarding the effects determination for each question.

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
III. AIR QUALITY. When available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:				
a. Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☒	☐
b. Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	☐	☒	☐	☐
c. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is a nonattainment area for an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors)?	☐	☐	☐	☒
d. Expose sensitive receptors to substantial pollutant concentrations?	☐	☒	☐	☐
e. Create objectionable odors affecting a substantial number of people?	☐	☐	☐	☒

a-e. See main document page 31-32 for a brief explanation regarding the effects determination for each question (a= AIR-1; b= AIR-2 and 3; c= AIR-1-2; d= AIR-4; e = AIR-5) and associated mitigation, if applicable.

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
IV.	BIOLOGICAL RESOURCES. Would the project:				
a.	Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☒	☒	☐
b.	Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☒	☒	☐
c.	Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marshes, vernal pools, coastal wetlands, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☒	☒	☐
d.	Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☒	☒	☐
e.	Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☒
f.	Conflict with the provisions of an adopted habitat conservation plan, natural community conservation plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☒

a-f. See main document pages 43-45 for a brief explanation regarding the effects determination for each question (a-d= BIO-1 and BIO 2; e= BIO 3; and f= BIO 4) and associated mitigation measures, if applicable.

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
V. CULTURAL RESOURCES. Would the project:					
a.	Cause a substantial adverse change in the significance of a historical resource as defined in Section 15064.5?	☐	☒	☐	☐
b.	Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5?	☐	☒	☐	☐
c.	Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☒	☐	☐
d.	Disturb any human remains, including those interred outside of formal cemeteries?	☐	☒	☐	☒

a-d. See main document pages 47-48 for a brief explanation regarding the effects determination for each question (a-c= CULT 1; d= CULT 2) and associated mitigation measures, if applicable.

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
VI. GEOLOGY AND SOILS. Would the project:				
a. Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				
1. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☒	☐
2. Strong seismic ground shaking?	☐	☐	☒	☐
3. Seismic-related ground failure, including liquefaction?	☐	☐	☒	☐
4. Landslides?	☐	☐	☒	☐
b. Result in substantial soil erosion or the loss of topsoil?	☐	☒	☐	☐
c. Be located on a geologic unit or soil that is unstable or that would become unstable as a result of the project and potentially result in an onsite or offsite landslide, lateral spreading, subsidence, liquefaction, or collapse?	☐	☐	☐	☒
d. Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	☐	☐	☐	☒
e. Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems in areas where sewers are not available for the disposal of wastewater?	☐	☐	☐	☒

a-e. See main document pages 49-50 for a brief explanation regarding the effects determination for each question (a= GEO-1; b= GEO 2; c and d= GEO 3; e= GEO 4) and associated mitigation measures, if applicable.

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
VII. HAZARDS AND HAZARDOUS MATERIALS. Would the project:					
a.	Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☐	☒
b.	Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☒	☐	☐
c.	Emit hazardous emissions or involve handling hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒
d.	Be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☒
e.	Be located within an airport land use plan area or, where such a plan has not been adopted, be within two miles of a public airport or public use airport, and result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒
f.	Be located within the vicinity of a private airstrip and result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒
g.	Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
h.	Expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	☐	☐	☐	☒

a-h. See main document pages 51-52 for a brief explanation regarding the effects determination for each question (a= HAZ-1; b= HAZ-2; c= HAZ 3; d= HAZ 4; e and f= HAZ 5; g= HAZ-6; h= HAZ-7) and associated mitigation measures, if applicable.

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
VIII. HYDROLOGY AND WATER QUALITY. Would the project:					
a.	Violate any water quality standards or waste discharge requirements?	☐	☒	☐	☒
b.	Substantially deplete groundwater supplies or interfere substantially with groundwater recharge, resulting in a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted)?	☐	☐	☐	☒
c.	Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion or siltation on site or off site?	☐	☐	☒	☐
d.	Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on site or off site?	☐	☐	☒	☐
e.	Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☐	☐	☐	☒
f.	Otherwise substantially degrade water quality?	☐	☐	☐	☒
g.	Place housing within a 100-year flood hazard area, as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	☐	☐	☐	☒
h.	Place within a 100-year flood hazard area structures that would impede or redirect flood flows?	☐	☐	☐	☒
i.	Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam?	☐	☐	☐	☒
j.	Contribute to inundation by seiche, tsunami, or mudflow?	☐	☐	☐	☒

a-f. See main document pages 54-56 for a brief explanation regarding the effects determination for each question (a= HYDRO-1; b= HYDRO-2; c-e= HYDRO 3; f= HYDRO 1-3; g and h= HYDRO-4; i= HYDRO-5; j= Hydro 6) and associated mitigation measures, if applicable.

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
IX. LAND USE AND PLANNING. Would the project:					
a.	Physically divide an established community?	☐	☐	☐	☒
b.	Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to, a general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☒
c.	Conflict with any applicable habitat conservation plan or natural community conservation plan?	☐	☐	☐	☒

a-c. See main document page 28 for a brief explanation regarding the effects determination for each question.

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
X. MINERAL RESOURCES. Would the project:					
a.	Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☒
b.	Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?	☐	☐	☐	☒

a-b. See main document page 28 for a brief explanation regarding the effects determination for each question.

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
XI. NOISE. Would the project:					
a.	Expose persons to or generate noise levels in excess of standards established in a local general plan or noise ordinance or applicable standards of other agencies?	☐	☐	☐	☒
b.	Expose persons to or generate excessive groundborne vibration or groundborne noise levels?	☐	☐	☐	☒
c.	Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☐	☒
d.	Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☐	☒
e.	Be located within an airport land use plan area, or, where such a plan has not been adopted, within two miles of a public airport or public use airport and expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒
f.	Be located in the vicinity of a private airstrip and expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

a-f. See main document page 29 for a brief explanation regarding the effects determination for each question and associated mitigation measures, if applicable.

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
XII. POPULATION AND HOUSING. Would the project:					
a.	Induce substantial population growth in an area, either directly (e.g., by proposing new homes and businesses) or indirectly (e.g., through extension of roads or other infrastructure)?	☐	☐	☐	☒
b.	Displace a substantial number of existing housing units, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒
c.	Displace a substantial number of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

a-c. See main document page 29 for a brief explanation regarding the effects determination for each question.

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
XIII. PUBLIC SERVICES. Would the project:				
a. Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities or a need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the following public services:				
Fire protection?	☐	☐	☐	☒
Police protection?	☐	☐	☐	☒
Schools?	☐	☐	☐	☒
Parks?	☐	☐	☐	☒
Other public facilities?	☐	☐	☐	☒

a. See main document page 29 for a brief explanation regarding the effects determination for each question.

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
XIV. RECREATION. Would the project:					
a.	Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☒
b.	Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?	☐	☐	☐	☒

a-b. See main document page 29 for a brief explanation regarding the effects determination for each question.

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
XV. TRANSPORTATION/TRAFFIC. Would the project:					
a.	Cause an increase in traffic that is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in the number of vehicle trips, the volume-to-capacity ratio on roads, or congestion at intersections)?	☐	☒	☐	☐
b.	Cause, either individually or cumulatively, exceedance of a level-of-service standard established by the county congestion management agency for designated roads or highways?	☐	☐	☐	☒
c.	Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	☐	☐	☐	☒
d.	Substantially increase hazards because of a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☐	☒
e.	Result in inadequate emergency access?	☐	☐	☐	☒
f.	Result in inadequate parking capacity?	☐	☐	☐	☒
g.	Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)?	☐	☐	☐	☒

a-g. See main document pages 56-57 for a brief explanation regarding the effects determination for each question (a= TRANS-1; b= TRANS-2; c= TRANS-3; d= TRANS-4; e and f= TRANS-5; g= TRANS-6) and associated mitigation measures, if applicable.

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
XVI. UTILITIES AND SERVICE SYSTEMS. Would the project:					
a.	Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	☐	☐	☐	☒
b.	Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☒
c.	Require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☒
d.	Have sufficient water supplies available to serve the project from existing entitlements and resources, or would new or expanded entitlements be needed?	☐	☐	☐	☒
e.	Result in a determination by the wastewater treatment provider that serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☐	☒
f.	Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	☐	☒	☐	☐
g.	Comply with federal, state, and local statutes and regulations related to solid waste?	☐	☒	☐	☐

a-g. See main document pages 57 for a brief explanation regarding the effects determination for each question (a, b, and e= UTIL-1; c= UTIL-2; b and d= UTIL-3; f and g= UTIL-4) and associated mitigation measures, if applicable.

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

a. The Proposed Action is a fish restoration project designed to benefit fish passage. Although long-term effects are beneficial, there is a potential to temporarily impact several resources (e.g., biological resources, water quality, air quality). Impacts would be reduced to Less than Significant with implementation of mitigation measures.

b. The Proposed Action is a fish restoration project designed to provide long-term benefits for fish passage. There would be no cumulatively considerable impacts associated with the project.

c. The Proposed Action does not have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly. There is no impact.

APPENDIX B.

ARTIFICIAL STRUCTURES LOCATED WITHIN THE LOWER CALAVERAS RIVER

Table B-1. Artificial structures located with the lower Calaveras River and scored according to their potential for being a salmonid passage impediment. Source: CDWR 2007 (scores range from 0-7 where 7 indicates greatest passage impairment). Note: highlighted structures indicate those owned or operated and/or maintained by SEWD.

Map ID No.	Structure name	Type	Channel	River mile	Score	Tier
1	Interstate 5 Bridge	BRO	CRM	2	0	-
2	Pershing Avenue Bridge	BRO	CRM	3.2	3	2
3	Pacific Avenue Bridge	BRO	CRM	3.7	0	-
4	Partial Concrete Structure Near Pacific Avenue Bridge	PDW	CRM	3.9	1	SP
5	El Dorado Street Bridge	BRO	CRM	4.5	0	-
6	Railroad Bridge #2	BRR	CRM	5.2	0	-
7	West Lane Bridge	BRO	CRM	5.5	0	-
8	Pedestrian Bridge near Railroad Bridge #1	BPD	CRM	5.6	0	-
9	Railroad Bridge #1	BRR	CRM	5.7	0	-
10	Old Wooden Bridge	BRO	OCC	6.1	3	[a]
11	Gotelli LFC	LFC	OCC	6.2	3	[a]
12	McAllen Road Bridge	BRO	OCC	6.9	3	[a]
13	McAllen FBD	FBD	OCC	6.9	2	3*
14	Pedestrian Bridge adjacent to Highway 99	BPD	OCC	7.4	0	-
15	Highway 99 Bridge	BRO	OCC	7.4	3	[a]
16	Cherryland FBD	FBD	OCC	7.9	6	1*
17	Railroad Bridge near Leonardini Road	BRR	OCC	8.6	0	-
18	Old CDWR Stream Gauge Weir	PDW	OCC	9.5	2	[a]
19	Solari Ranch Road Bridge	BRO	OCC	10.1	0	-
20	Solari FBD	FBD	OCC	10.1	1	3*
21	Ashley Lane Bridge	BRO	OCC	10.1	0	-
22	Alpine Road Bridge	BRO	OCC	11.1	0	-
23	Pezzi Road Bridge	BRO	OCC	11.9	0	-
24	Pezzi FBD	FBD	OCC	12.1	1	3*
25	Murphy FBD	FBD	OCC	12.5	1	3*
26	Highway 88 Bridge	BRO	OCC	13.1	0	-
27	Eight Mile Road Bridge	BRO	OCC	14.7	0	-
28	Eight Mile Flashboard Dam	FBD	OCC	15	1	3*
29	Jack Tone Road Foot Bridge	BPD	OCC	15.8	0	-
30	Jack Tone Road Bridge	BRO	OCC	15.8	0	-
31	Tully Road Bridge	BRO	OCC	17.8	0	-
32	Tully FBD	FBD	OCC	17.9	2	3*
33	Rosa Bridge	BRO	OCC	18.6	0	-

34	Duncan Road Bridge	BRO	OCC	19.6	0	-
35	Duncan Road Driveway Bridge	BRO	OCC	19.8	unk	-
36	Messick Road Bridge	BRO	OCC	20.1	0	-
37	Guernsey Bridge	BRO	OCC	20.6	2	[a]
38	Clements Road FBD	FBD	OCC	21.5	7	1*
39	Botsford Bridge #1	BRO	OCC	21.7	0	-
40	Botsford Bridge #2	BRO	OCC	21.7	1	[a]
41	Houston Bridge	BRO	OCC	22.1	0	-
42	De Martini Lane Bridge	BRO	OCC	22.8	0	-
43	De Martini Wood Bridge	BRO	OCC	23.1	0	-
44	Chestnut Hill Road Bridge	BRO	OCC	23.6	0	-
45	Podesta Bridge	BRO	OCC	24.2	0	-
46	Pelota Bridge	BRO	OCC	24.8	0	-
47	Gotelli #1 FBD	FBD	OCC	25.4	0	-
48	Gotelli Bridge #1	BRO	OCC	25.4	0	-
49	Gotelli Bridge #2	BRO	OCC	25.5	0	-
50	Highway 26	BRO	OCC	25.8	0	-
51	Calaveras Headworks	PDW	OCC	25.9	5	SP
52	McGurk Earth Dam	PDW	CRM	27.1	4	SP
53	McGurk LFC	LFC	CRM	27.1	4	SP
54	Wilsons LFC	LFC	CRM	28	3	SP
55	Old Dog LFC	LFC	CRM	29	3	SP
56	Old Dog Ranch Bridge	BRO	CRM	30.2	3	SP
57	Shelton Road Bridge	BRO	CRM	31	0	-
58	Williams LFC	LFC	CRM	33	unk	-
59	Deteriorated Low-flow Road Crossing	LFC	CRM	34.9	3	SP
60	Gotelli LFC	LFC	CRM	35.3	3	SP
61	Rubble Dam upstream of Bellota Weir	PDW	CRM	35.5	1	-
62	Milton Road Bridge	BRO	CRM	36	0	-
63	New Hogan Dam Road Bridge	BRO	CRM	42.9	3	SP
64	Wooden Bridge West of Wilson Way	BRO	SDC	1.2	0	-
65	Wilson Way Bridge	BRO	SDC	1.2	0	-
66	Central California Traction Railroad Bridge	BRR	SDC	1.1	5	1
67	Cherokee Road Bridge	BRO	SDC	0.7	0	-
68	Waterloo Road Bridge	BRO	SDC	2.3	0	-
69	Highway 99 Bridge	BRO	SDC	2.1	0	-
70	Budiselich FBD	FBD	SDC	2.1	5	1
71	Stockton Terminal and Eastern Railroad Bridge	BRR	SDC	2.1	0	-
72	Highway 26 Bridge	BRO	SDC	3	0	-
73	Southern Pacific Railroad Bridge	BRR	SDC	3.5	0	-
74	Main Street FBD	FBD	MRS	4.9	1	3

75	Panella FBD	FBD	MRS	6.6	4	2
76	Bridge Near Panella FBD	BRO	MRS	6.6	0	-
77	Caprini LFC	LFC	MRS	7.3	5	1
78	Lavaggi FBD	FBD	MRS	7.5	3	2
79	Jack Tone Road Bridge	BRO	MRS	8	0	-
80	Hogan LFC	LFC	MRS	8.4	5	1
81	McClean FBD	FBD	MRS	8.5	3	2
82	Fujinaka LFC	LFC	MRS	9.5	4	2
83	Copperopolis Road Bridge	BRO	MRS	10	0	-
84	Prato FBD	FBD	MRS	10.4	4	2
85	Mormon Slough Railroad Crossing	BRR	MRS	11.1	5	1
86	Duncan Road Bridge	BRO	MRS	11.2	0	-
87	Piazza FBD	FBD	MRS	12	3	2
88	Milton Road Bridge	BRO	MRS	12	0	-
89	Bonomo FBD	FBD	MRS	12.2	4	2
90	Concrete Slabs (Remnant Bridge)	PDW	MRS	12.7	2	3
91	Hosie LFC	LFC	MRS	13.2	5	1
92	Hosie FBD	FBD	MRS	13.4	3	2
93	Flood Road Bridge	BRO	MRS	14	0	-
94	Avansino FBD	FBD	MRS	14.4	3	2
95	Fine Road Bridge	BRO	MRS	15	0	-
96	Fine Road FBD	FBD	MRS	15.6	3	2
97	Highway 26 FBD	FBD	MRS	16.6	2	3
98	Watkins LFC	LFC	MRS	16.9	5	1
99	Escalon Bellota Bridge	BRO	MRS	18	0	-
100	Bellota Weir	PDW	MRS	25.1	6	SP

Codes: BRO= Bridge – Road; CRM= Calaveras River mainstem; FBD= Flashboard dam; LFC= Low-flow Road Crossing; PDW= permanent dam/weir; BRR= Bridge – Railroad; BPD= Bridge – Pedestrian; OCC= Old Calaveras River channel; SDC=Stockton Diverting Canal; MRS= Mormon Slough; SP= structure addressed in separate process

[a] indicates structures that are

indicates that structure may be placed in a different tier dependent on whether a fish passage solution can be developed and implemented for the Old Calaveras Headworks Facility

APPENDIX C

Example of a Memorandum for an Action where the Lower Calaveras River Anadromous Fish Barriers Improvement Project PEA/IS is the Only Documentation Necessary to Comply with NEPA/CEQA

Memorandum of National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) Compliance under the Lower Calaveras River Anadromous Fish Barriers Improvement Project
Final Programmatic Environmental Assessment/Initial Study

Project Name: Budiselich Flashboard Dam
Project Location: Stockton Diverting Canal river mile 2.1
Project Type: Fishway/Boulder Weir
Project Schedule: October 16-December 31, 2009 (actual dates within this timeframe TBD)

SEWD proposes to improve fish passage at a flashboard dam structure located at river mile 2.1 in the Stockton Diverting Canal. The proposed improvement involves a rock ramp fishway and seven grade-control structures (i.e., boulder weirs) and meets design criteria described in *Design of Fish Passage Solutions* (CDWR [In Press])[7]. The retrofit is designed to increase flow depths on the dam, overcome the steep channel slope, and result in acceptable velocities over the dam and on the riprap channel surface for the fish passage range of flows. Design details and assumptions are provided below. By meeting the design criteria, the structure will provide fish passage during migration periods at the required exceedance flows

The project will consist of constructing a roughened channel with seven boulder weir drop structures just downstream of the existing Budiselich flashboard dam foundation. Final designs are provided in Attachment A.

Roughened channels, sometimes referred to as nature-like fishways, are constructed channels stabilized with an immobile framework of large rock mixed with smaller material, providing fish passage by controlling the channel profile and adding roughness and structure to it (CDFG 2009[8]). The weirs within the roughened channel will consist of 3' to 4' boulders (approximately 600 cubic yards total) trenched into the existing channel with a 1' vertical drop between weirs (DFG and NMFS criterion for adult anadromous salmonids) and a 33' distance between weirs, giving the new channel a 3% slope. Excavating the trenches for the weirs will result in the removal of approximately 1500 cubic yards of native material from the existing channel. Each weir will have an approximately 10' wide, 1' deep low-flow notch, and the 1' drop between weirs will spread the currently existing, steep, 6' drop, out over approximately 200'. The top of the most downstream weir will be set at the elevation of the existing channel invert. The dimensions of the construction portion of the project will be 275' in length, 140' in width just below the dam foundation, and 40' in width at the most downstream end of the project (a total area of about 25,000 square feet or 0.58 acres). The fill between the weirs (the "roughened" fishway) will be an engineered streambed material mix 2' to 3' thick, and will consist of a range of different

[7] CDWR. (In Press). Design of Fish Passage Solutions. California Department of Water Resources, Division of Planning and Local Assistance, Fish Passage Improvement Program, Sacramento, CA.
[8] CDFG. 2009. California Salmonid Stream Habitat Restoration Manual, Chapter XII, Fish Passage Design and Implementation. California Department of Fish and Game.

sized particles, from 9" cobbles down to sand and silt. The larger particles are sized to be stable at the expected velocities in the channel and the fine grained material will keep low flows from flowing subsurface. Excavation for the installation of the engineered streambed material will result in the removal of approximately 1800 cubic yards of native material and 150 cubic yards of existing riprap from the channel. The amount of engineered streambed material installed for the project will be approximately 1400 cubic yards (approximately 250 cubic yards of the excavated native material can be used). In addition, bankline rock, 200 cubic yards of an engineered material mix consisting of a range of different sized particles from 15" boulders down to sand and silt, will be placed in roughly a 2' thick layer at the toe and lower portions of the banks to keep them stable (25 cubic yards of existing riprap can be used). The upper portions of the banks will be revegetated with native plants.

HEC-RAS modeling indicates that the minimum flow depth at all sections will be at least 0.5 feet at 15 cfs and 1.0 feet at 50 cfs, hydraulic drop between pools will be less than 1 foot, plunge pool depths will be at least a minimum of 3 feet deep, jump pool depths will be at least a minimum of 2 feet deep, and velocities will be less than 6 feet per second (fps) as recommended in design criteria described in *Design for Fish Passage Solutions* (CDWR [In Press]). These criteria ensure that upstream and downstream passage is unimpaired for both adult and juvenile salmonids. Also, modeling indicates that channel capacity will not be affected because the water surface profile for the proposed design is lower than Stockton Diverting Canal's existing water surface profile at capacity of 5,500 cfs.

The design of the weirs follows the recommendations for boulder weir step pool fishway in *Design for Fish Passage Solutions* (CDWR [In Press]). The weirs will span the channel bottom in the cross-vane shape developed by Rosgen (2001)[9] and will be keyed into the channel banks.

SEWD has completed its environmental review, including consultation and coordination with the following Federal and State agencies:

- U. S. Fish and Wildlife Service: Written concurrence of no effect to T&E Species, avoid wetlands.
- National Marine Fisheries Service: Written concurrence of no effect to T&E Species.
- U. S. Army Corps of Engineers: Section 10 and 404 Permit.
- California Department of Fish and Game: Streambed Alteration Agreement.
- San Joaquin County Flood Control: Encroachment Permit.

Based upon a review of the project, SEWD has determined that the impacts of the proposed project are fully and accurately described in the Final Programmatic Environmental Assessment/Initial Study (PEA/IS) for the Lower Calaveras River Anadromous Fish Barriers Improvement Project dated July 17, 2009. This memorandum documents that SEWD has reviewed the proposed action, alternatives, and potential direct, indirect and cumulative impacts and found them to be accurately described by the PEA/IS and its associated FONSI/Mitigated Negative Declaration. No further documentation is required to comply with NEPA and CEQA.

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[9] Rosgen, D.L. 2001. The Cross-Vane, W-Weir, and J-Hook Vane Structures … Their Description, Design, and Application for Stream Stabilization and River Restoration. ASCE Conference Proceedings, Reno, NV.

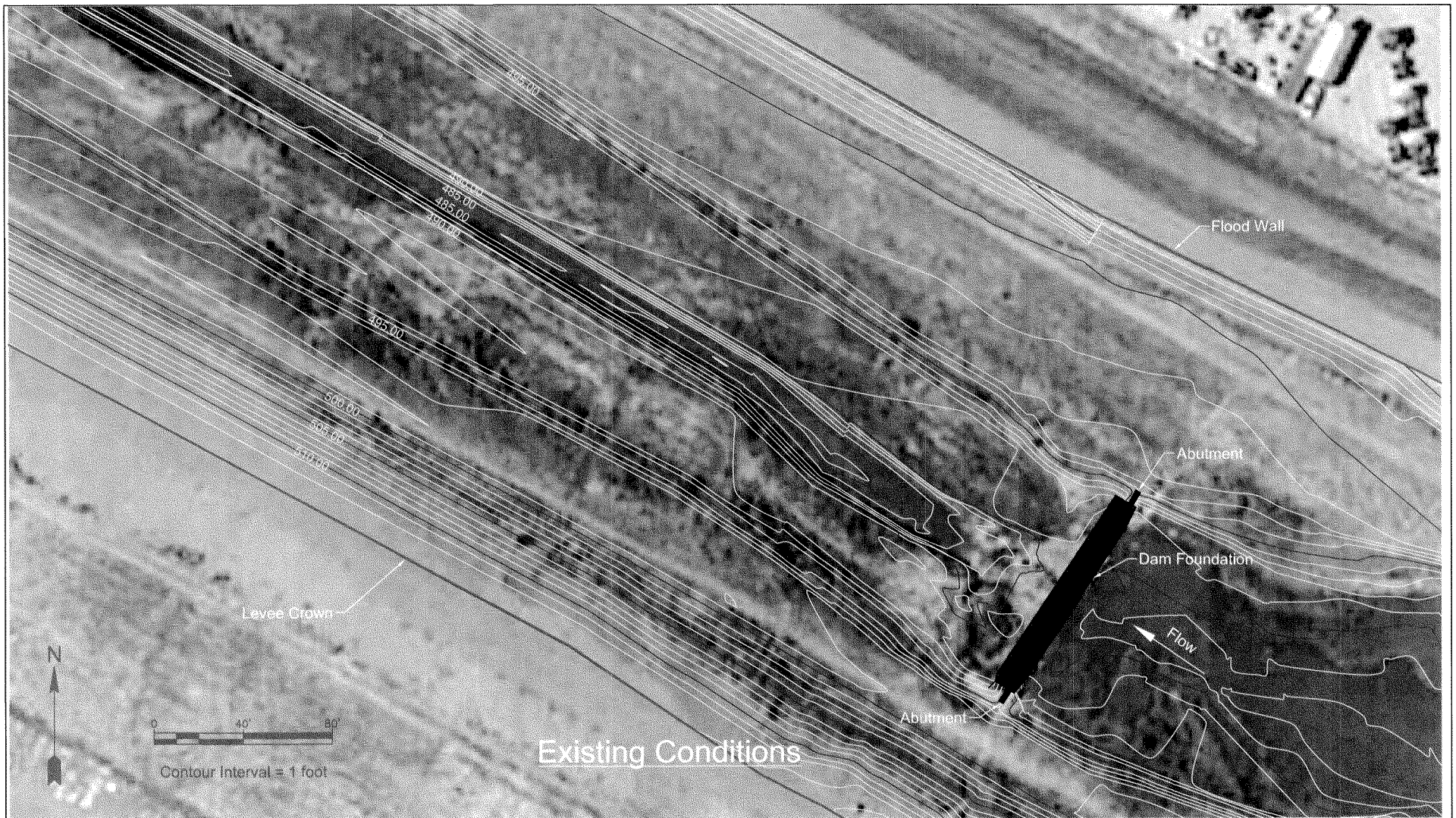
The applicant is required to incorporate the mitigation measures presented in Attachment B into the proposed project.

Preparer: Kevin Kauffman
Title: SEWD General Manager
Date: July 17, 2009

Memorandum of NEPA and CEQA Compliance under the Lower Calaveras River Anadromous Fish Barriers Improvement Project Final Programmatic Environmental Assessment/Initial Study
Attachment A.
Final Designs

Final designs on the following pages were developed collaboratively with the following participants: SEWD, USFWS, CDFG, CDWR, USACE, and Fishery Foundation of California.

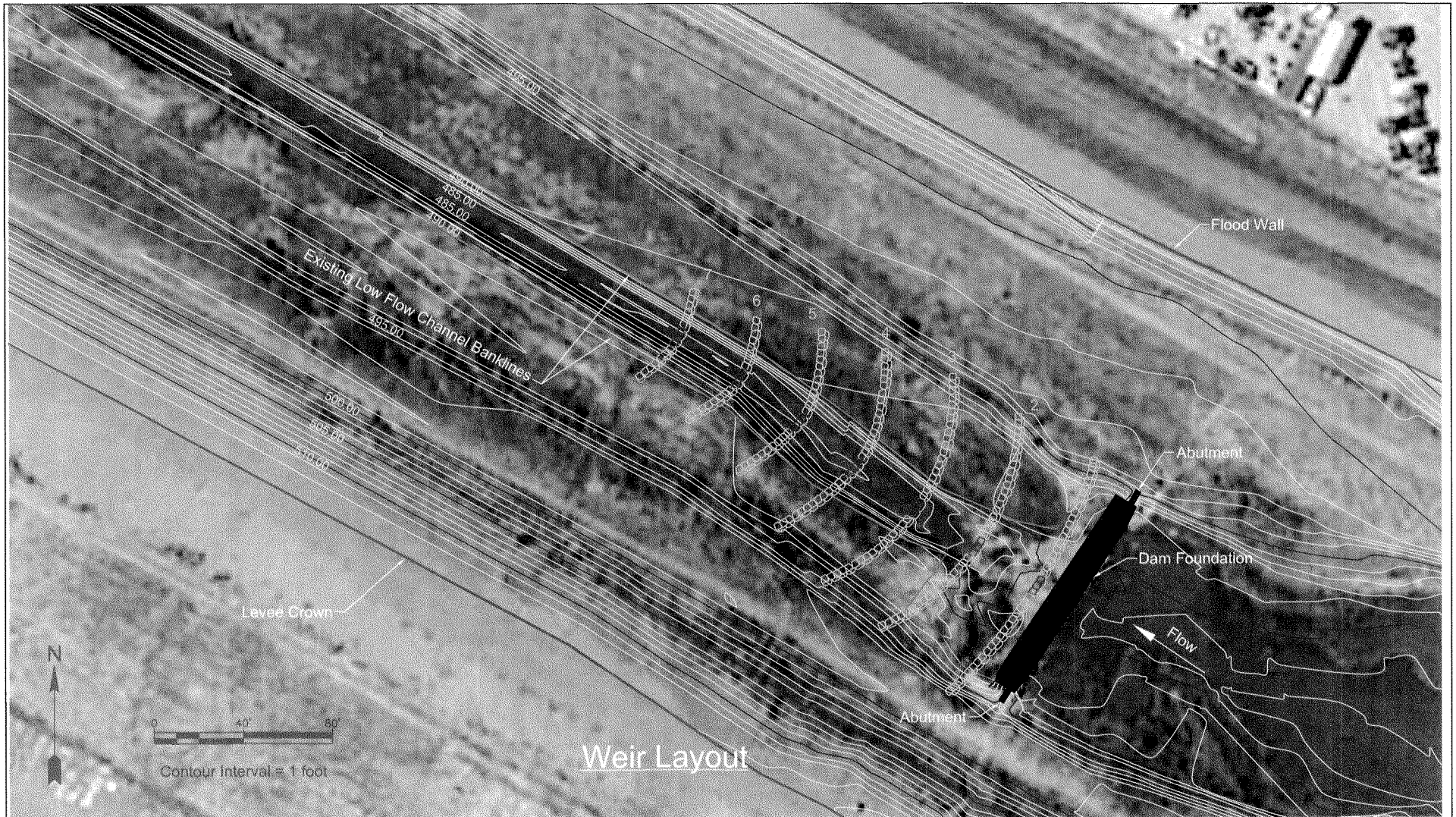
[Insert final designs from Randy's e-mail- 7 pages]



NOTES:

California Department of Water Resources
Fish Passage Improvement Program

JOB NAME: Budiselich Flashboard Dam Fish Passage		DRAWN BY: RP	CHECKED BY: RB
LOCATION: Calaveras River System-Stockton Diverting Canal		SCALE: See Drawing	
		DATE: May 2009	
		AGENCY:	SHEET
DESCRIPTION: Existing Conditions (Draft)		DWR	1



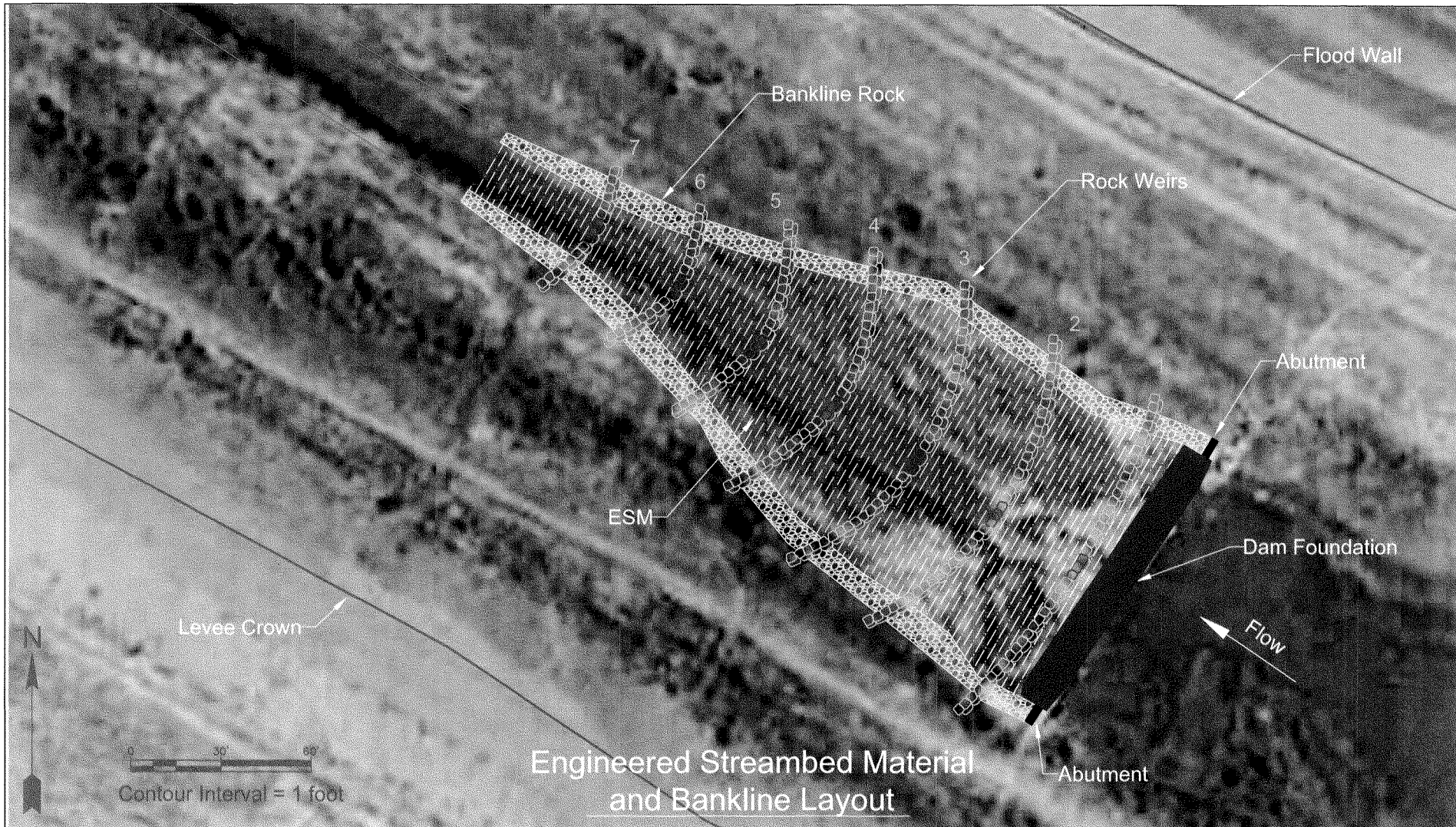
NOTES:

1. The low flow notch of each weir is indicated by the red boulders.

California Department of Water Resources

Fish Passage Improvement Program

JOB NAME: Budiselich Flashboard Dam Fish Passage		DRAWN BY: RP	CHECKED BY: RB
LOCATION: Calaveras River System-Stockton Diverting Canal		SCALE: See Drawing	
		DATE: May 2009	
		AGENCY:	SHEET
DESCRIPTION: Roughened Channel Design (Draft)		DWR	2

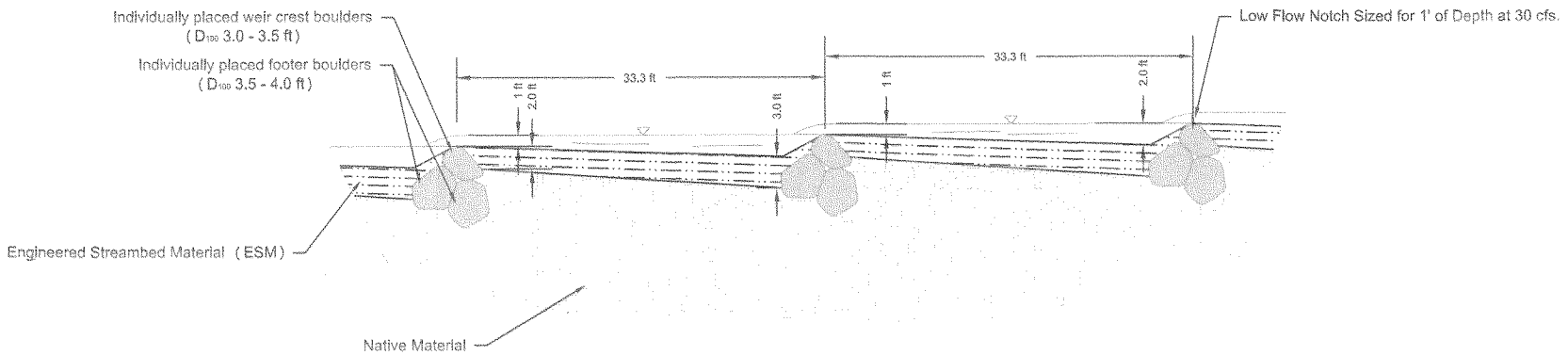


Engineered Streambed Material and Bankline Layout

NOTES:
1. Engineered Streambed Material (ESM)

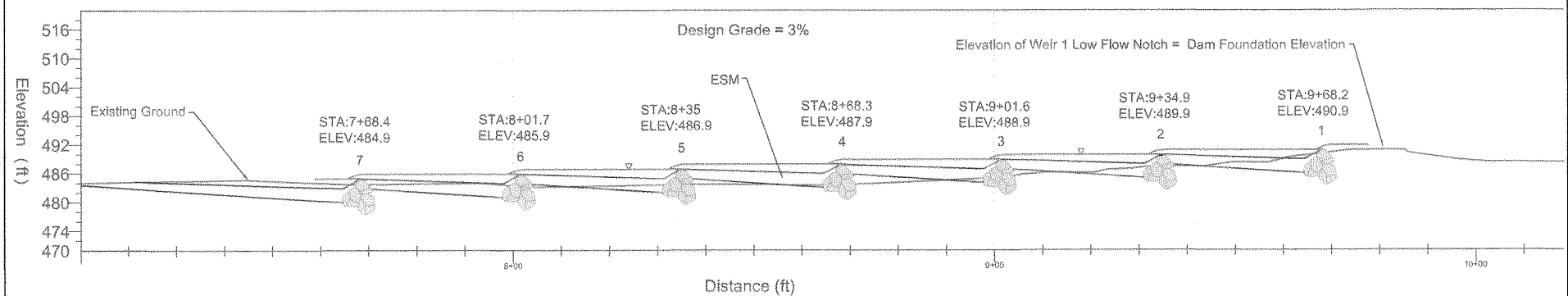
California Department of Water Resources
Fish Passage Improvement Program

JOB NAME: Budiselich Flashboard Dam Fish Passage		DRAWN BY: RP	CHECKED BY: RB
LOCATION: Calaveras River System-Stockton Diverting Canal		SCALE: See Drawing	
		DATE: May 2009	
		AGENCY:	SHEET
DESCRIPTION: Roughened Channel Design (Draft)		DWR	3



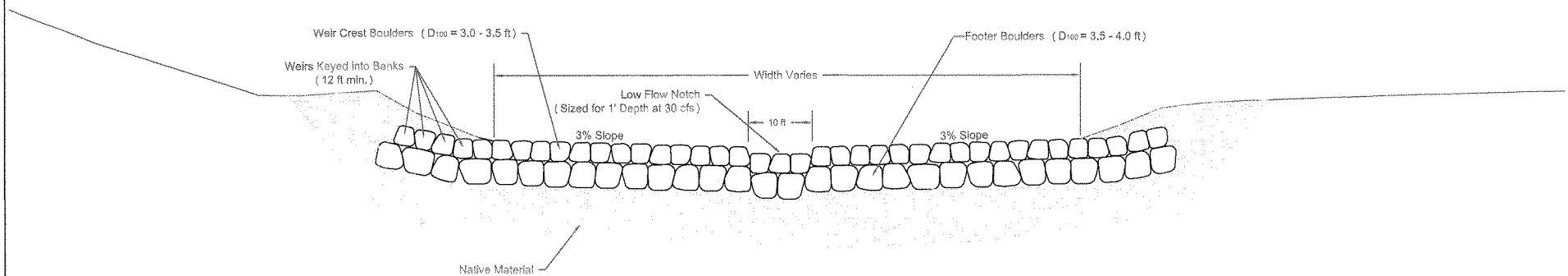
Detail of Channel Profile

0 10' 20'

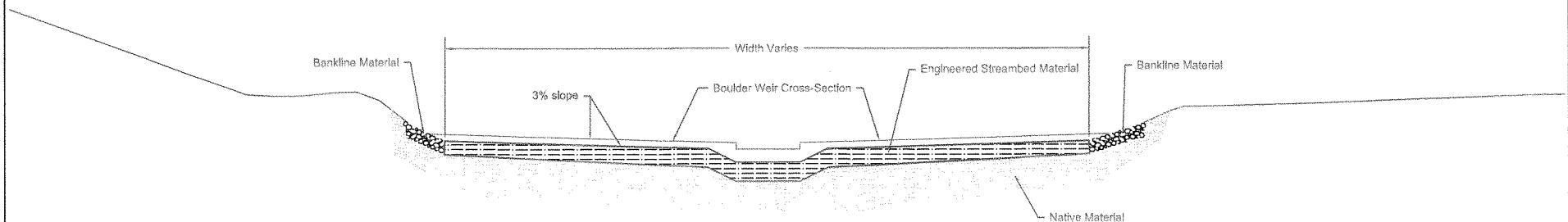


New Channel Profile - Low Flow Notch Elevations Shown

NOTES:		California Department of Water Resources Fish Passage Improvement Program	JOB NAME: Budiselich Flashboard Dam Fish Passage LOCATION: Calaveras River System- Stockton Diverting Canal	DRAWN BY: RP	CHECKED BY: RB
				SCALE: NA	
				DATE: May 2009	
				AGENCY:	SHEET
			DESCRIPTION: Roughened Channel Design (Draft)	DWR	4



Typical Boulder Weir Cross-Section



Typical Engineered Streambed Material Cross-Section

(Shown just downstream of boulder weir)

Bankline Material Mix				
Calculated Mix			Proposed Mix (by volume)	
D84 - D100	16%	0.47 to 1.18 (ft)	5 parts	Facing Rock (4" to 1.3')
D50 - D84	34%	0.19 to 0.47 (ft)	5 parts	2.5" to 4 " cobbles
D16 - D50	34%	0.023 to 0.19 (ft)	7 parts	0.31" med gravel to 2.5" very coarse gravel
D8 - D16	8%	0.0065 to 0.023 (ft)	2 parts	0.079" very fine gravel to 0.31" fine gravel
to D8	8%	Fines	1 part	silt to 0.079" very coarse sand

Engineered Streambed Material Mix				
Calculated Mix			Proposed Mix (by volume)	
D84 - D100	16%	0.26 to 0.65 (ft)	3 parts	2.5" to 9" cobbles
D50 - D84	34%	0.10 to 0.26 (ft)	6 parts	1.26" to 2.5 " very coarse gravel
D16 - D50	34%	0.018 to 0.10 (ft)	7 parts	0.31" med gravel to 1.26" coarse gravel
D8 - D16	8%	0.0062 to 0.018 (ft)	2 parts	0.079" very fine gravel to 0.31" fine gravel
to D8	8%	Fines	2 parts	silt to 0.079" very coarse sand

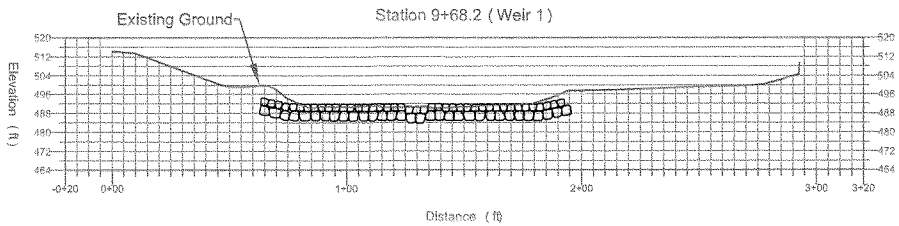
NOTES:
1. Engineered Streambed Material (ESM)

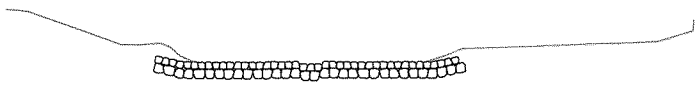
California Department of Water Resources
Fish Passage Improvement Program

JOB NAME: Budiselich Flashboard Dam Fish Passage
LOCATION: Calaveras River System-
Stockton Diverting Canal

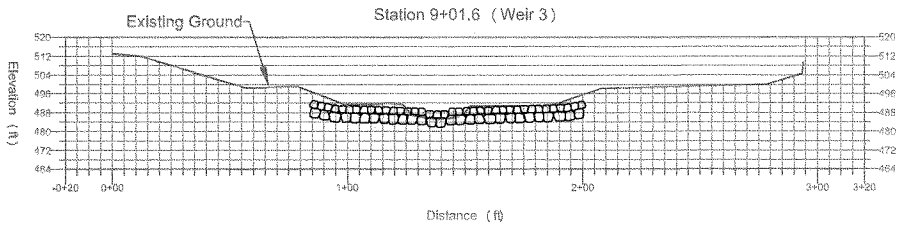
DESCRIPTION: Roughened Channel Design (Draft)

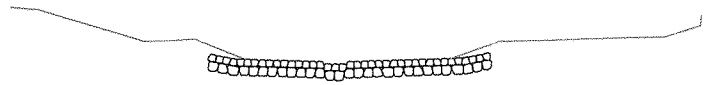
DRAWN BY: RP | CHECKED BY: RB
SCALE: NA
DATE: May 2009
AGENCY: DWR | SHEET: 5



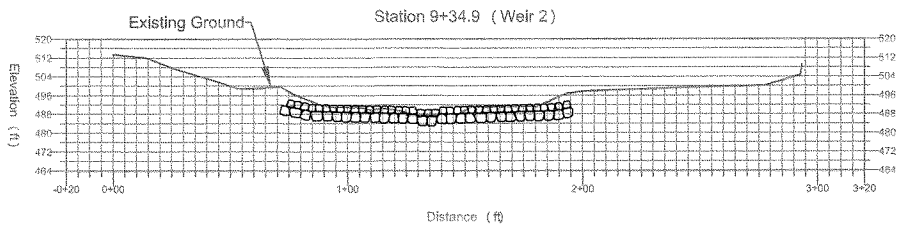


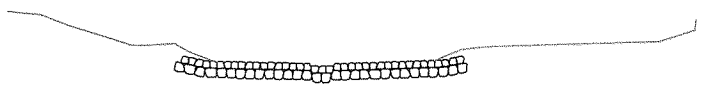
New Cross Section
(Weir 1 is flat to minimize flood flow impacts)



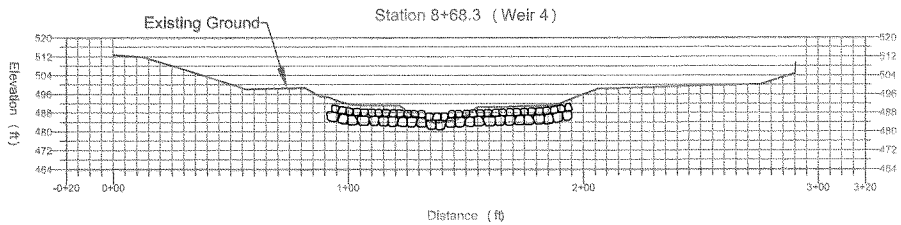


New Cross Section





New Cross Section
(Weirs 2-7 have a 3% slope towards low flow notch)



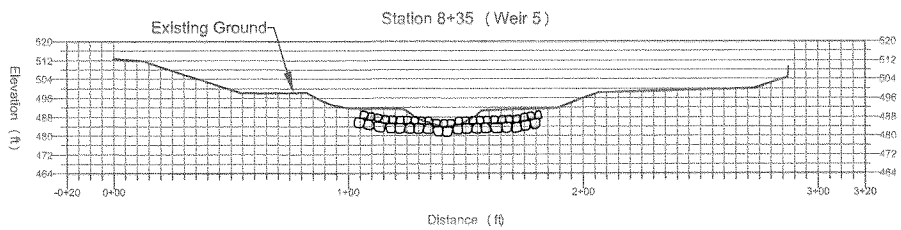
New Cross Section

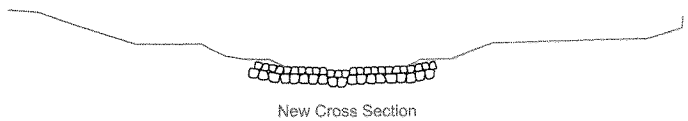
Weir Cross-Sections

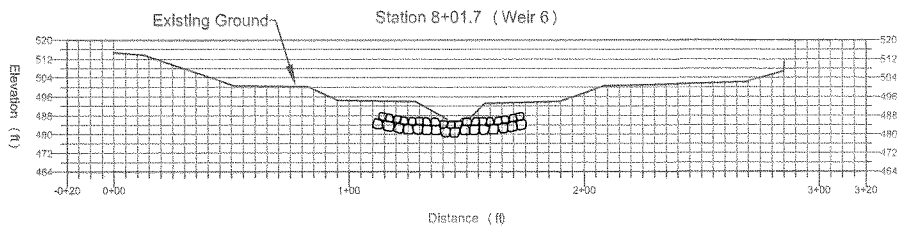
NOTES:

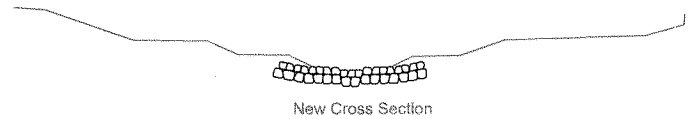
California Department of Water Resources
Fish Passage Improvement Program

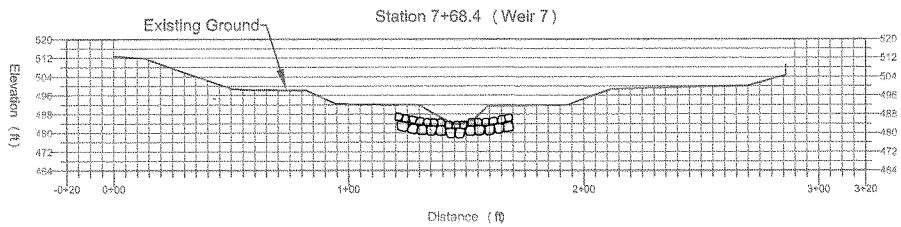
JOB NAME: Budiselich Flashboard Dam Fish Passage		DRAWN BY: RP	CHECKED BY: RB
LOCATION: Calaveras River System- Stockton Diverting Canal		SCALE: See Drawing	
		DATE: May 2009	
		AGENCY:	SHEET
DESCRIPTION: Roughened Channel Design (Draft)		DWR	6

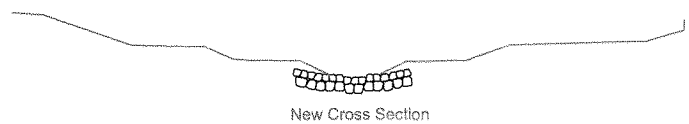












Weir Cross-Sections

NOTES:		California Department of Water Resources Fish Passage Improvement Program	JOB NAME: Budiselich Flashboard Dam Fish Passage LOCATION: Calaveras River System- Stockton Diverting Canal	DRAWN BY: RP	CHECKED BY: RB
				SCALE: See Drawing	
				DATE: May 2009	
				AGENCY:	SHEET
			DESCRIPTION: Roughened Channel Design (Draft)	DWR	7

Memorandum of NEPA and CEQA Compliance under the Lower Calaveras River Anadromous Fish Barriers Improvement Project Final Programmatic Environmental Assessment/Initial Study
Attachment B.
Construction and Environmental Disturbance Mitigation Requirements

SEWD is responsible for applying for and securing all federal and/or state permits required for constructing the project. If any archeological or historic artifacts, including human remains are encountered during construction activities, SEWD must stop all work immediately and contact the State Historic Preservation Officer.

The following best management practices/mitigation measures will be implemented:

No.	Resource	Best Management Practices/Mitigation Measures
1	Air Quality	All requirements of San Joaquin Valley Air Pollution Control District (SJVAPCD) Rules 8011 and 8021 would be adhered to and any permits or training needed for construction activities and pump operation would be obtained.
2	Air Quality	Open burning of construction waste would not be allowed.
3	Air Quality	Project participant would use reasonably practicable methods and devices to control, prevent, and otherwise minimize atmospheric emissions or discharges of air contaminants.
4	Air Quality	Visible emissions from diesel-powered equipment would be controlled.
5	Air Quality	Equipment and vehicles that show excessive emissions of exhaust gases due to poor engine adjustments or other inefficient operating conditions would not be operated until corrective repairs or adjustments were made.
6	Air Quality	Vehicles and equipment used in construction and maintenance of the Project would maintain appropriate emissions control equipment and be permitted, if required.
7	Air Quality	Construction would follow the recommended measures outlined in the project site's dust control plan. Measures include watering and other approved suppressing agents for limiting dust generation during construction.
8	Air Quality	Fill material storage piles would include dust-control measures such as water.
9	Air Quality	Ground surfaces outside of bankfull channel, which have been significantly disturbed, would be seeded to prevent wind dispersion of soil, as needed.
10	Air Quality	Removal of vegetation and ground disturbance would be limited to the minimum area necessary to complete construction activities. Vegetative cover would be maintained in appropriate areas to reduce dust.
11	Air Quality	Regular watering of exposed soils and unpaved access roads would be conducted during the construction period.
12	Air Quality	Grading activities would cease during periods of high winds (greater than 25 miles per hour [mph] averaged over one hour).
13	Air Quality	Trucks transporting loose material would be covered or maintain at least two feet of freeboard and not create any visible dust emissions.

No.	Resource	Best Management Practices/Mitigation Measures
14	Cultural Resources	Before construction, all construction personnel would be instructed on the protection of cultural resources. SEWD would instruct construction workers that cultural resources might be present at the Project site. They would be trained to stop work near any discovery, and notify SEWD's GM of their discovery. The GM would stop work to confirm if the resource could be avoided and consult with a qualified archeologist.
15	Cultural Resources	Known significant cultural resources would be fenced and a minimum distance maintained for work disturbances.
16	Cultural Resources	Should human remains be discovered during excavation, SEWD shall cease construction and notify and consult with the county coroner's office and the Native American Heritage Commission.
17	Hazardous Materials	Hazardous materials would not be drained onto the ground, into streams, or into drainage areas.
18	Hazardous Materials	All construction waste, including trash and litter, garbage, other solid waste, petroleum products, and other potentially hazardous materials, would be removed to a disposal facility authorized to accept such materials.
19	Hazardous Materials	Waters or soils contaminated with construction material would be disposed of in a suitable location to prevent discharge to surface waters.
20	Hazardous Materials	Vehicles would be inspected and maintained to reduce the potential for leaks or spills of oils, grease, or hydraulic fluids.
21	Hazardous Materials	Hazardous materials would not be stored at the Project sites.
22	Hazardous Materials	No vehicles would be refueled at the Project sites.
23	Vegetation and Wildlife	To prevent the spread of noxious weed, equipment will be rinsed prior to changing work areas within the Project site. The rinse water will be disposed of through the sanitary sewer system.
25	Vegetation and Wildlife	On completion of the work, disturbed areas left in a condition that would facilitate natural or appropriate vegetation, provide for proper drainage, and prevent erosion.
27	Special-Status Species	Construction activities associated with replacement or retrofit of artificial instream structures would be conducted between October 15 and December 31 when the channel is "dry" (reach is dewatered and there is no connection between confluence and reach above Bellota). This timeframe would be outside the breeding seasons for the giant garter snake, Swainson's hawk, and burrowing owl; and it would be outside salmonid migration conditions which occur under flood control releases or freshet flows.
28	Special-Status Species	For special-status plants, pre-construction surveys would be conducted within 250 feet of the Project area. If special-status plants are observed on the Project site they would not be disturbed, the appropriate agency (CDFG or USFWS) would be consulted to avoid impacts to special-status plants.
29	Special-Status Species	For burrowing owl, a qualified biologist would survey the area, including a 500-foot buffer zone, around the proposed project boundary no more than 14 days prior to the initiation of construction activities.
30	Special-Status Species	During the non-breeding season (September 1 through January 31), burrowing owls occupying the Project site may be evicted by passive relocation with concurrence from CDFG (SJMSCP 2000).
31	Special-Status Species	If passive relocation of burrowing owls is warranted, a qualified biologist would observe the area for 2 to 3 weeks to determine the occupied burrows to be destroyed.

No.	Resource	Best Management Practices/Mitigation Measures
32	Special-Status Species	For giant garter snake, a qualified biologist will conduct preconstruction surveys 24-hours prior to construction activities. If a snake is encountered during construction, activities shall cease until appropriate corrective measures have been completed or it has been determined that the snake will not be harmed.
33	Special-Status Species	On completion of the work, disturbed areas would be left in a condition that would facilitate natural or appropriate vegetation, provide for proper drainage, and prevent erosion.
34	Special Status-Species and Noise	Vehicles traveling to and from the recharge basin would be restricted to existing access roads on-site traveling no more than 15 mph.
35	Fisheries	Artificial instream structure improvements shall be designed according to criteria in *Design of Fish Passage Solutions* (CDWR [In press]).
36	Fisheries	Construction activities associated with replacement or retrofit of artificial instream structures would be conducted between October 15 and December 31 when the channel is "dry" (i.e., reach is dewatered and there is no connection between confluence and reach above Bellota). This time period would be outside salmonid migration conditions (i.e., flood control releases or freshet flows). Provisions must be made to allow migrating salmonids to bypass construction work areas in the channel in the event that unanticipated flood control releases or freshets occur
37	Fisheries	Monitor water turbidity levels during instream construction activities according to a Section 401 water quality permit.
38	Fisheries	Prepare an erosion control plan (and a stormwater pollution prevention plan, if applicable).
39	Water Quality	Hazardous materials would not be drained onto the ground, recharge cells, the instream channel, or into drainage areas. All waste, including trash and litter, garbage, other solid waste, petroleum products, and other potentially hazardous materials, would be removed to a disposal facility permitted to accept such materials.
40	Water Quality	Construction materials would not be stockpiled or deposited near the Project Sites where they could be washed away by high water or storm runoff or can encroach, in any way, upon the watercourse.
41	Water Quality	Fueling, cleaning, and maintenance of equipment would not be allowed except in designated areas located as far from the instream channels as possible.
42	Water Quality	Spill equipment would be present and easily accessible when refueling the diesel engine for the pump.
43	Water Quality	Grading activities would implement erosion and sediment control measures.
44	Water Quality	SEWD would prepare a construction SWPPP and implement appropriate measures.
45	Land Use	Construction operations would be conducted to prevent unnecessary destructing, scaring, or defacing of the natural surroundings to preserve the natural landscape to the extent practicable.
46	Noise	Construction would be restricted to the hours between 6:00 a.m. and 9:00 p.m.
47	Soils	In construction areas where ground disturbance is substantial or where recontouring is required, surface restoration would occur.
48	Soils	Any vehicles used during operation and maintenance would drive on existing levees.
49	Soils	Compaction of soil would be minimized by limiting the areas requiring heavy equipment during construction.
50	Traffic	Preparation and implementation of a haul route access plan would minimize potential conflicts between construction activities and general traffic.

APPENDIX D

ARTIFICIAL STRUCTURES PROPOSED FOR FISH PASSAGE IMPROVEMENTS

Artificial Structures Proposed for Fish Passage Improvements

The California Department of Water Resources' (CDWR) Fish Passage Improvement Program has identified 100 artificial instream structures within the lower Calaveras River (CDWR 2007[10]). Of these, up to 37 artificial instream structures in the Calaveras River are proposed for fish passage improvements. Individual structures were scored according to their potential to impede or prevent fish passage based on structural (structure length; slope, width, or diameter of opening relative to the active channel width; outlet drop; elevation of the tailwater control relative to structure inlet, outlet, and pool invert; and whether the channel substrate is continuous over or through the structure) and hydraulic (flow depth, jump height, jump pool depth, and flow velocity) criteria (CDWR 2007). According to this scoring system, structure ratings ranged from zero to seven points with seven indicating the greatest potential to impair fish passage.
Based on the scores developed by CDWR (2007), three priority tiers were developed where those structures with the highest potential to impair fish passage were assigned to Tier 1, those with a moderate potential assigned to Tier 2, and those with the lowest potential assigned to Tier 3 (Appendix B), as follows:

4. Tier 1- structures with a score of five or above (nine structures including two in OCC);
5. Tier 2- structures with a score of three or four (15 structures including four in OCC);
6. Tier 3- structures with a score of one or two (13 structures including nine in OCC)[11].

Detailed descriptions and associated photographs of each of the 37 proposed structures are provided below. All descriptions and photographs are excerpts from CDWR (2007).

[10] CDWR (California Department of Water Resources). 2007. Calaveras River fish migration barriers assessment report. California Department of Water Resources, Sacramento, California. 299 pp. http://www.watershedrestoration.water.ca.gov/fishpassage/projects/calaveras.cfm

[11] Structures in the Old Calaveras River Channel may be reassigned to different tiers, because their implementation is dependent on whether a fish passage solution can be developed and implemented for the Old Calaveras Headworks Facility through a separate process.

TIER 1 STRUCTURES

Clements Road Flashboard Dam and Bridge (Score 7)

The Clements Road Dam Crossing is on the Calaveras River near river mile 21.5, downstream of the Calaveras Headworks. The structure is a box culvert with two bays oriented perpendicular to the river (Photo D-1). The structure functions as a road crossing and a temporary dam. Clements Road runs across the top of the structure. The structure has guide slots for installing flashboards across the inlet to divert water during the irrigation season.

The culvert has 2 identical bays that are 7.5 feet wide, 6 feet high, and 30 feet long. The culvert bottom is not embedded. The structure appears to be in good condition. Both the upstream and downstream ends of the box culvert are flush with the vertical concrete headwalls. Guidewalls bracket the inlet bays and extend 2 feet upstream, perpendicular to the headwall, to support the flashboards. The culvert inlet is relatively flush with the channel thalweg, and has a concrete apron that has irregularly shaped rough edges. The left bank at the inlet has a concrete over-pour feature extending a few feet upstream to armor the structure. The outlet apron is a continuation of the box culvert bottom. The apron is flat, made of concrete, spans the full width of the channel, and extends four feet downstream from the culvert outlet. A 3-foot drop exists from the top of the outlet apron to the riprap below.

The channel upstream of the culvert is somewhat meandering and well defined with a rounded trapezoidal cross section. Both the channel bed and lower banks are bare; grasses cover the mid- and upper side slopes (Photo D-2). There are many trees and bushes on top of the channel banks. The thalweg has an adverse slope leading up to the culverts.

The downstream channel is similar to the upstream, except for the area immediately downstream from the outlet apron (Photo D-3). From the edge of the apron, a 3-foot drop onto a steep cascade over concrete rubble, debris, and riprap extends 36 feet downstream (Photo D-4). Concrete rubble also lines the channel banks near the culvert outlet and along the left side of the river (facing downstream).

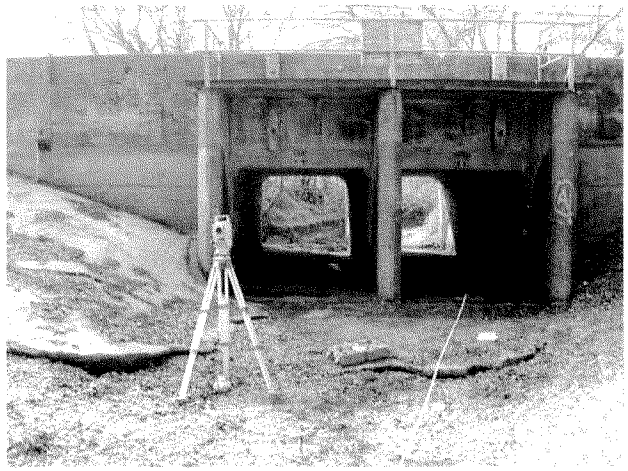


Photo D-1. Downstream at Clements Road Dam

Photo D-2. Channel upstream from Clements Road Dam

Photo D-3. Downstream channel from Clements Road Dam Outlet

Photo D-4. Downstream of Clements Road Dam looking upstream

Cherryland Flashboard Dam (Score 6)

Cherryland Flashboard Dam is at river mile 7.9, downstream from the Calaveras Headworks (Photo D-5). The structure supports flashboards during irrigation season. Flashboards are removed during non-irrigation season, and the Calaveras River receives only minimal flows that are released from the Calaveras Headworks.

The dam base span is about 32 feet with a bankfull channel width of 46 feet. The length of the dam base along the channel centerline is 25 feet. There is a drop of 3.5 feet from the base of the dam to the downstream river channel bottom. However, in the area where the dam base drops to the river channel, the channel is choked with riprap and woody debris (Photo D-6). The dam base extends from the channel bottom up part of the banks (Photo D-7). The dam base span is only about 8 feet across the channel bottom and narrows the river channel. There is not a notch in the dam base. When water flow is present, typically there are swift currents over the dam base.

The river channel immediately downstream from the dam base is cluttered with riprap and debris. After about 50 feet, the riprap gives way to a bare substrate made up of silty clay with some small stones. The downstream bank is heavily vegetated with small bushes and grasses. The downstream river channel has little or no meander with a well-defined rounded trapezoidal cross section (Photo D-8).

The river channel immediately upstream from the dam base is backwatered by the dam base, and the water surface is wide and flat compared to downstream (Photo D-9). On each side of the bank upstream, there are drainage canal outlets (Photo D-10). The river channel narrows upstream from the drainage canals outlet, has little or no meander, and has a rounded trapezoidal cross section. Compared to the downstream bank, the upstream bank is less vegetated. There are few bushes, and the lower portion of the left bank is bare. Scattered willows and cottonwoods would provide limited shade in the river channel (Photo D-11).

Cherryland Flashboard Dam is an 8.1-foot-high flashboard dam that spans about 25 feet (Photo D-12). The flashboards, guide posts, and supports are set into slots in a concrete lined section of the channel. During the irrigation season the dam creates a 3.5-foot water surface difference between the upstream and downstream pools. The plunge pool immediately downstream from the dam is about a foot deep and 5.7 feet away from the dam face.

The minimum plunge pool depth of 2 feet for juvenile salmonids is not met at Cherryland Dam. This structure was modeled to evaluate depth and velocity at the dam against fish passage criteria. The modeling results are in this report.

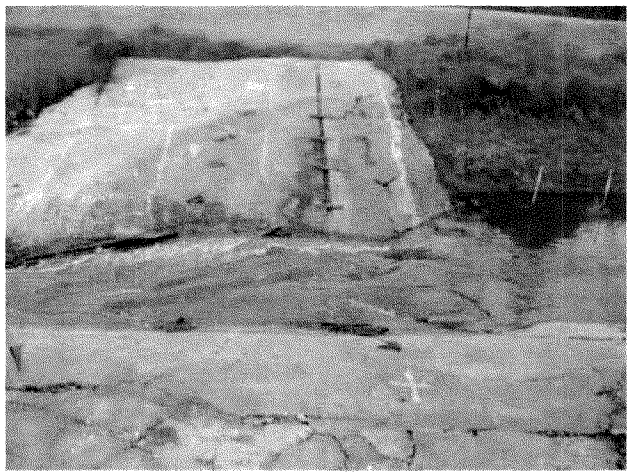


Photo D-5. Cherryland Flashboard Dam base

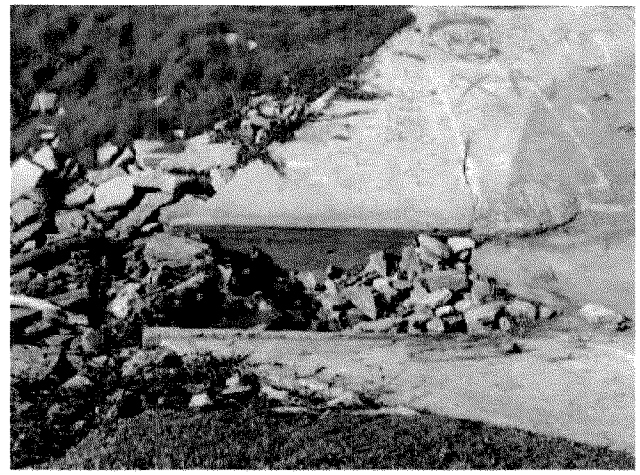


Photo D-6. Drop from dam base to river channel with no flow

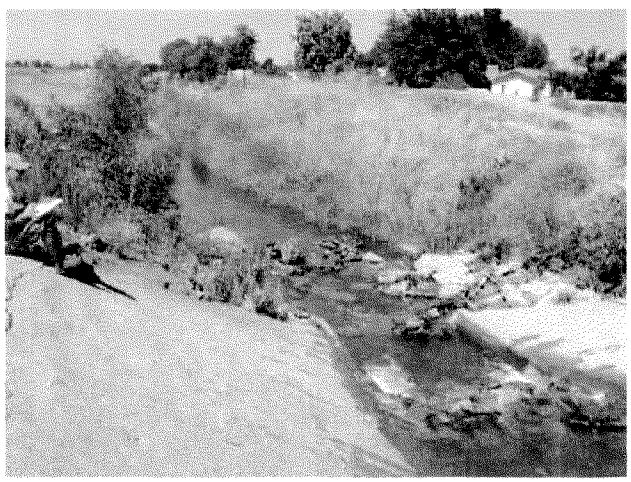


Photo D-7. Downstream end of Cherryland Flashboard Dam base

Photo D-8. Downstream from Cherryland Flashboard Dam

Photo D-9. Upstream end of Cherryland Flashboard Dam

Photo D-10. The outlet of drainage canal upstream of Cherryland Flashboard Dam

Photo D-11. Upstream from Cherryland Flashboard Dam

Photo D-12. Downstream looking upstream at Cherryland Flashboard Dam

Central California Traction Railroad Bridge (Score 5)

The Central California Traction Railroad Bridge (CCTRR) is located at river mile 1.1 in the Stockton Diverting Canal. Central California Traction is an active railroad line that crosses the Stockton Diverting Canal near river mile 1. The structure is oriented perpendicular to the flow path, and the bridge piers are aligned parallel to the direction of flow. The bridge spans 245 feet across the flood diversion channel with an active channel width of 165 feet (Photo D-13).

Between the left and right bank bridge abutments, the CCTRR has 14 piers spaced 15 feet apart. A roughened concrete apron was built connecting the bridge piers in an attempt to stabilize the channel bed near the bridge. Its surface is pitted and scoured and has two large perforations extending to the channel bed. During low flows, the apron functions as a weir. A concrete box flume for concentrating low-flows cuts through the concrete apron. The apron extends 15 feet upstream of the trestle on both sides of the flume and is about 3 feet above the upstream channel thalweg. Downstream of the bridge on the right side of the flume, the concrete apron is 100 feet wide and 65 feet long. Thirty feet of concrete rubble and rooted waterweeds extend downstream from the apron on the right. On the left side of the flume, the concrete apron is 75 feet wide and only extends 15 feet downstream of the bridge. Downstream of the apron on the left lies 50 feet of concrete rubble. There is an almost 4-foot drop to the downstream channel thalweg.

The concrete box flume is 57 feet long, 6 feet wide, and 3 feet deep with the top of the flume flush with the surface of the concrete apron (Photo D-14). The concrete of the flume is finished smooth and the flume has a mild slope of about 0.3%. There is a rough concrete apron about 10 feet long at the inlet to the flume. The flume entrance also has rough concrete wing walls to direct flow into the flume.

Upstream of the structure, the channel is straight and well defined, with a manmade trapezoidal cross section. The channel bank slope is very gradual on the left bank and slightly steeper on the right. Aquatic vegetation clogs the upstream channel and grasses are the dominant vegetation on the uplands. The channel bed is silty clay with some gravelly-sands, and the banks are vegetated with low brush and weeds. The vegetation, made up of water grasses and sedges, is denser closer to the water level, transitions to weedy annual grasses and thins out toward the top of the levee (Photo D-15). The upstream flow regime appears to be subcritical for a fair distance upstream, characteristic of a glide. The flume and weir structure is the dominant controlling feature for the upstream pool.

Downstream of the structure, the low-flow path meanders mildly within the confines of the straight, well-defined flood control channel (Photo D-16). The channel bed is similar to that of the bed upstream. A transitional shelf, immediately downstream of the structure, is littered with chunks of concrete riprap and vegetated with large clumps of grasses and reeds that clog the downstream channel (Photo D-16). Grasses and the occasional small tree grow on the low- to mid-levee banks thin out toward the top of the levee and provide little in the way of riparian habitat. Debris and vegetation clutter the active channel so water splits into multiple flow paths downstream of the flume.

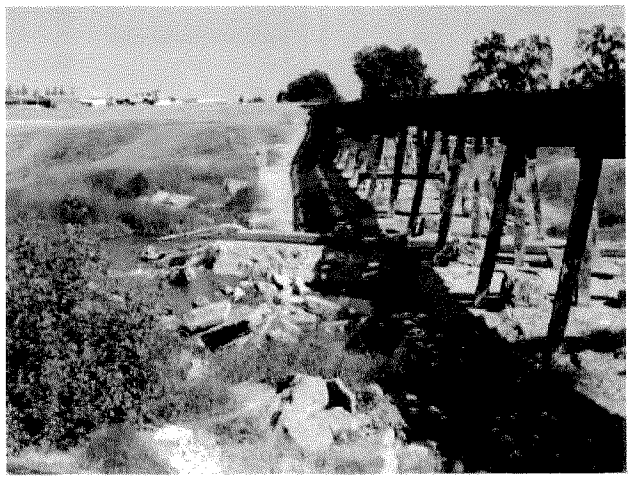


Photo D-13. Side view of CCTRR, apron, and flume from the left downstream bank

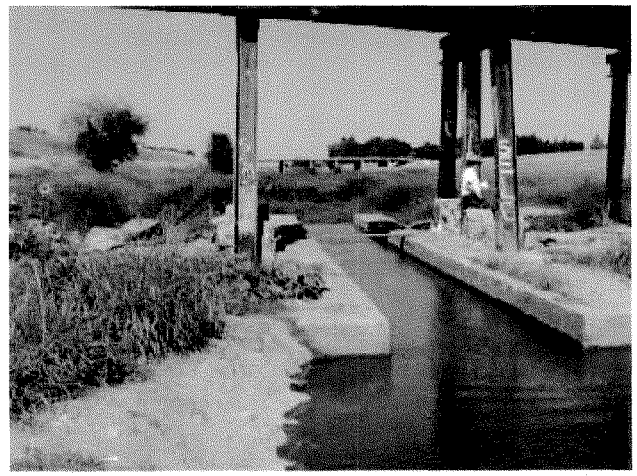


Photo D-14. View of CCTRR flume from the upstream side

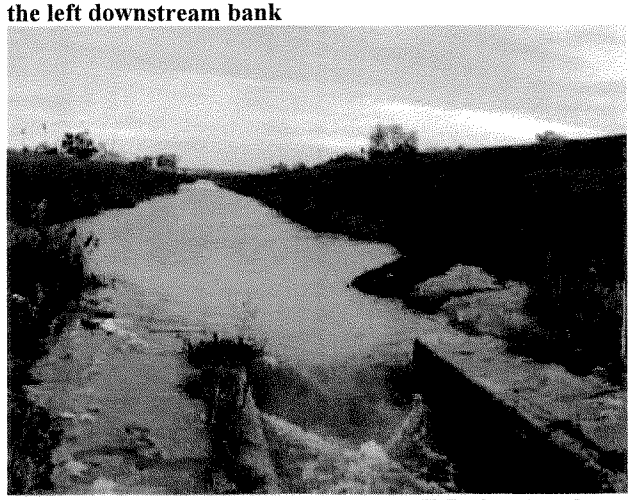


Photo D-15. Channel upstream of CCTRR showing the flume inlet

Photo D-16. View of the downstream channel from the CCTRR flume outlet

Budiselich Dam (Score 5)

The Budiselich Flashboard Dam is in the Stockton Diverting Canal near river mile 2. The Stockton Diverting Canal joins flows of Mormon Slough and the old Calaveras River in the City of Stockton. The maximum design flow of the main channel is 12,500 cfs. The flashboards are installed during the irrigation season. The flashboards are removed during months when irrigation water is not needed, usually between October and March (Photo D-17).

The structure is composed of 8-foot high rectangular concrete wing wall abutments and a 12-foot wide flat concrete slab sill spanning the 98 feet between abutments (Photo D-17).

The concrete sill is oriented perpendicular to the flow path and is elevated above the downstream channel grade. Although the sill is about 12 feet wide, two notches 3 feet wide and 7 feet long are cut into the sill and extend through the riprap on the downstream side near the center of the span (Photo D-17). The downstream face of the dam is protected from scour by a large pile of broken concrete rubble and rock riprap extending about 50 feet downstream of the structure and extending 80 feet across the channel from the right bank.

The upstream reach of the channel is wide and straight, with a manmade trapezoidal shape. The flow regime appears to be tranquil at low flows with ponding upstream of the structure because of the dam sill. The bankfull channel width is 180 feet. The channel bottom is silty-clay, with a few pieces of riprap immediately upstream of the structure. The banks are vegetated with grasses and waterweeds, which are denser at the water line (Photo D-18).

The downstream channel continues the wide, straight, trapezoidal geometry. Downstream from the riprap cascade a narrower, low-flow channel about 23 feet wide has developed in the bottom of the canal (Photo D-18). The channel bottom is silty-clay with dense grass and weed growth near the water's edge.

Because the dam has not been used for diversions for several years, the midchannel flashboard supports were removed from the dam sill. The structure sill and abutments are being preserved in place for potential future use by SEWD.

In fall of 2001, modifications were performed to provide temporary improvements to fish passage conditions at Budiselich Dam. Sandbags were placed along the edge of the concrete perpendicular to the direction of flow to increase the depth over the sill (Photo D-19). A portion of the riprap was relocated, and sandbags were placed to create a flow path for migrating salmonids and improve water depth through the riprap cascade (Photo D-20).

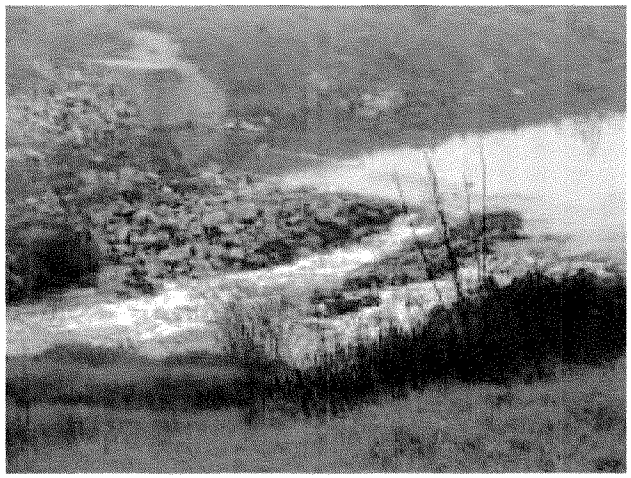


Photo D-17. Budiselich Dam, overview of upstream from the downstream left bank

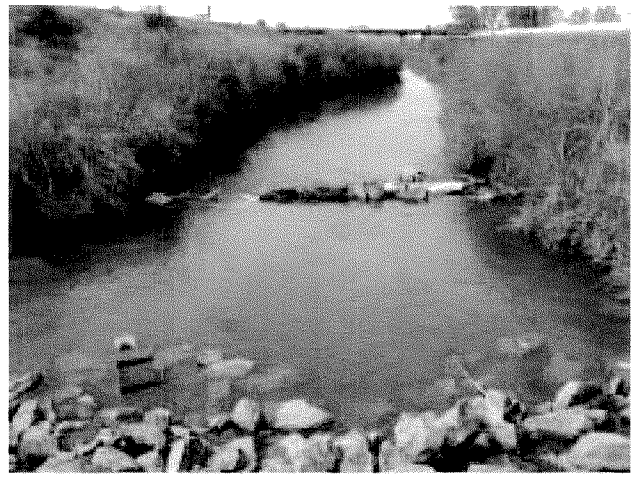


Photo D-18 Channel downstream from Budiselich Dam riprap cascade

Photo D-19. At-grade view of riprap cascade downstream from Budiselich Dam

Photo D-20. Temporary modification of the channel downstream of Budiselich Dam

Caprini Low-flow Road Crossing (Score 5)

The Caprini LFC is on Mormon Slough near river mile 8. The crossing is situated in the active channel perpendicular to the flow path (Photo D-21) and rises about 4 feet above the apron. The LFC is 45 feet in length and 10 feet in width. The structure is composed of a rectangular concrete road prism of unknown thickness overlaying three corrugated metal pipe (CMP) culverts.

All three culverts have similar geometric properties – corrugated metal pipe, 36 inch diameter, about 10 feet long, and set at about a 3% slope. The culvert inlets and outlets are flush with the road prism, which acts as a head wall. The road surface is composed of smooth concrete and is 10 feet wide. The structure is in fair condition with no evident structural defects. The condition of the culverts is good, though they are exhibiting signs of corrosion.

The structure has a concrete apron attached to the upstream and downstream faces of the crossing. The upstream apron extends about 15 feet upstream of the structure, spans the active channel width of 80 feet, and is flush with the culvert inlet inverts. The downstream apron is also 15 feet in length and flush with the culvert outlet inverts. The portion of the apron that spans the channel bottom is flat and rough (Photo D-22). There appear to be remnant portions of the apron underneath the piles of rocky debris and riprap armor lining the side slopes. The riprap consists of large, irregularly shaped boulders and concrete slabs. A riprap cascade extends about 55 feet downstream from the outlet apron (Photo D-22).

The upstream channel consists of a gravelly-sand bottom with alluvial deposits of silt, silty-clay brush lined banks, and grass-covered levees. There is a rocky, weir-like feature immediately upstream of the crossing (Photo D-23). The upstream flow regime appears to be subcritical for a fair distance upstream, characteristic of a glide. Caprini LFC is the dominant controlling feature for the upstream pool.

Immediately downstream of the concrete apron at the culvert outlets, a rock cascade forms a series of two major step pools from the outlet apron sill to a pool below. The pool below is a significant plunge pool about 120 feet long and 4 feet deep under minimal flow conditions.

The downstream channel is highly degraded (Photo D-24). A typical downstream cross section is composed of a muddy clay bottom and earthen levee banks with sparse vegetation. The active channel exhibits signs of scour at the toe of the levee with bare clay side slopes where riprap has scoured away resulting in a channel littered with rocky debris. The debris was likely placed to inhibit down-cutting and probably has been redistributed by high flows. The levee banks are heavily armored with rock slope protection. The downstream flow regime appears to be subcritical for a fair distance downstream, characteristic of a glide (Photo D-24).

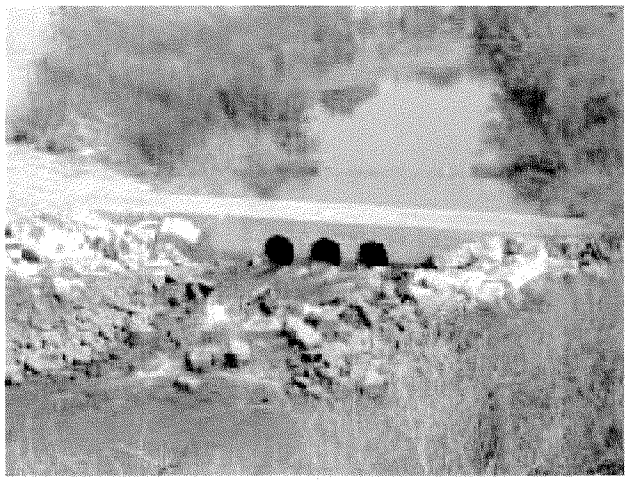


Photo D-21. Upstream at Caprini LFC

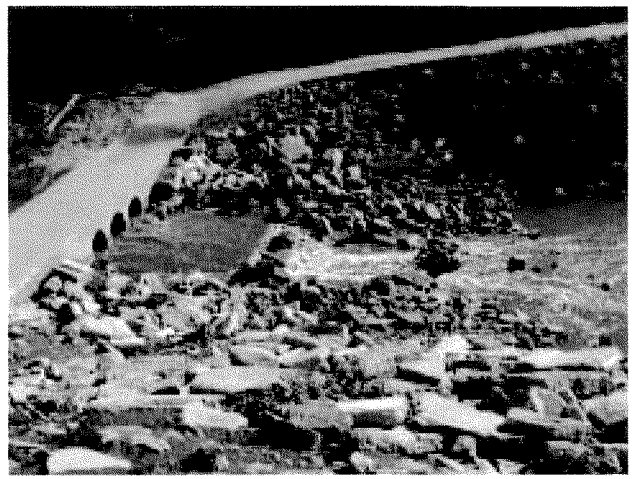


Photo D-22. Caprini LFC showing downstream apron

Photo D-23. View of upstream channel from Caprini LFC

Photo D-24. Channel downstream of Caprini LFC during receding storm flows

Hogan Low-flow Road Crossing (Score 5)

The Hogan Low-flow Crossing (LFC) is on Mormon Slough near river mile 8.4. The crossing is in the active channel perpendicular to the flow path. The structure is made of an irregular rectangular concrete road prism of unknown thickness poured over three not uniformly placed reinforced concrete pipe (RCP) culverts.

Culvert No. 1 (numbered from left to right with respect to Photo D-25) is a 57–foot-long, 48-inch diameter RCP. The slope of the pipe is 0.35% and the outlet is about 1.2 feet above the riprap downstream of the structure. Culverts No. 2 and No. 3 are both 64-foot-long, 30-inch diameter RCPs. The slope of culvert No. 2 is 1.9% and the drop from the outlet of the pipe to the downstream riprap is about 0.3 feet. Culvert No. 3 has an adverse slope of -1.1%. The drop from the outlet of culvert No. 3 to the downstream riprap is about 1.2 feet. The culvert inlets and outlets are projecting from the road prism.

The road surface is made of rough concrete overlay and is 50 feet wide. The structure is in poor condition exhibiting scour damage and signs of numerous repairs. Several concrete surface overlays and a crude concrete over-pour across the upstream and downstream faces of the structure are evident. Each of the culverts appears to have been retrofit with extensions (Photo D-26).

The bed of the upstream channel (Photo D-27) has degraded leaving the inlets of the culverts perched above the bed. A typical cross section is composed of a gravelly-clay bottom with some alluvial deposits of gravelly-silt at the culvert inlets. Weeds, grass, and occasional shrubs line muddy clay banks. Some riprap is present along the lower banks and bed leading up to structure particularly on the left bank adjacent to the structure. The upstream flow regime appears to be subcritical for a fair distance upstream, characteristic of a glide. The structure is the dominant controlling feature for the upstream pool.

Downstream of the culverts riprap appears to have been scoured away. Although there are concrete pieces immediately downstream around the culverts, the rubble extends only sporadically for 100 feet. Riprap is spread intermittently across the 45 feet of channel width and along 50 feet of the right bank. Where the riprap has been scoured away, the downstream channel is also degraded. A typical cross section is composed of a muddy clay bottom and earthen levee banks with sparse vegetation. The active channel exhibits signs of scour with bare clay side slopes. Riprap covers the right bank (Photo D-28). Some of the riprap was likely placed to inhibit down cutting and has probably been redistributed by high flows. The top of the levee banks also are heavily armored with riprap. The downstream left bank is undercut where the roadway meets the left bank. The downstream flow regime appears to transition from a pool near the structure to a riffle a few hundred feet downstream.

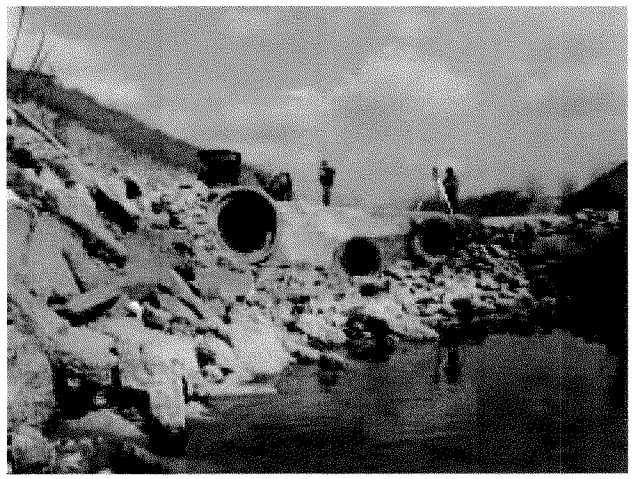


Photo D-25. At-grade view downstream of Hogan Low-flow Road Crossing culvert outlets

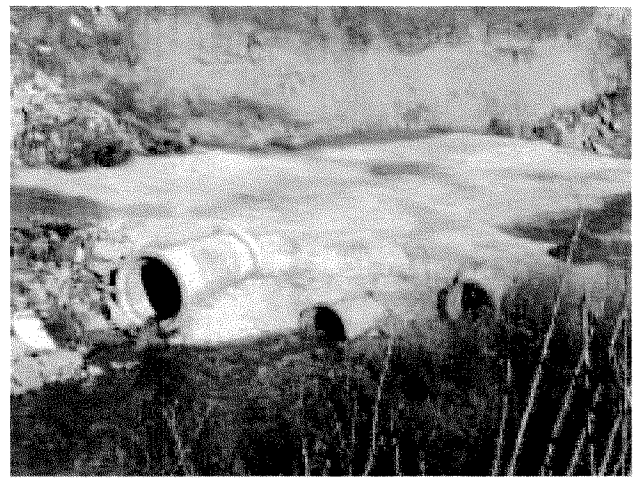


Photo D-26. Cross-view of Hogan Low-flow Road Crossing culvert inlets

Photo D-27. Hogan Low-flow Road Crossing upstream channel

Photo D-28. Hogan Low-flow Road Crossing downstream channel

Mormon Slough Railroad Bridge (Score 5)

The Mormon Slough Railroad Bridge (MSRR) is where the old Southern Pacific line crosses Mormon Slough near river mile 13. The structure spans about 240 feet across the bankfull channel on a skewed alignment. The structure is supported by two end abutments and four elongated hexagonal concrete piers with conical spread footings in the active channel. The structure appears abandoned because the tracks have been removed and ends barricaded. However, the structure is being preserved for potential future use by SEWD.

The four Mormon Slough Railroad Crossing Piers are 50 feet apart (Photo D-29). The piers' footings are incorporated into a concrete apron extending continuously across the channel between the abutments and 15 feet downstream and upstream of the bridge. The apron has a total width of 50 feet and there is a 9-foot drop from the apron to the channel (Photo D-30). Overall, the structure appears to be in fair condition. The structure itself is at a steep angle to the flow path. The piers project a large area with unequal flow pressures causing different flow profiles between individual piers.

The upstream channel approaches at an oblique angle (Photo D-31). The typical upstream channel cross section is a well-defined, engineered trapezoid composed of a sandy-clay substrate with alluvial deposits of gravel and cobble. Riprap extends 50 feet upstream from the upstream edge of the apron. The left bank levee toe is armored with riprap for several hundred feet more upstream. The channel banks are lined with small brush and some grasses.

The upstream flow regime appears to be subcritical for a fair distance upstream, characteristic of a glide, but transitions to supercritical immediately upstream of the apron. The structure is the dominant controlling feature for the upstream pool.

The downstream channel makes a gradual sweeping right bend (Photo D-32). The typical downstream channel cross section is similar to that of the upstream except the substrate appears to be a little sandier. Riprap lines the channel bottom for 130 feet downstream of the apron. The left bank levee toe is likewise armored around the bend and downstream.

Potter Creek flows into Mormon Slough immediately downstream of the structure. Potter Creek has riprap on the banks and bed upstream of the confluence with Mormon Slough. Closer to the confluence larger pieces of riprap armor the bed. Some riprap remains on the left bank as it curves around to become the Mormon Slough bank.

The downstream flow regime is subcritical, characteristic of a pool, immediately downstream of the structure and transitions to supercritical about 120 feet downstream. The flow regime beyond that is not apparent.

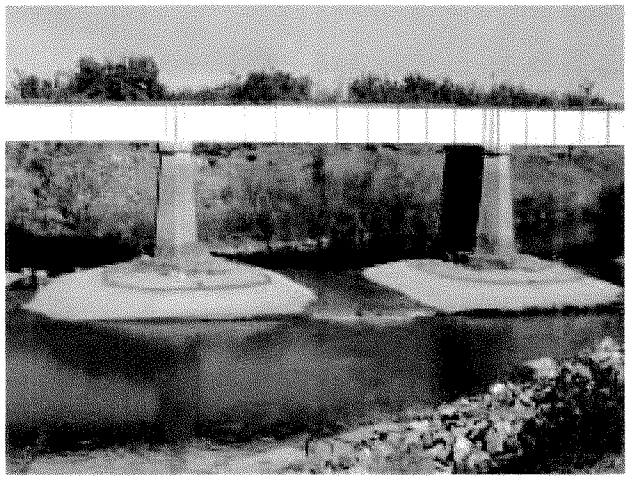
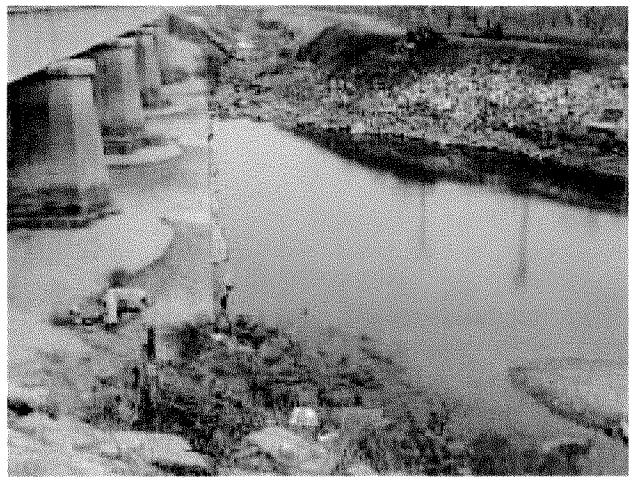


Photo D-29. MSRRX bridge piers and apron, typical Photo



D-30. Transverse view of MSRRX bridge piers and apron

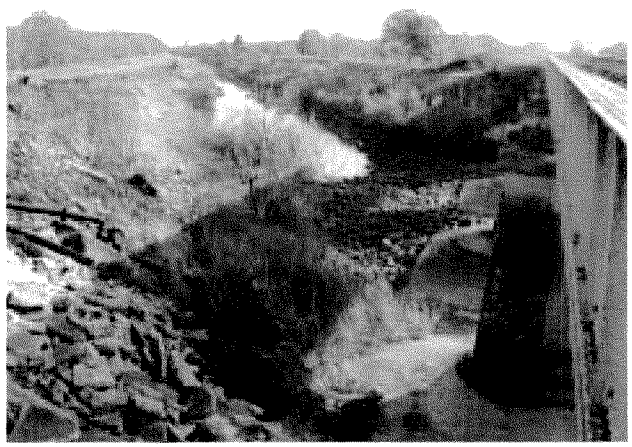


Photo D-31. MSRRX upstream channel Photo

D-32. MSRRX downstream channel

Hosie Low-flow Road Crossing (Score 5)

The Hosie LFC (Photo D-33) is on Mormon Slough near river mile 13.2. The crossing is situated in the active channel slightly skewed to the flow path and is elevated 1.5 feet above the downstream channel bottom (Photo D-34). The structure is made of a rectangular reinforced concrete pad of unknown thickness, about 160 feet long and 13 feet wide. The concrete pad is in poor condition showing signs of scour and exposed reinforcement wire (Photo D-321).

The typical upstream channel is trapezoidal. The right upstream bank is composed of brush, weeds, and grassy vegetation on a gentle slope. The left bank is covered with riprap armoring upstream and downstream (Photo D-35). The channel bottom immediately upstream of the structure has aggraded to match grade with the structure. The upstream flow regime appears to be subcritical for a fair distance upstream, characteristic of a glide. The structure is the dominant controlling feature for the upstream pool.

The downstream channel is typically similar to the upstream except the brush is absent on the left bank (Photo D-36). The downstream face of the structure and the channel bottom 45 feet downstream are littered with rocky debris likely placed to inhibit degradation. A field visit on January 19, 2005, found riprap covering the entire 155-foot width of the downstream channel. The rocky debris consisted of large boulders and concrete chunks covered with a tough bamboo-like grass. The grass covered riprap formed three elongated islands parallel to the flow. Pieces of concrete riprap lined the downstream left bank from toe to the top of the bank.

A tail water control was not found during the field survey on January 14, 2004. The downstream flow regime appears to be subcritical characteristic of a glide. As the water spreads across the structure, the rocks and vegetation tend to create a braided channel under some conditions as the flow leaves the structure.

Some temporary solutions to improve fish passage conditions were done at this site in fall 2001. A series of shallow step pools leading to the structure from the downstream pool were built from small boulders and large cobble on-site and a sandbag dike was placed along the downstream sill of the structure (Photo D-36). The goal of this retrofit was to aid better fish passage by improving the migration path to the structure, consolidate the braided low-flow water to two concentrated flow paths, and increase the water depth on the road. The modifications from 2001 should be checked and any necessary maintenance or sandbag replacement made to continue providing temporary fish passage improvement.

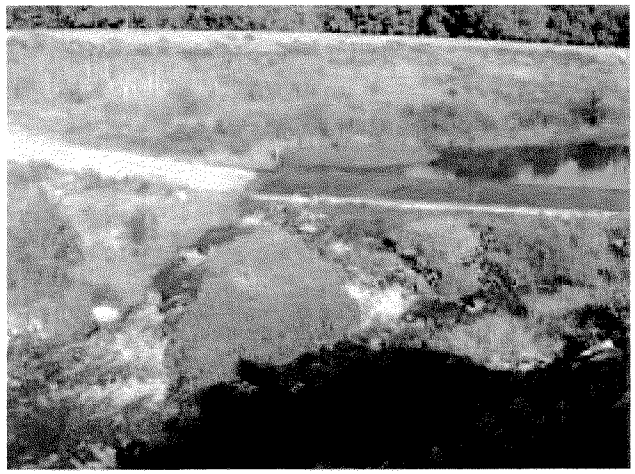


Photo D-33. View of Hosie Low-flow Road Crossing from top of levee

Photo D-34. View across Hosie Low-flow Road Crossing

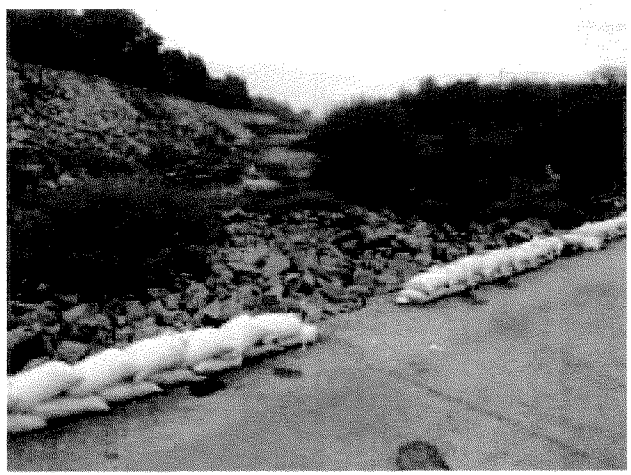


Photo D-35. View upstream across Hosie Low-flow Road Sandbags installed to provide temporary fish passage improvement.

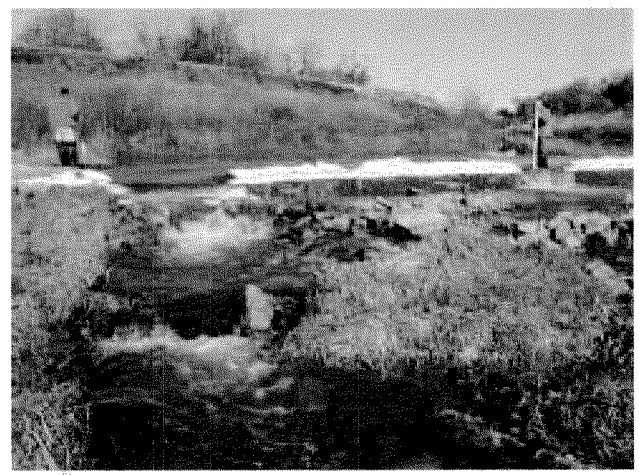


Photo D-36. Hosie Low-flow Road Crossing downstream Crossing. channel. Sandbags installed to provide temporary fish passage improvement.

Watkins Low-flow Road Crossing (Score 5)

The Watkins LFC (Photo D-37) is on Mormon Slough near river mile 19. The crossing is situated in the active channel slightly skewed to the flow path. The drop from the structure crest to the channel bed has ranged from 1 foot to 2.2 feet from 2003 to 2005. The structure is made of a rectangular reinforced concrete pad of unknown thickness, about 142 feet long and 13 feet wide. A culvert of unknown dimensions exists under the road (Photo D-38).

The culvert has not been maintained. We suspect it has been abandoned. The upstream end is buried, and the downstream end is almost buried and severely deteriorated. Channel debris plugged the culvert, and no daylight can be seen through it. Some water does appear to flow through the culvert which is likely the result of percolation through the porous material plugging the barrel. The jagged edges of the culvert outlet have since been removed.

The typical upstream channel is trapezoidal composed of brush-lined banks with grass and weed covered levees and patches of rock riprap armoring (Photo D-39). The bankfull channel width is about 200 feet. The riprap on the upstream side of the structure is 192 feet wide and 9 feet long. The channel bottom immediately upstream of the structure has aggraded to match grade with the structure. The upstream flow regime appears to be subcritical for a fair distance upstream, characteristic of a glide. The structure is the dominant controlling feature for the upstream pool.

The downstream channel is dimensionally similar to the upstream with higher density of rock riprap armoring along the toe of the right channel bank. The water crosses the structure and is directed toward the right bank where flows are faster and deeper. This indicates the structure has a slight slope to the right side of the channel. Riprap extends 192 feet across the channel and 25 feet downstream. The downstream flow regime appears to be subcritical characteristic of a glide.

Some temporary solutions to improve fish passage were done at this site in fall of 2001. The rock pile along the downstream face of the structure (Photo D-40) was rearranged to provide a concentrated low-flow path over a rock cascade that loosely mimics a series of step pools. A sandbag dike was also placed along the downstream sill of the structure. The goal was better fish passage by improving the migration path to the structure, consolidate the widespread low flow water to a single concentrated flow path, and increase the water depth on the road. The modifications from 2001 should be checked and any necessary maintenance or sandbag replacement made to continue providing temporary fish passage improvement.

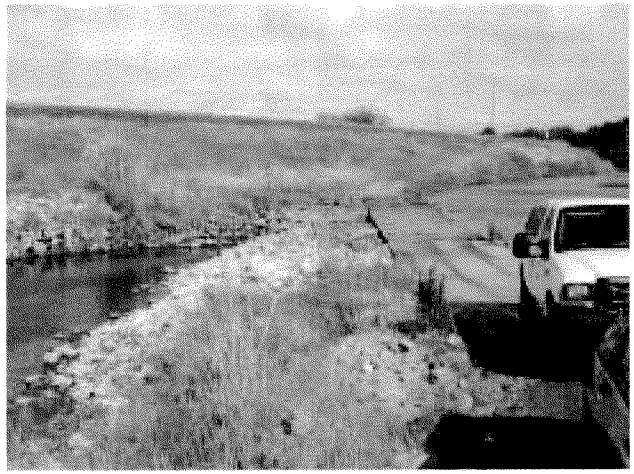


Photo D-37. Watkins LFC overview Photo

D-38. View upstream to Watkins LFC

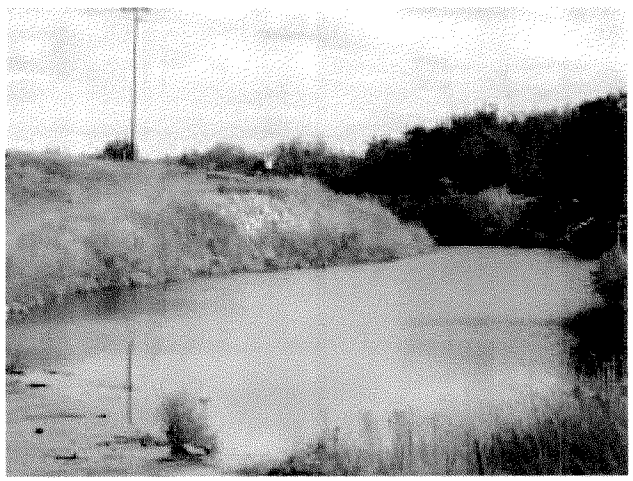
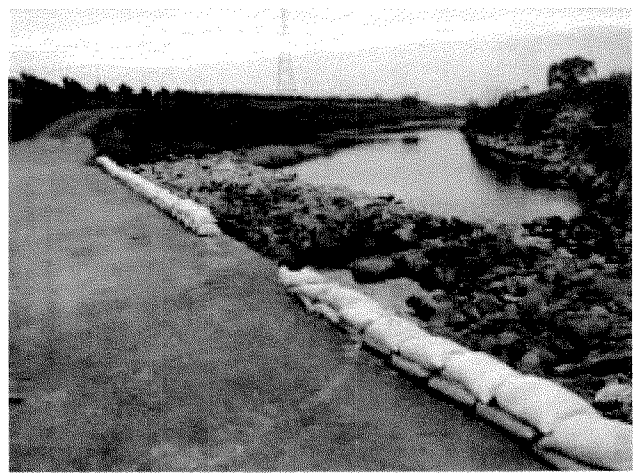


Photo D-39. Channel upstream of Watkins LFC Photo



D-40. Watkins LFC 'dry' downstream channel

TIER 2 STRUCTURES

Panella Flashboard Dam (Score 4)

Panella flashboard Dam is on Mormon Slough at river mile 6.6 (Photo D-41). The dam base supports flashboards during irrigation season. The flashboards are removed usually betweenOctober and March when Mormon Slough is a flood control channel.

Panella Flashboard Dam's base spans 41 feet between the concrete abutments and is 9 feet wide, with a total span including abutments of 60 feet across Mormon Slough (Photo D-42). There is no notch in the base of the dam. Riprap and debris line the channel bottom for 39 feet downstream of the dam. Riprap also extends 12 feet upstream of the dam base for a width of 60 feet across Mormon Slough. Several mature riparian trees grow on the lower left bank upstream of the dam and provide cover and shade. A few less-mature trees grow on the left bank downstream of the dam, and provide slight cover and shade to the channel (Photo D-43).

Downstream of the riprap, rocks are scattered along the channel bed. Both upstream and downstream of the dam, the banks slope steeply, and weeds and brush grow on the banks above the scour line. The channel is straight with well-defined rounded trapezoidal cross-section.

During irrigation season with 5-foot-high flashboards, the water surface difference between the dam crest and the plunge pool is 4.3 feet and the upstream wetted width is 62 feet (Photo D-44). The concrete dam base extends 8 feet downstream of the flashboards and is flush with the channel grade. Water spills over the flashboards into a shallow pool that is just over 6 inches deep at the base of the apron. A second pool 9 feet downstream is about 1.5-foot-deep. The 6-inch downstream plunge pool depth does not meet the minimum 2-foot requirement for juvenile salmonids.

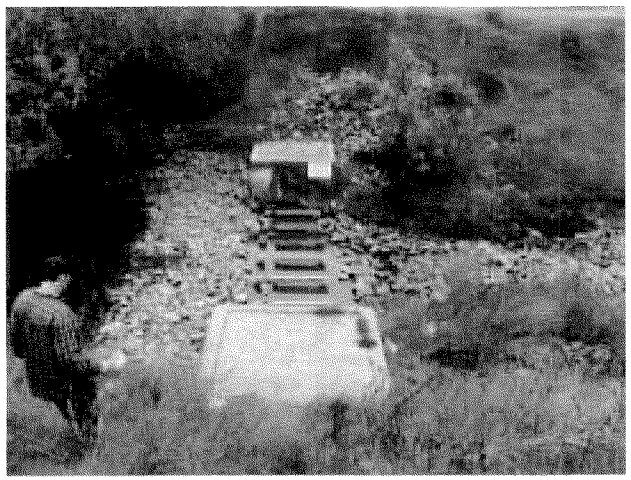


Photo D-41. Panella Flashboard Dam

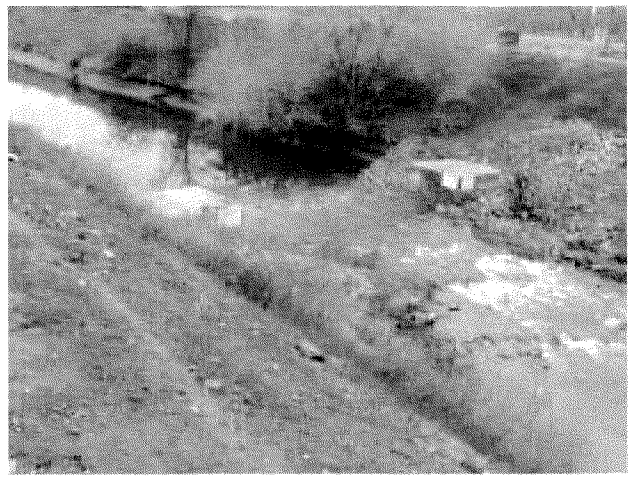


Photo D-42. Panella Flashboard Dam upstream from downstream right bank

Photo D-43. Downstream of Panella Flashboard Dam

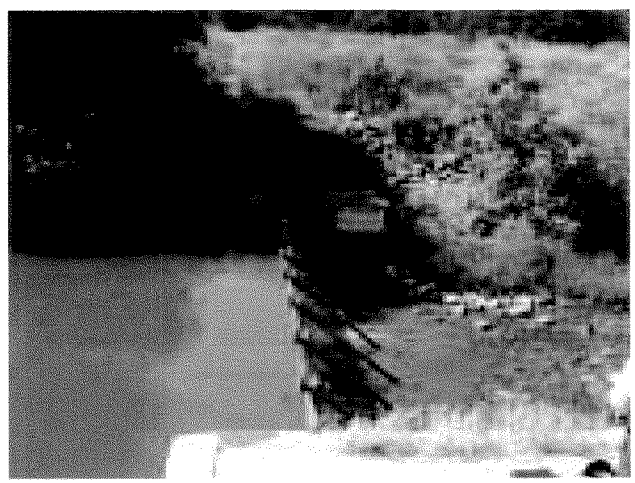


Photo D-44. Flashboards in at Panella Flashboard Dam

Fujinaka Low-flow Road Crossing (Score 4)

The Fujinaka Low-flow Road Crossing is on Mormon Slough near river mile 10.0. The crossing is in the active channel perpendicular to the flow path (Photo D-45) and is 6 feet above the average channel bottom. The structure, which is 110 feet long, is composed of a rectangular concrete road prism of unknown thickness penetrated by three circular concrete culverts.

The road surface is made of rough concrete overlay and is 25 feet wide. The structure is in poor condition with scour damage and many signs of repair work.

The geometric properties of each culvert are different from each other. Their respective parameters are listed in Table D-1. The culverts are numbered left to right with respect to Photo D-45.

The inlet of culvert No. 1 protrudes from the crossing. The inlets of culverts No. 2 and No. 3 are flush with the crossing creating a headwall situation. The outlet of culvert No. 1 has been retrofitted with a fiberglass sleeve. None of the culvert outlets were perched under the survey conditions, and their diameters and invert elevations are staggered. During a Nov. 18, 2004, site visit, the inlet of culvert No. 1 was blocked. During storm flows, debris probably can be caught on the upstream face of the structure.

The upstream channel typically consists of grass-covered levees with rock riprap armoring along the toe and an earthen bottom with some alluvial deposits of cobble (Photo D-46). There is a point bar immediately upstream of the crossing. The upstream flow regime appears to be subcritical for a fair distance upstream, characteristic of a glide. The structure is the controlling feature for the upstream pool.

The downstream channel is similar to the upstream channel except the riprap extends partially across the channel and alluvial deposits are sparse. Between site visits, the riprap on the lower banks and toe sections immediately downstream of the structure had been scoured away (Photo D-47). The tail water control appears to be a small deposition zone. It is creating a riffle crest about 300 feet downstream from the structure where the flow of the downstream pool transitions from subcritical to supercritical flow. The riffle was composed of small cobbles and gravels. For a short distance, they seemed embedded before yielding to a dominant muddy clay substrate. Riprap scour protection lines the channel below the culverts and levee toes upstream and downstream of the low-flow crossing.

Fujinaka Low-flow Crossing has four paths for flow to pass the structure. The three culverts allow water to pass through the structure, and during high flows, water can pass over the top of the road. Under optimal hydraulic conditions, each flow path can allow fish passage.

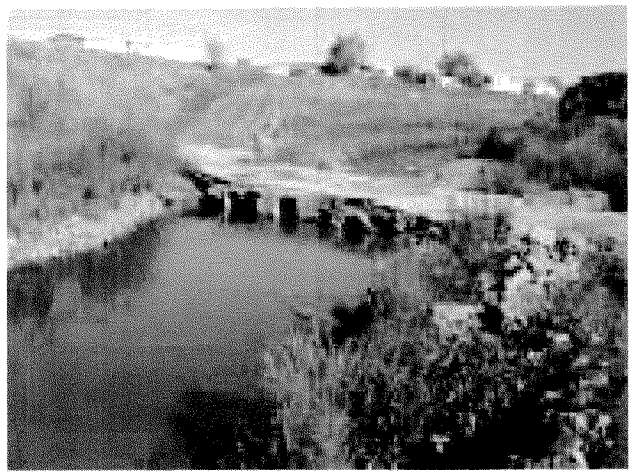


Photo D-45. Upstream at Fujinaka Low-flow Crossing

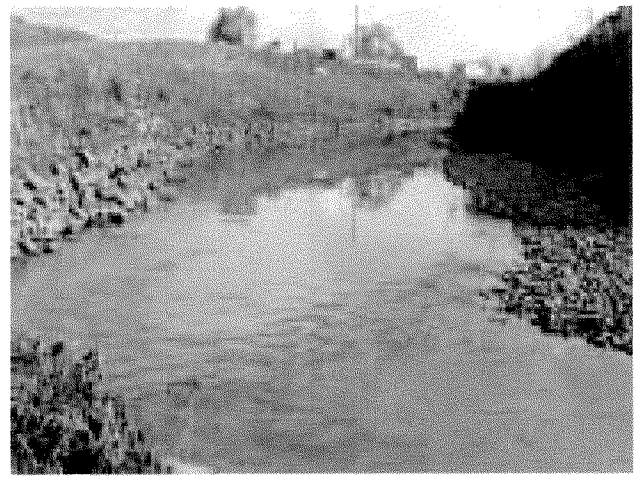


Photo D-46. Typical upstream channel as viewed from Fujinaka Low-flow Crossing

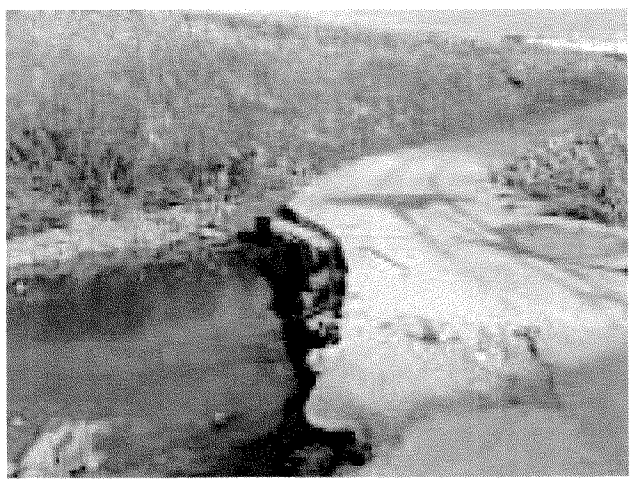


Photo D-47. View across downstream side of Fujinaka Low-flow Crossing

Prato Flashboard Dam (Score 4)

Prato flashboard Dam is on Mormon Slough at river mile 10.4 (Photo D-48). The dam supports flashboards during irrigation season. The flashboards are removed usually between October and March when Mormon Slough is a flood control channel.

The concrete base of Prato Flashboard Dam spans 46 feet across the bottom of Mormon Slough and is 11 feet wide. Including the two concrete abutments, the dam spans 70 feet. A 5-foot section of the concrete base has been removed, creating a low-flow notch. The concrete base is flush with the riprap around the dam. Riprap in the channel bottom extends 18 feet upstream of the dam and is 70 feet wide. Riprap also extends 65 feet downstream of the dam and is 65 feet wide. The downstream riprap forms two steps and a cascade area. The first step is 20 feet from the dam base, and the second is 21 feet farther downstream. The cascade is 13 feet beyond the second step. The low-flow channel narrows downstream of the dam base.

Downstream of the dam, the banks are steep and covered mostly with weeds and gravel (Photo D-49). Weedy grasses have invaded the instream riprap, which also lines the right bank near the dam. Willows encroach into the channel and can provide some shaded riverine habitat. The channel meanders to the left and is a well-defined rounded trapezoidal cross-section. Upstream the banks are steep, covered with gravel and weeds on the left bank, and bare soil with occasional grass on the right bank (Photo D-50). One tree on the right bank that may provide some cover to the channel in the summer. The channel is a well-defined trapezoidal cross-section.

With flashboards up during irrigation season, the upstream wetted channel width is 77 feet and flashboards span 46 feet across Mormon Slough (Photo D-51). The flashboards are about 7 feet high and the water surface difference between the dam crest and the plunge pool is about 6 feet. The plunge pool is a foot deep, which does not meet the 2-foot minimum depth for juvenile salmonids.

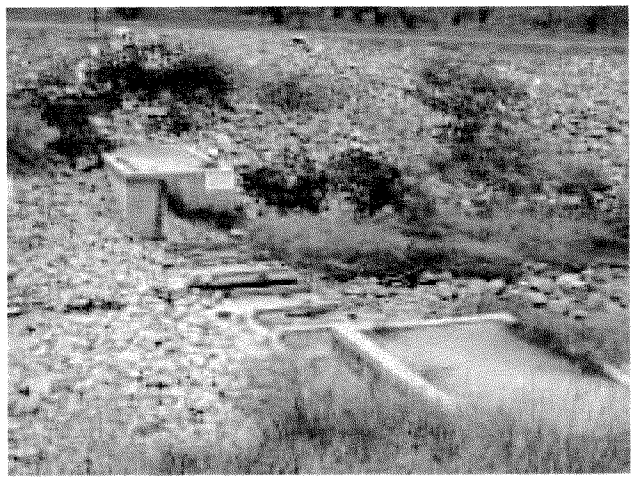


Photo D-48. Prato Flashboard Dam

Photo D-49. Downstream of Prato Flashboard Dam

Photo D-50. Upstream of Prato Flashboard Dam

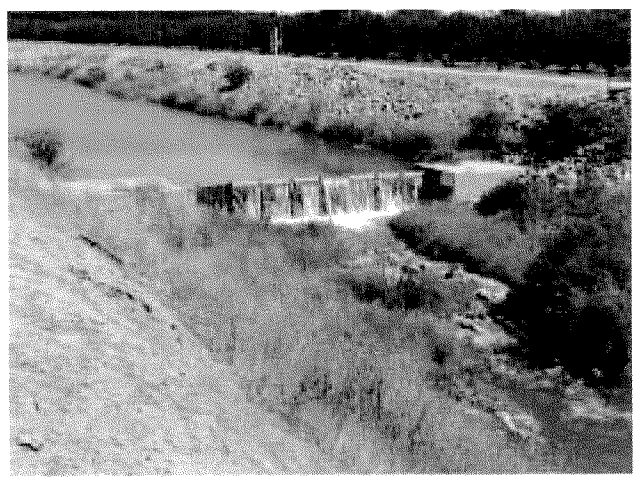


Photo D-51. Flashboards in place at Prato Flashboard Dam

Bonomo Flashboard Dam (Score 4)

Bonomo Flashboard Dam is on Mormon Slough at river mile 12.2. The dam provides support for flashboards during irrigation season. The flashboards usually are removed between October and March when Mormon Slough is a flood control channel.

Bonomo Flashboard Dam base spans 42 feet between concrete abutments and is 11 feet wide (Photo D-52). The concrete base has a 6-inch drop to the downstream riprap, which extends 53 feet downstream (Photo D-53). Three pump-intakes are visible upstream of the dam, two on the right bank and one on the left (Photos D-54 and D-55). Upstream, the banks are steep and heavily eroded. A walnut orchard grows close to the top of the bank crown upstream. The banks are bare or covered in weeds and grasses. There is little riparian vegetation. The middle of the channel is incised and closer to the toe; consolidated muddy benches slope into the channel.

Riprap litters the river channel immediately downstream of the dam base. Downstream of the riprap, there continues to be rocky debris on the right bank, but much of the channel has a bare substrate made up of silty-clay. Grass and weeds above the scour line cover the steep banks. There is little riparian vegetation. The downstream river channel has some meander and has a well-defined rounded trapezoidal cross-section.

During irrigation season with flashboards, the upstream wetted channel is 74 feet wide (Photo D-56). The flashboard dam is 42 feet wide. The water surface difference between the crest and plunge pool is about 5 feet and the plunge pool is 6 inches deep. The dam does not meet the minimum plunge pool depth of 2 feet for juvenile salmonids. We will use modeling results from Piazza Flashboard Dam to assess fish passage at Bonomo Flashboard Dam.

Photo D-52. Bonomo Flashboard Dam

Photo D-53. Downstream of Bonomo Flashboard Dam

Photo D-54. Upstream of Bonomo Flashboard Dam

Photo D-55. Upstream of Bonomo Flashboard Dam, left bank

Photo D-56. Flashboards in place at Bonomo Flashboard Dam

Pershing Avenue Bridge (Score 3)

The Pershing Avenue Bridge crosses perpendicular to the Calaveras River near river mile 3.2, downstream of the confluence of the Stockton Diverting Canal and the Calaveras River (Photo D-57). The Pershing Avenue Bridge crosses the Calaveras River on the west side of the University of the Pacific campus.

The Pershing Avenue Bridge spans 413 feet. The concrete bridge has 102 piers configured in 17 roughly parallel rows of six. The distance between the rows of piers is about 22 feet. The active channel encompasses 8 rows of piers and is about 167 feet wide. The bridge has four lanes. There is no apron under the bridge; however, there are extensive riprap and concrete slabs in the channel extending onto the banks. Both the north and south banks have concrete paths for biking, running, and walking.

Upstream of the bridge, the river channel is well-defined, relatively straight, and dissects the University of the Pacific campus (Photo D-58). Tidal influence keeps water in this section of the river. The upstream banks are flat until you reach the river channel where they are steeply incised. The banks are well vegetated with weeds and grasses. Scattered riparian trees provide minimal shade to the river channel. The invasive giant reed or Arundo donax inundates an island immediately upstream of the bridge. The river bottom directly under and upstream of the bridge is composed of riprap and concrete slabs. Deeper water upstream prevented us from determining what makes up the bottom.

Immediately downstream of the bridge the river channel is composed of riprap and concrete slabs. Farther downstream the channel bottom is bare with scattered rocks. Just downstream, the invasive giant reed or Arundo donax covers an island (Photo D-59). The banks downstream are flat until you reach the active channel where they become steeply incised. The banks are well vegetated with weeds and grasses. Scattered riparian trees provide minimal shade to the river channel. There is a slight left to right meander when looking downstream from Pershing Avenue Bridge.

Because of a constant presence of water, we were unable to determine channel bottom characteristics. Pershing Avenue Bridge has no visible water surface difference between one side of the structure and the other so it does not appear to be a barrier to fish migration.

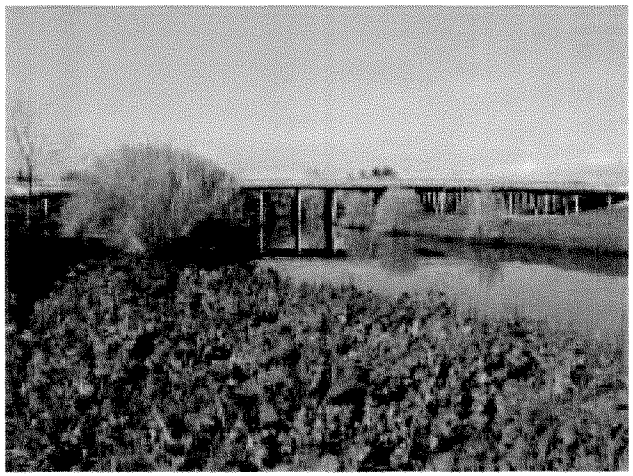


Photo D-57. Looking downstream at Pershing Avenue bridge

Photo D-58: Upstream Calaveras River channel from Pershing Avenue bridge

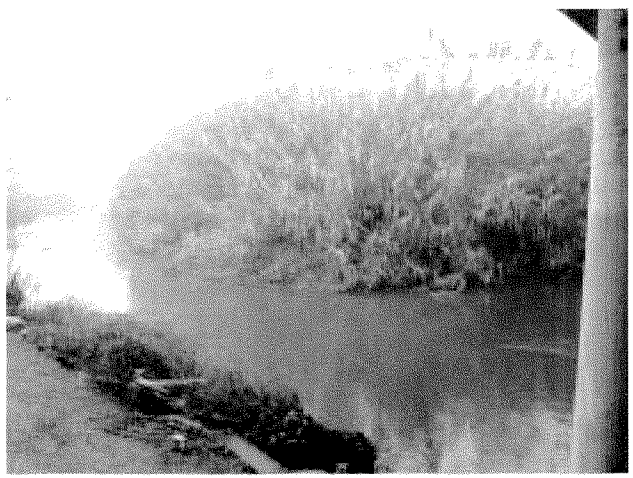


Photo D-59. Below Pershing Avenue bridge looking downstream at island inundated with giant reed (*Arundo donax*)

Old Wooden Bridge (Score 3)

The Old Wooden Bridge is an abandoned wooden bridge on the Calaveras River channel downstream of the Calaveras Headworks near river mile 6. The structure is oriented perpendicular to the flow path and spans approximately 65 feet across the channel. Two sets of wooden support piers made of treated lumber are in the bankfull channel. Most of the small diameter, unfinished logs that rest on the piers spanning the channel remain in place. A few are broken partway or are completely missing. Only a few of the planks that make up the bridge deck still exist at the right bank side (Photo D-60).

The bridge piers are spaced approximately 20 feet apart; the footings are protected by a full-span concrete apron (Photo D-61). The apron is the width of the bridge at approximately 16 feet. The apron appears to be in fair condition and has a rough concrete pour at the downstream end to attempt to reduce scour (Photo D-62).

Upstream of the bridge, the channel is straight and well defined with a rounded trapezoidal shape. The banks are completely covered with thick, grassy vegetation. A single tree stands on the left bank (Photo D-63). The bottom of the upstream pool is approximately one foot below the top of the concrete apron.

The downstream channel is also well defined and a rounded trapezoidal shape. The dense, grassy vegetation on the banks extends into the stream channel starting approximately 20 feet downstream from the structure (Photo D-64). The distance from the top of the apron to the bottom of the downstream pool is approximately 1.75 feet.

The structure appears to be creating some localized downstream scour at the right bank (Photo D-40). This scour is likely due to velocity increased by constriction of flow between the bridge piers and by the concrete apron that is smoother than the natural channel bottom. Because the structure is no longer in use and the bridge is unsafe, the bridge should be removed. Removal of the structure should eliminate future scour problems and unsafe conditions.

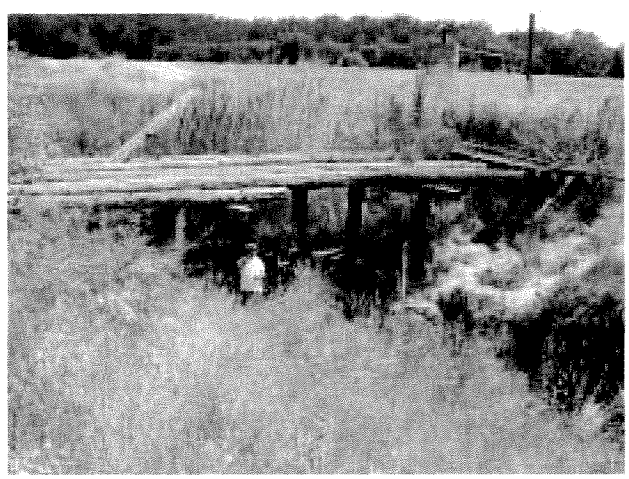


Photo D-60. View from downstream of Old Wooden Bridge

Photo D-61. Footings and apron of Old Wooden Bridge

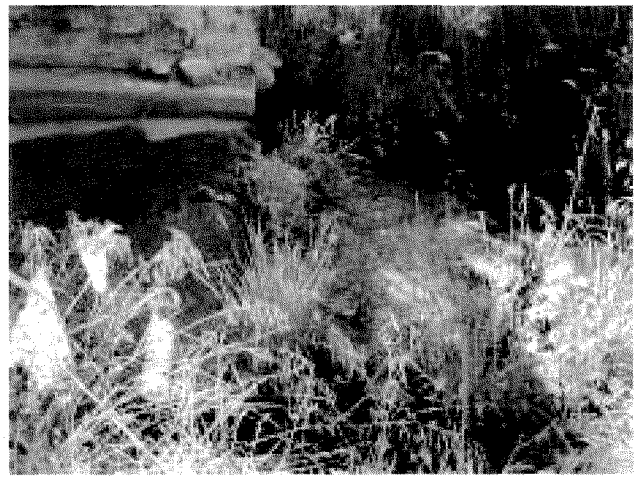


Photo D-62. Rough concrete pour at downstream edge of apron at Old Wooden Bridge

Photo D-63. Concrete apron and upstream channel of Old Wooden Bridge

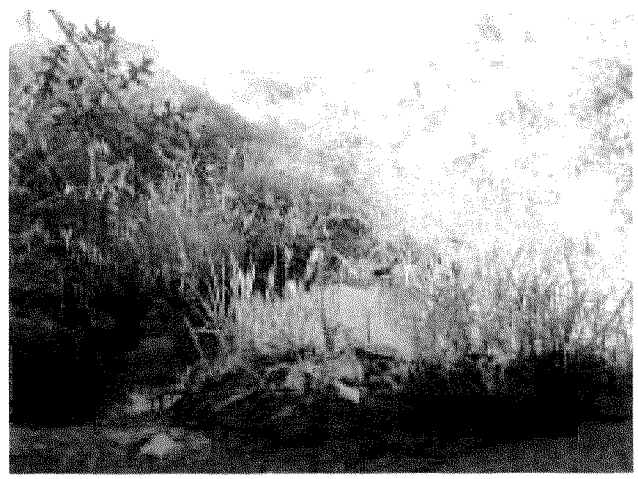


Photo D-64. Channel downstream of Old Wooden Bridge

Gotelli Low-flow Road Crossing (Score 3)
The Gotelli Crossing is a culvert that provides vehicular access across the Calaveras River (Photo D-65). The structure is on the Calaveras River at river mile 6.2, downstream of the Calaveras Headworks. The crossing consists of a circular corrugated metal culvert overlain by an earthen fill road prism situated perpendicular to the channel alignment. The road crossing is unpaved and about 17 feet wide and 40 feet long. The culvert has a diameter of 3.5 feet and a length of 20 feet and is laid on a 2% slope. The inlet and outlet inverts of the culvert are flush with the channel thalweg. The pipe is in poor condition.

The upstream channel is relatively straight, narrow, and trapezoidal (Photo D-66). The channel bottom was fairly clean, and the banks were overgrown with grassy vegetation. The channel bed substrate and banks appeared to be predominantly silty clay.

The downstream channel has properties similar to the upstream channel (Photo D-67). The channel bottom is lined with broken concrete and various household refuse items within 16 feet of the outlet. Further downstream, the bottom of the channel was relatively clean, and the banks were overgrown with grassy vegetation. An old road crossing downstream of the site was causing a backwater condition during the site visit.

Photo D-65. Gotelli Low-flow Road Crossing (River Mile 6.2), view of outlet

Photo D-66. Calaveras River upstream of Gotelli Low-flow Road Crossing (River Mile 6.2)

Photo D-67. Calaveras downstream of Gotelli Low-flow Road Crossing (River Mile 6.2)

McAllen Road Bridge (Score 3)

The McAllen Road Bridge crosses perpendicular to the Calaveras River at river mile 6.9. The bridge is immediately downstream of McAllen flashboard dam (Photo D-68). The bridge has a two-lane road.

The McAllen Road Bridge spans 113 feet. The bridge has two rows of four piers. The rows are 31 feet apart. The active channel below the bridge is 28 feet wide. There is extensive riprap in the channel below, immediately upstream and downstream from the bridge (Photo D-69).

Upstream from the bridge the river channel is a well-defined rounded trapezoid and slightly meandering (Photo D-70). The upstream banks slope moderately until you near the tops of the levee where it becomes more gradual. The banks are well vegetated with weeds, bushes, and grasses. Upstream, riparian trees provide some shade to the river channel. Immediately upstream from the bridge is McAllen flashboard dam. Riprap covers the upstream channel. Upstream on the right bank are four drainpipe outlets. Farther upstream, the river channel is bare with scattered rubble.

Downstream of McAllen Road Bridge the river channel narrows and is well defined (Photo D-71). The downstream banks are steep until you reach the top of the levee where the slope becomes more gradual. The banks are heavily vegetated with grasses, bushes, and weedy vegetation (especially blackberry). Downstream riparian trees (especially left bank) provide shade to the river channel. Immediately downstream from the bridge, the channel is composed of riprap that gives way to a bare substrate.

Photo D-68. Looking downstream at McAllen Road Bridge

Photo D-69. Riprap below McAllen Road Bridge

Photo D-70. Looking upstream from McAllen Road Bridge

Photo D-71. From McAllen Road Bridge looking downstream

Highway 99 Pedestrian Bridge (Score 3)

The Highway 99 Pedestrian Bridge crosses perpendicular to the Calaveras River at river mile 7.4. This bridge is just downstream from the Highway 99 Bridge, southbound. The bridge is wide enough for cyclists and walkers simultaneously.

The Highway 99 Pedestrian Bridge spans 126 feet (Photo D-72). The bridge uses four wooden piers grouped into two rows of two. Each row is 33 feet apart. The 15-foot-wide active channel runs between the two rows of piers. Under the bridge, the channel is bare earth.

Immediately upstream from the pedestrian bridge are the Highway 99 bridges, southbound and northbound (Photo D-73). The river channel upstream from the bridge has a bare earth substrate with some scattered riprap. Farther upstream, the river channel converts into the concrete that is associated with the apron from Highway 99 Bridge, northbound. As the river channel approaches the apron, the channel becomes wider. Upstream from the bridge, both banks go from being covered with grasses to bare earth (when under Highway 99 bridge, southbound), to riprap, weedy grasses, and bushes (between Highway 99 bridges), and finally to concrete (associated with Highway 99 Bridge, northbound). The upstream banks are moderately sloped near the river channel, becoming less steep as you approach the road.

Downstream from the pedestrian bridge, the channel is bare earth with some scattered riprap. Here the river channel narrows and has a slight meander (Photo D-74). Downstream from the bridge, both banks are covered with blackberry and grasses. The downstream banks are steep near the river, but less steep as you approach the tops of the levees. A few riparian trees provide minimal shade to the river channel.

Because the structure has no apron or riprap scour protection and there is no visible water surface difference between one side of the structure and the other, it is not a barrier to fish migration.

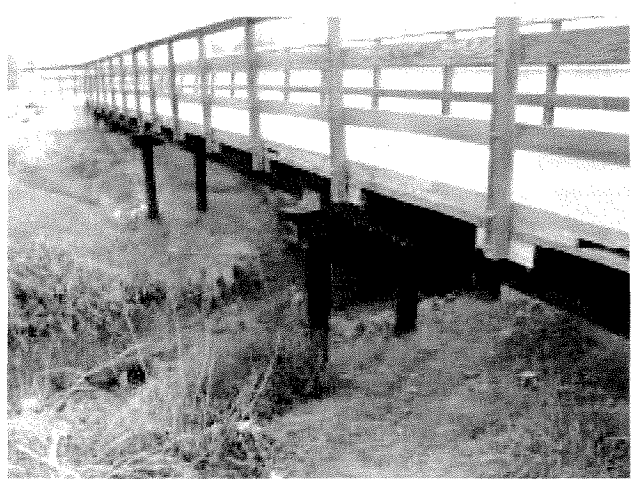


Photo D-72. Highway 99 Pedestrian Bridge

Photo D-73. Between Highway 99 Pedestrian Bridge and Highway 99 Bridge, southbound

Photo D-74. Downstream of Highway 99 Pedestrian Bridge

Lavaggi Flashboard Dam (Score 3)

Lavaggi Flashboard Dam is on Mormon Slough at river mile 7.5. The dam base supports flashboards during irrigation season. When the flashboards are removed, Mormon Slough becomes a flood control channel.

Lavaggi Flashboard Dam spans 45 feet across Mormon Slough between two 18-foot concrete abutments (Photo D-75). The dam base is 11 feet wide and drops about 2 feet to the downstream riprap. The riprap is 42 feet wide and extends 32 feet downstream of the dam base. There is also riprap on the banks immediately around the base. The channel bottom is silty-clay. In general, grass, shrubs, and weeds cover the steep banks above the scour line. Willows are beginning to take hold on the upstream left bank and immediately downstream of the left bank abutment. They provide some surface shade to the channel. The channel has little or no meander with a well-defined rounded trapezoidal cross section (Photos D-76, D-77).

During irrigation season, a 7-foot-high flashboard dam creates a 6.5-foot water surface difference and 63-foot upstream wetted width (Photo D-78). Water spilling over the dam creates a 6-inch-deep sheet flow over the downstream concrete apron, which is 7.5 feet long. Downstream of the apron, shallow water flows over and through a stretch of riprap. The minimum plunge pool depth of 2 feet for juvenile salmonids is not met at Lavaggi Flashboard Dam.

Photo D-75. Lavaggi Flashboard Dam Photo

D-76. Upstream of Lavaggi Flashboard Dam

Photo D-77. Downstream of Lavaggi Flashboard Dam

Photo D-78. Flashboards in at Lavaggi Flashboard Dam

McClean Flashboard Dam (Score 3)

McClean Flashboard Dam is on Mormon Slough near river mile 11 (Photo D-79). The dam base supports flashboards during irrigation season. The flashboards usually are removed between October and March when Mormon Slough is a flood control channel.

The concrete base of McClean Flashboard Dam spans 45 feet across Mormon Slough between two 16-foot concrete abutments. The concrete base is 12 feet wide and flush with the riprap scour protection upstream and downstream. Riprap extends 15 feet upstream of the dam base.

About 60 feet upstream, there is a rock and concrete rubble weir to reduce erosion upstream of the dam during high flows (Photo D-80). The right bank is steep and poorly vegetated with annual weeds and grasses. There are no riparian woody plants. The banks in the active channel are eroded exposing silty clay. Two gravel bars, one next to the rubble weir, have been deposited upstream at the left bank toe. A grated pump intake pipe extends from the right bank. The channel upstream of dam is straight; however, there is a slight meander in the channel downstream. The channel has a well-defined trapezoidal cross-section.

A riprap apron extends 23 feet downstream of the dam base and extends intermittently for another 209 feet (Photo D-81). The downstream channel is narrow and incised where riprap has been scoured away. It is trapezoidal in shape with a vegetated bench next to the right and left banks. Exotic grasses and weeds cover the channel and banks. Where there is vegetation on the upper banks, it is mostly annual weedy grasses. Grass and weeds also cover the channel banks around the dam although some cattails (Typha sp.) and willows (Salix sp.) are taking hold near the toes of the downstream banks.

During irrigation season when the flashboards are in place, the crest to pool height is about 6 feet and the upstream wetted channel is 72 feet (Photo D-82). The bankfull channel is 90 feet wide and the flashboard crest length is 45 feet. Also, the flashboards are 7 feet high; water flowing over the dam creates a plunge pool of about a foot. The minimum plunge pool depth of 2 feet for juvenile salmonids is not met at McClean Flashboard Dam. We will use modeling results from Piazza flashboard dam to assess fish passage at McClean Flashboard Dam.

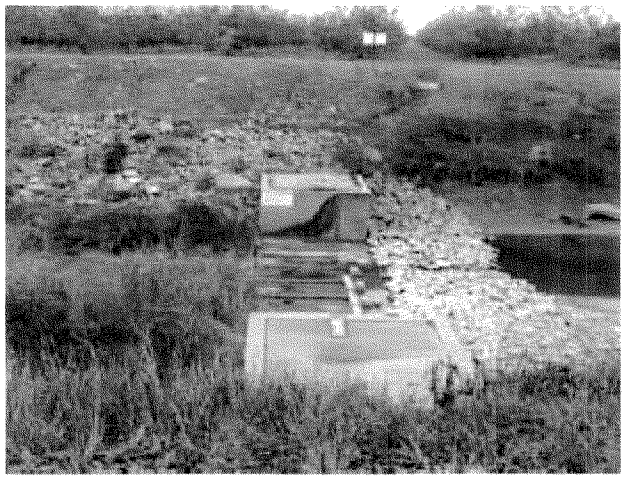


Photo D-79. McClean Flashboard Dam

Photo D-80. McClean Flashboard Dam with rock weir 60 feet upstream

Photo D-81. Looking downstream from the McClean Flashboard Dam base

Photo D-82. McClean Flashboard Dam with flashboards installed

Piazza Flashboard Dam (Score 3)

Piazza Flashboard Dam is on Mormon Slough at river mile 12.0. The structure supports flashboards during irrigation season. When they are removed, Mormon Slough becomes a flood-control channel.

The concrete base of Piazza Flashboard Dam base spans 53 feet across Mormon Slough between two 17-foot abutments (Photo D-83). The dam base is 11.5 feet wide and drops 6 inches to the downstream riprap. The riprap is 43 feet wide and extends 26 feet downstream. There is no notch in the dam base. Grass and weeds grow on the banks near the dam, but there is no riparian cover.

Upstream of the dam, there is an irrigation pump on the right bank (Photo D-384). There is riprap on the banks on the upstream side, and the channel is made up of silty-clay. There is riprap just downstream of the dam. Beyond that, rocks are scattered along the channel bed. Both upstream and downstream of the dam, the banks are steep, and weeds and brush line the banks above the scour line (Photo D-85). There is little riparian vegetation. The channel is straight with a well-defined rounded trapezoidal cross-section.

During irrigation season when flashboards are installed, the upstream wetted channel is 137 feet wide. The flashboards are 7 feet high and the water surface difference between the crest and the plunge pool is about 6 feet. Water flowing over the dam creates a plunge pool depth of a foot, which does not meet the 2-foot minimum plunge pool depth requirement for juvenile salmonids. The flashboards span 50.4 feet across Mormon Slough (Photo D-86). The concrete apron downstream of the flashboards is 8.7 feet long.

Photo D-83. Piazza Flashboard Dam base

Photo D-84. Upstream of Piazza Flashboard Dam

Photo D-85. Downstream of Piazza Flashboard Dam

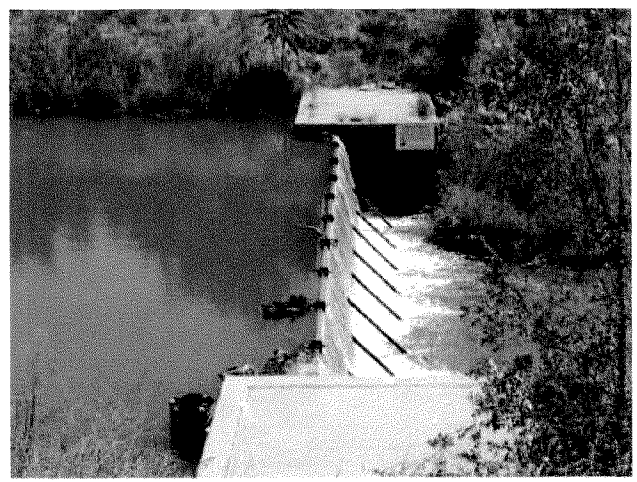


Photo D-86. Flashboards in place at Piazza Flashboard Dam Interstate 5 Bridges

Hosie Flashboard Dam (Score 3)

The Hosie Flashboard Dam is on Mormon Slough at river mile 13.4 (Photo D-87). The Hosie Flashboard Dam base spans 77 feet between abutments and is 11 feet wide. Riprap extends 77 feet across the channel and 49 feet downstream. There is no drop between the dam base and the downstream riprap. Upstream riprap scour protection is flush with the dam base. The dam base is in poor condition with the concrete eroding from the downstream side.

The typical upstream channel is trapezoidal (Photo D-88). The channel upstream has a slight meandering. The right upstream bank supports brush, weeds, and grassy vegetation on a gentle slope. Rock riprap covers the left bank armoring it upstream and downstream. Perennial grasses and water weeds are established in the channel. Willows are growing on depositional bars. The channel bed immediately upstream of the dam has aggraded to match the structure grade. The few riparian trees provide little shade to the slough. The dam is the dominant controlling feature for the upstream pool.

The downstream channel is similar to the upstream (Photo D-89). There is riprap downstream of the dam for 49 feet. There are no trees to shade the channel downstream of the structure.

With all the flashboards in place, the crest length is 78 feet. Upstream wetted width is 105 feet (Photo D-90). The crest to pool height is 4 feet and the plunge pool depth is 6 inches, which does not meet the minimum plunge pool depth of 2 feet for juvenile salmonids.

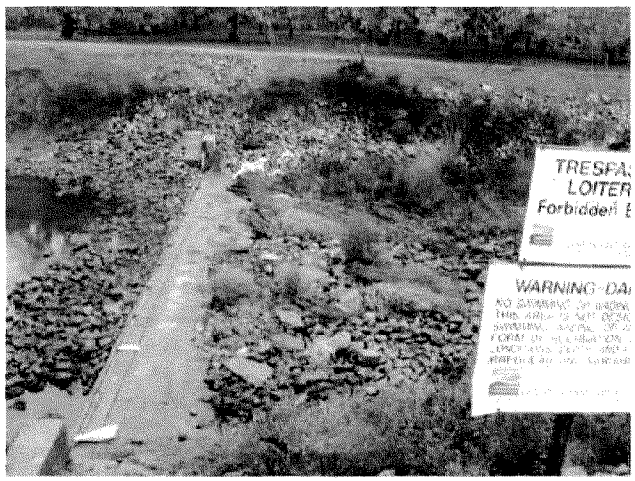


Photo D-87. Hosie Flashboard Dam from right bank

Photo D-88. Looking upstream from Hosie Flashboard Dam

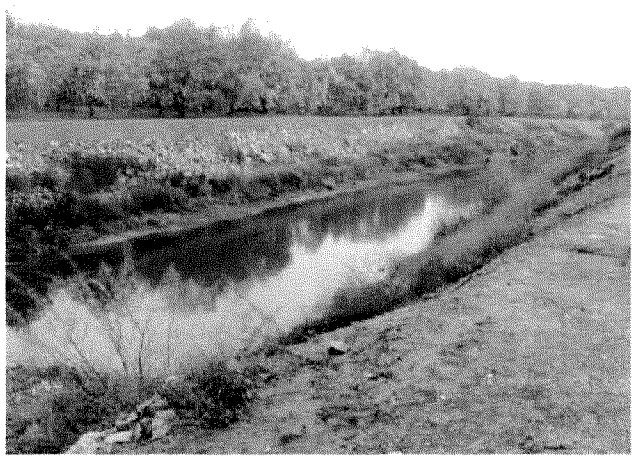


Photo D-89. Looking downstream of Hosie Flashboard Dam

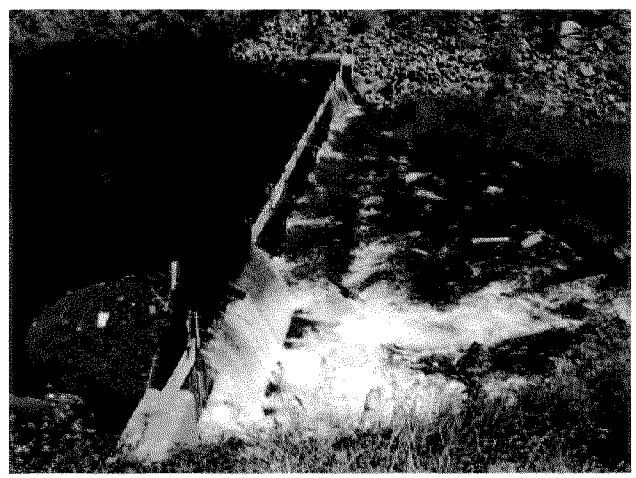


Photo D-90. Hosie Flashboard Dam with all but two flash-boards

Avansino Street Flashboard Dam (Score 3)

Avansino Street Flashboard Dam is on Mormon Slough, downstream of Bellota Weir, at river mile 14.4 (Photo D-91). The dam supports flashboards during irrigation season. The flashboards usually are removed between October and March when Mormon Slough is a flood control channel.

The Avansino Street Flashboard Dam base spans 61 feet between the concrete abutments and is 11 feet wide. There is no notch in the foundation. The base drops 6 inches to the downstream riprap. Riprap lines the entire width of the channel bottom for 33 feet downstream of the dam base. Riprap protection also lines the upstream (Photo D-92) face of the dam base and extends up the banks around the abutments. The lower banks along this stretch of the channel are scoured next to the lowflow channel and grass and shrubs cover them above the scour line (Photo D-93). The upper banks have little riparian cover.

The channel cross-section is trapezoidal, and there is no meander near the dam base. Beyond the riprap upstream and downstream of the dam base, the channel bottom is a bare, silty-clay. During high flows the dam base is under water.

During the irrigation season, a 7.5-foot-high flashboard dam impounds water for irrigation deliveries through two pumps (Photo D-94). The flashboards span 61 feet across the channel between two 15- foot concrete abutments and create a 6.3-foot water surface difference. Water spilling over the dam crest falls into a 1.4-foot-deep plunge pool over a 7.7-foot-long concrete apron. The dam's minimum plunge pool depth of 2 feet for juvenile salmonids is not met.

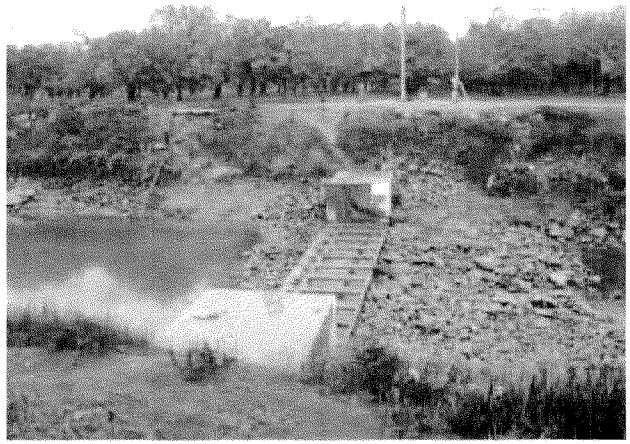


Photo D-91. Avansino Street Flashboard Dam base

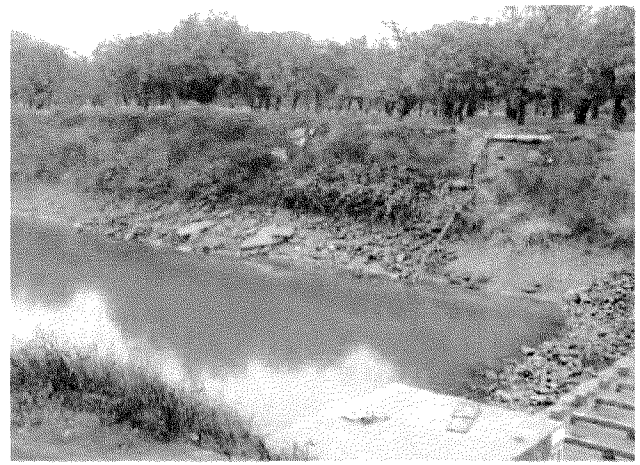


Photo D-92. Upstream of Avansino Street Flashboard Dam

Photo D-93. Downstream of Avansino Street Flashboard Dam

Photo D-94. Flashboards in place at Avansino Street Flashboard Dam

Fine Road Bridge (Score 3)

Fine Road Bridge is a concrete and steel structure 206 feet long across Mormon Slough four-tenths of a mile upstream of river mile 15 (Photo D-95). The structure is supported by two concrete piers 65 feet apart. The piers stand at the edges of the active channel. Although the active channel measures 65 feet wide below the bridge, it narrows to 49 feet away from the bridge. The channel upstream and downstream of the bridge is straight. The banks are steep, and for the most part, covered with grass. The channel has a silty bottom.

Photo D-95. Fine Road Bridge

McAllen Flashboard Dam (Score 2)

McAllen Flashboard Dam base is near river mile 6.9, immediately upstream of McAllen Road Bridge (Photo D-96). Flashboards are used during irrigation season. When the flashboards are removed, the channel typically receives minimal flows.

The dam base span is about 36 feet. The distance between terminal points of the concrete on the banks is about 43 feet. The bankfull channel is about 80 feet wide. The bottom of the dam base is 5 feet wide and creates a 1.3-foot sloping drop to the channel bed. Riprap and boulders line the channel bottom. Additionally, significant amounts of trashy debris are in the river channel near this site. Four water outfall pipes are on the right bank upstream from the dam (Photo D-97). The structure is a concrete base across the channel bottom and extends partly up the sides of the channel. There is no notch in the flashboard dam base.

The upstream channel about 50 feet from the structure is covered with riprap (Photo D-98). Upstream, the river channel is a well-defined rounded trapezoid and slightly meandering. Upstream beyond the riprap, the substrate in the river channel is silty clay with some scattered riprap. The upstream banks are moderate in slope until you near the tops of the levee where the slope becomes more gradual. The banks are well vegetated with weeds, bushes, and grasses. Upstream, riparian trees provide some shade to the river channel.

Immediately downstream from the dam base the channel bed and lower banks are covered with riprap. The riprap continues until downstream of McAllen Road Bridge where the channel substrate gives way to silty clay with some scattered riprap. Downstream, the channel narrows visibly and is well-defined. The downstream banks are steep until you reach the area near the tops of the levee where the slope becomes more gradual. The banks are heavily vegetated with grasses, bushes, and weedy vegetation, especially blackberry. Downstream, riparian trees (especially left bank) shade the river channel.

With the flashboards in, McAllen Flashboard Dam is 5.3 feet high and spans 36 feet across the river (Photo D-99). During irrigation season, the typical water surface difference between the dam crest and the plunge pool is 2.9 feet. The deepest part of the plunge pool is 2.4 feet deep and about 4 feet away from the dam face. The minimum plunge pool depth of 2 feet for juvenile salmonids is met at McAllen Flashboard Dam.

Photo D-96. McAllen Flashboard Dam upstream of McAllen Road Bridge

Photo D-97. Outfall pipes upstream of McAllen Flashboard Dam base

Photo D-98. Upstream from McAllen Flashboard Dam base

Photo D-99. Downstream from McAllen Flashboard Dam

TIER 3 STRUCTURES

Old DWR Gage Weir (Score 2)

Old DWR Gage Weir is an abandoned flow gage system on the Calaveras River downstream of Calaveras Headworks at river mile 9.5. The system consists of a concrete weir downstream of Solari Ranch Road bridge and an encased gage apparatus affixed to the bridge at the right bank.

The concrete weir spans 16 feet across the channel bottom in an arced chevron shape pointing in the downstream direction. The weir has an ogee shape; a rounded crest that slopes down then flattens, and is about 4 feet from upstream crest to downstream lip and 2.5 feet tall from centerline crest to toe (Photo D-100). Under low-flow conditions, there is a drop from the downstream edge of the weir to plunge pool surface.

The typical channel near the structure has a rounded trapezoidal shape and is straight and well defined. The channel upstream from the weir is silty and flat. The banks are vegetated with vines and trees, with dense, overhanging vegetation on the left bank. Upstream from the weir is the abandoned DWR stream gage apparatus and bridge for Solari Ranch Road. About 15 feet upstream from the bridge are concrete lined banks and the concrete base for Solari flashboard dam.

Downstream from the weir, the silty bottom has riprap and scattered concrete rubble. Dense blackberry vines and trees overhang the channel on the left bank. The right bank has sparser blackberry cover and shows signs of bank erosion (Photo D-101). Trash and debris litter the channel bottom both up and downstream from the weir.

The structure is a potential barrier to upstream fish migration. Until flows are high enough to backwater or submerge the weir, fish leaping onto the flat portion of the weir do not have sufficient water depth to proceed and leap over the rounded crest. Water velocity over the smooth concrete may also cause a fish to fall back after leaping onto the lower weir. Because the weir and gage are no longer in use, the structure should be removed.

Photo D-100. Looking upstream at the Old DWR Gage Weir

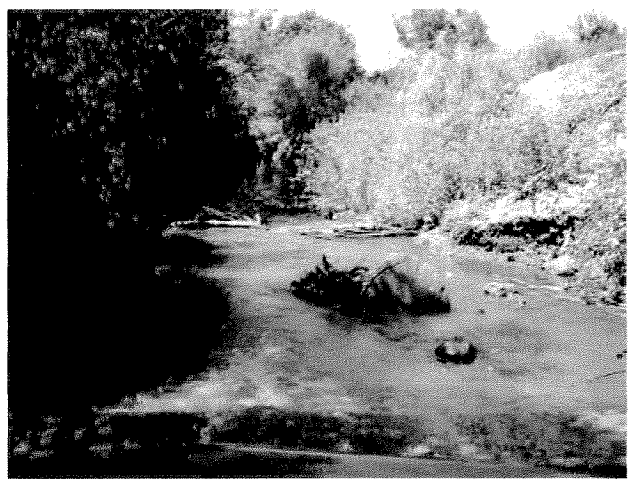


Photo D-101. Looking downstream from the Old DWR Gage Weir crest

Tully Flashboard Dam (Score 2)
Tully Flashboard Dam is at river mile 17.9, immediately upstream of Tully Road Bridge. The base of the structure (Photo D-102) provides support for flashboards during irrigation season. When the flashboards are removed, the channel typically receives minimal flows.

The dam base span is 65 feet. The distance between terminal points of the concrete on the banks is 68 feet, also representing the bankfull channel. The structure, shaped like a trapezoid, forms a complete concrete lining on the river channel and on the banks. The bottom of the dam base is 4 feet wide, and there is no drop from the dam base to the channel bed. The bottom portion of the dam is covered with a thin layer of silt and algae. There is no dam base notch.

Immediately upstream of Tully Flashboard Dam there is some scattered rubble on the left bank. Farther upstream on the left and right banks, the channel is mostly bare with some grass. Farther up the banks, the vegetation becomes thick with weedy bushes (especially blackberry) (Photo D-103). Upstream, the river channel is a well-defined rounded trapezoid, slightly meandering, and bare. The upstream banks are moderate in slope, and a few riparian trees provide minimal shade to the river channel.

Immediately downstream of Tully Flashboard Dam, the channel is inundated with vegetation (Photo D-104). This vegetation constricts the river channel. The vegetation is a mixture of weedy grasses, weedy bushes, and riparian trees, and continues along the river channel downstream of Tully flashboard dam beyond Tully Road Bridge. Downstream from the dam, the river channel substrate gives way to silty clay with some woody debris. The downstream banks are steep and heavily vegetated. Downstream, riparian trees provide shade to the river channel.

Tully Flashboard Dam is 10 feet high and spans 67 feet across the river (Photo D-105). During the irrigation season, the dam creates a 7.2-foot water surface difference.

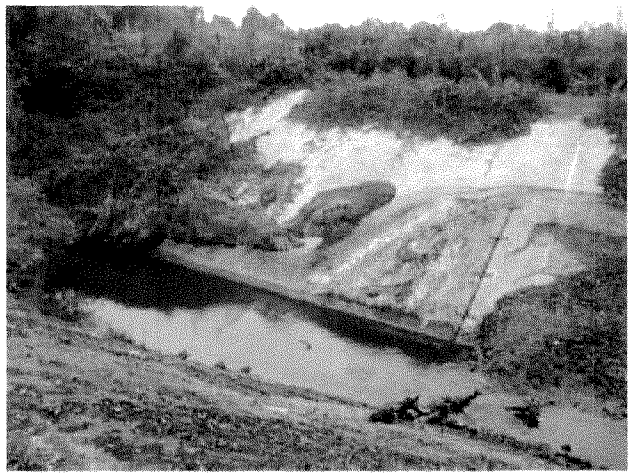


Photo D-102. Looking at the base of Tully Flashboard Dam

Photo D-103. Looking upstream from Tully Flashboard Dam

Photo D-104. Downstream from Tully Flashboard Dam

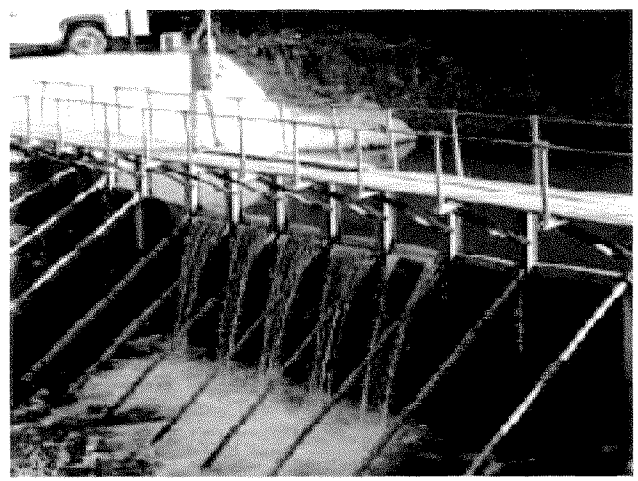


Photo D-105. Looking at Tully Flashboard Dam

Guernsey Road Bridge (Score 2)

The Guernsey Road Bridge crosses perpendicular to the Calaveras River at river mile 20.6, downstream of the Calaveras Headworks (Photo D-106).

The Guernsey Road Bridge spans 34 feet. The bridge does not have any piers. The bridge has concrete abutments at both ends for support. The active channel is 21 feet. There is no apron under the bridge. There is scattered riprap under the bridge. The riprap encompasses the entire active channel and extends approximately 20 feet upstream and downstream.

Upstream, past the riprap, the river channel is bare earth composed of silty-clay soil. The channel is trapezoidal and has a slight meander. The left bank upstream is steep and heavily vegetated with weedy bushes and grasses and some riparian vegetation. The left bank is less steep and less vegetated. Some grasses and riparian vegetation are associated with the left bank (Photo D-107).

Downstream of the bridge, past the riprap, the river channel is bare earth composed of silty-clay soil. The channel is trapezoidal and has a slight meander. The right bank is heavily vegetated with bushy weeds, and the left bank is dominated by grasses. Visible riparian trees provide shade to the river channel (Photo D-108). The upstream and downstream areas surrounding the river are dominated by orchards.

Photo D-106. Guernsey Road Bridge on the Calaveras River

Photo D-107. Looking upstream from Guernsey Road Bridge

Photo D-108. Looking downstream from Guernsey Road Bridge at the log jam

Concrete Slabs (Remnant Structure) (Score 2)

There are concrete slabs on the channel bottom on Mormon Slough near river mile 12.7. We suspect they are remnants of an old bridge (Photo D-109). We did not measure or survey the site. The pieces of concrete might be a barrier to fish migration and should be removed.

Photo D-109. Concrete slabs of remnant structure

Highway 26 Flashboard Dam (Score 2)

Highway 26 Flashboard Dam is on Mormon Slough near river mile 17. The flashboards usually are removed between October and March when Mormon Slough is a flood control channel.

The Highway 26 Flashboard Dam base is 65 feet long between abutments and 11 feet wide. When the boards are in place the bank full channel width is 80 feet while the upstream wetted channel width is 72 feet. The drop from the dam crest to the downstream pool is just over 2 feet while the plunge pool depth is a tenth of an inch under a foot (Photo D-110). The upstream channel is wide, trapezoidal and has two bends before reaching the dam (Photo D-111).

The upstream banks are steep and vegetated with annual weedy species. There are a few trees near the first upstream bend (Photo D-111). When we took the photograph, however, they were too small to provide instream benefit. There is a lot of riprap on the left bank upstream and next to the abutment.

The channel downstream of the flashboard dam is straighter than the upstream channel and there are annual weeds and grasses (Photo D-112). Another similarity is the woody vegetation established and growing where the channel bends. The vegetation is hanging over the toe and providing some instream benefits.

The drop from the dam base to the riprap apron in the channel is 10 inches. The in-channel riprap spans the width of the channel for 80 feet and down the channel for 19 feet. The upstream riprap apron is 65 feet wide. We will use modeling results from Piazza Flashboard Dam to assess fish passage at Highway 26 Flashboard Dam.

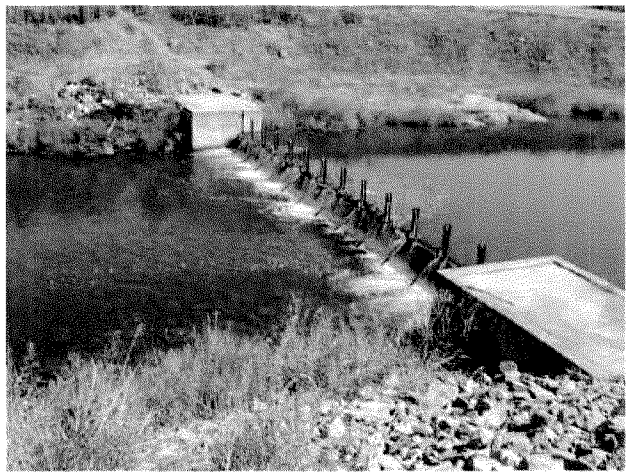


Photo D-110. Highway 26 Flashboard Dam taken from the downstream left bank

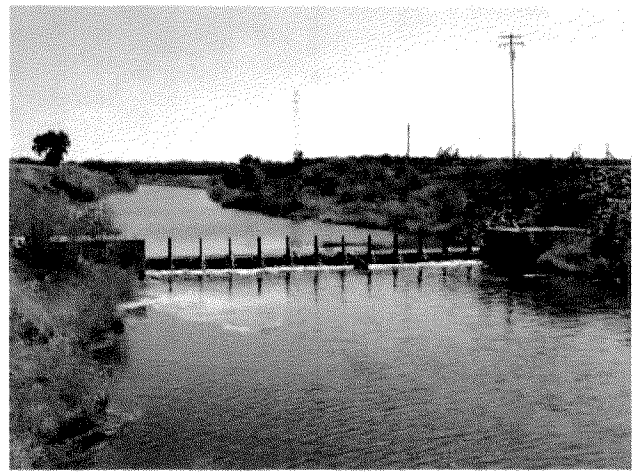


Photo D-111. Hwy 26 Flashboard Dam as seen from downstream

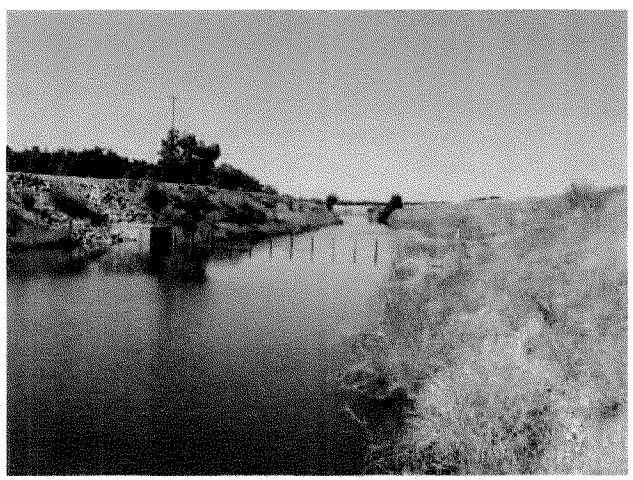


Photo D-112. Highway 26 Flashboard Dam looking downstream

Concrete Remnant Structure Upstream Of Pacific Avenue Bridge (Score 1)

The concrete remnant structure upstream of Pacific Avenue Bridge, near river mile 3.9, appears to have been the foundation and abutments of a flashboard dam (Photo D-113). The opening between abutments is 8 feet wide, and the bankfull width is 60 feet. The structure has been washed away near the left bank and is no longer in use. Because the structure is no longer in use, it should be removed.

Photo D-113. Upstream face of concrete remnant structure

Solari Ranch Flashboard Dam (Score 1)

Solari Ranch Flashboard Dam base is near river mile 10.1, immediately upstream of Solari Ranch Road Bridge and the old DWR stream gage (Photo D-114). The structure provides support for flashboards during irrigation season. When the flashboards are removed, the channel typically receives minimal flows.

The base of Solari Dam is concrete lining that creates a trapezoidal channel. The structure span comprises the distance between terminal points of the concrete on the banks, about 51 feet. The bankfull channel width is about 51 feet. The concrete lining extends about 52 feet along the channel, is about 13 feet wide, and ends flush with the channel bottom. There are significant amounts of trashy debris in the river channel near this site. There is no dam base notch present. When water flow is present, typically high water velocities exist over the dam base.

The river channel immediately upstream from the dam base is bare with some scattered rubble. The channel is trapezoid in shape and has little meander (Photo D-115). The upstream banks are moderate in slope until you near the top of the levee where the slope is more gradual. Both banks are well vegetated with weeds, bushes, and grasses. Upstream, there are riparian trees, and they provide some shade to the river channel.

Immediately downstream from the dam base there is a narrow band of riprap that crosses the whole channel. Downstream of this row of riprap there is scattered rubble, and excessive trash and debris (Photo D-116). This continues downstream past the old DWR stream gage. Where there is not rubble, debris, or trash the channel substrate is comprised of silty-clay soil. Compared to the upstream banks, the downstream banks are steeper. Both banks are well vegetated with weeds, bushes, and grasses (except for under the bridge). Downstream, there are riparian trees, and they provide some shade to the river channel. Fish passage at Solari Ranch flashboard dam is represented by the modeling results from Murphy Dam.

Photo D-114. Solari Ranch Flashboard Dam base

Photo D-115. Upstream from Solari Ranch Flashboard Dam

Photo D-116. Downstream from Solari Ranch Flashboard Dam base

Pezzi Flashboard Dam (Score 1)

Pezzi Flashboard Dam is near river mile 12, downstream from the Calaveras Headworks. The structure is a concrete box culvert with two bays oriented perpendicular to the river (Photo D-117). The structure supports flashboards during the irrigation season and is topped with a 20-foot-wide bridge.

The culvert has two bays that are 12 feet wide, 17 feet high and 20 feet long. A half-height buttress wall is centered in each bay to support the flashboards. Each bay and buttress has metal guide slots to install flashboards across the inlet of the structure to allow upstream water diversions during the irrigation season.

Due to the large amount of accumulated sediment upstream from the inlet, three rows of flashboards (total height 3.6 feet) were still in place as of November 2002. The bottom slab of the culvert was buried below sediment.

The channel upstream from the culvert is gradually meandering and well defined with a rounded trapezoidal cross section. The channel bottom and lower banks are bare; made up of silty-clay with some small stones. The mid- and upper-side slopes are well vegetated with shrubs and trees (Photo D- 118). Both sideslopes have concrete protection that extends about 20 feet upstream from the structure. The right bank (looking downstream) also has a water-diversion pump. Significant sediment accumulation has occurred due to the seasonal flashboard dam. The sediment occurs during the irrigation season when the flashboards are in place and irrigation flows are routed through the channel. During the non-irrigation season, when the flashboards are removed, the channel typically receives minimal flows.

The downstream reach narrows and curves to the left (looking downstream) as it moves away from the structure. Concrete lines the right slope from the top of the bank to mid-channel and extends 95 feet downstream from the structure. Dense blackberry bushes and shrubs cover the left slope. Downstream from the concrete lining, both banks are heavily overgrown (Photo D-119). Both the channel bottom and banks are made up of sandy clay with some small stones. A lot of sediment has been deposited downstream. A sandy bar has formed on the right immediately downstream from the culvert outlet; up to 1.5 feet of sandy material covers the concrete lining in the channel.

The low flow control point is 40 feet downstream from the structure where the channel narrows. Upstream from the control point, a pool is backed up inside the culvert. Downstream from the control point, the channel has the characteristic of a glide.

Pezzi Flashboard Dam has half-height buttress walls centered in each bay to provide support for the flashboards. Each bay and buttress has metal guide slots for installation of flashboards across the inlet of the structure to accommodate upstream water diversions during the irrigation season. The culvert bays are blocked with flashboards 7.3 feet high during the irrigation season (Photo D-120). The flashboards create a 7.2-foot water surface difference. The plunge pool downstream from the dam is about 4 feet from the dam face and greater than 5 feet deep.

Photo D-117. Looking upstream at Pezzi Flashboard Dam

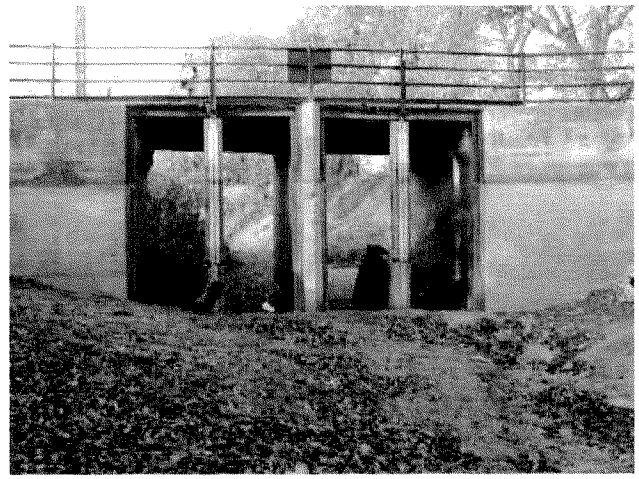


Photo D-118. Upstream view of Pezzi Flashboard Dam. Note sediment accumulation at inlet

Photo D-119. Channel downstream of Pezzi Flashboard Dam

Photo D-120. Looking upstream at Pezzi Flashboard Dam

Murphy Flashboard Dam (Score 1)

Murphy Flashboard Dam crosses perpendicular to the river at river mile 12.5, downstream from the Calaveras Headworks. The culvert abutments are 23 feet long in the direction of flow and extend into the channel 18 feet from the banks. The culvert has four narrow bays that are 5 feet wide and 15 feet high. The walls dividing the bays are a foot thick and sloped on the downstream side, extending farther downstream at the base (18 feet) than at the top (6 feet) (Photo D-121). The culvert floor is 19 feet long in the direction of flow. Each bay has metal guide slots for installation of flashboards across the inlet of the structure to accommodate upstream water diversions during the irrigation season (Photo D-122). The total span between the abutments is 23 feet. The flashboards of Murphy Flashboard Dam block the entire opening of the culverts during irrigation season. The boards are placed 10.5 feet high and create a 3.5 feet water surface difference. The downstream plunge pool is at least 7.4 feet deep and 5.3 feet from the dam face. The minimum plunge pool depth of 2 feet for juvenile salmonids is met at Murphy Dam.

One row of flashboards (1.2 feet high) remained in place as of November 2002, and a large amount of sediment has accumulated upstream of the inlet. The bottom slab of the culvert was embedded below deposited sediment, but this area was still lower in elevation than the channel upstream or downstream.

The channel upstream of the culvert is gradually meandering, wide and well defined with a rounded trapezoidal cross section. Immediately upstream of the structure, both side slopes have concrete protection that extends about 13 feet upstream. A diversion pump is on each bank. Beyond the concrete lining, the channel bottom and lower banks are bare; made up of silty-clay with some small stones. The upper side slopes are well vegetated with grasses, shrubs and a few trees (Photo D-123). The sediment accumulation occurs during the irrigation season when the flashboards are in place and irrigation flows are routed through the channel. During the non-irrigation season, when the flashboards are removed, the channel typically receives minimal flows.

Downstream of the culvert, the channel continues its gradual meander, and has a wide, rounded trapezoidal shape. Concrete lines both banks for about 24 feet downstream of the structure's abutments. Beyond the concrete lining, the silty-clay lower banks and channel are free of debris and vegetation. The upper side slopes are well vegetated with shrubs and trees (Photo D-124). Although there is a scour pool inside the culvert due to water flow over the flashboards, the scour is localized. Once outside the culvert, the channel thalweg rapidly returns nearly to that of the upstream elevation.

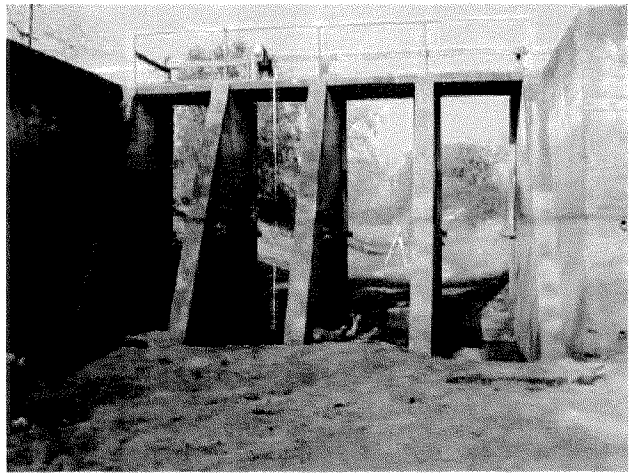


Photo D-121. View from downstream side of Murphy Flashboard Dam

Photo D-122. View from upstream side of Murphy Flashboard Dam

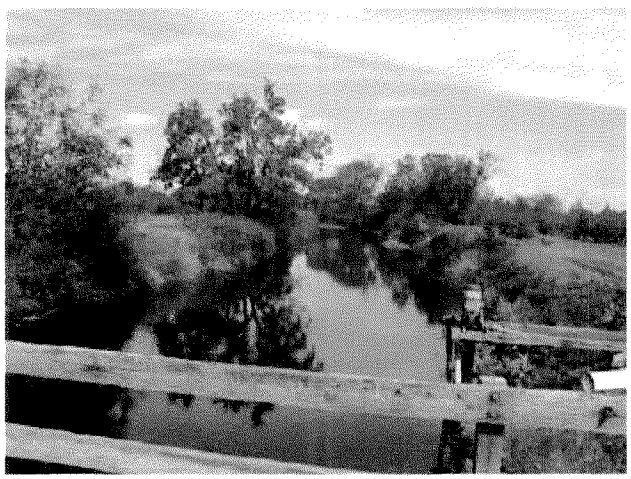


Photo D-123. Upstream view from top of Murphy Flashboard Dam with flashboards installed

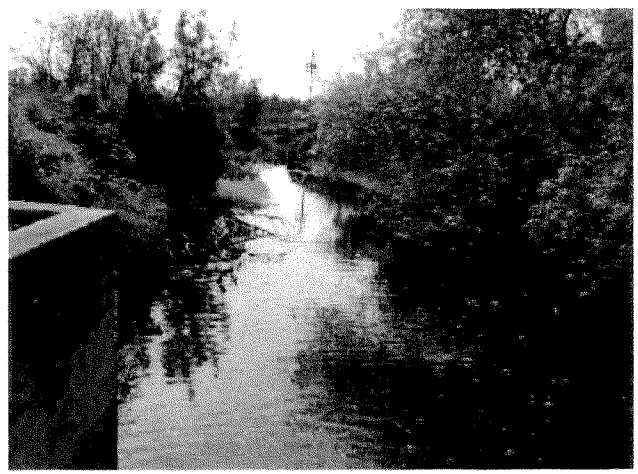


Photo D-124. Downstream view from top of Murphy Flashboard Dam with flashboards installed

Eight Mile Flashboard Dam (Score 1)

Eight Mile Flashboard Dam base is on the Calaveras River near river mile 15, upstream of Eight Mile Road Bridge (Photo D-125). The structure provides support for flashboards during irrigation season. When the flashboards are removed, the channel typically receives minimal flows.

The dam base span is about 68.5 feet. The structure is a trapezoid that forms a complete concrete lining on the river channel and on the banks. The active channel is about 10 feet wide. Due to silt buildup in the river channel, there is no drop from the dam base to the channel bed. The bottom portion of the dam is covered with a thin layer of silt and algae. There is no dam base notch present.

Upstream of Eight Mile Flashboard Dam base there are some sandbags on the right bank. Farther upstream on the right bank and on the left bank, the banks are comprised of bare earth. Farther up the banks the vegetation becomes thick with weedy bushes (especially blackberry) (Photo D-126). Upstream, the river channel is a well-defined rounded trapezoid, slightly meandering, and is bare. The upstream banks are moderate in slope. Upstream, there are riparian trees that provide shade to the river channel.

Immediately downstream from the dam base the channel is inundated with vegetation (Photo D-127). The vegetation creates a constriction of the river channel and continues that way downstream of Eight Mile Flashboard Dam beyond Eight Mile Road Bridge. The vegetation is a mixture of weedy grasses, weedy bushes, and riparian trees. Downstream from the dam base the river channel substrate gives way to silty clay with some woody debris and scattered rubble. The downstream banks are steep and heavily vegetated. Downstream, riparian trees provide shade to the river channel.

Eight Mile Flashboard Dam is an 8.8-foot-tall flashboard dam, spanning 23.6 feet at the channel bottom and 70.2 feet at the top with a wooden catwalk (Photo D-128). During the irrigation season, the flashboard dam creates a 6.9-foot water surface difference. The 2.2-foot-deep plunge pool is 12.2 feet downstream from the dam face. The minimum plunge pool depth of 2 feet for juvenile salmonids is met at Eight Mile Flashboard Dam.

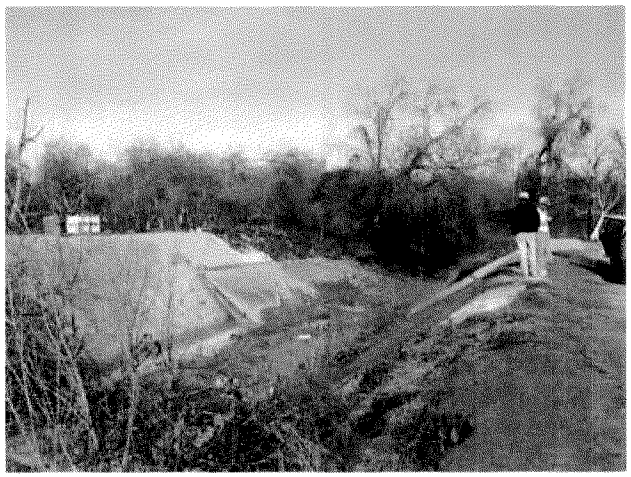


Photo D-125. Eight Mile Flashboard Dam base

Photo D-126. Looking upstream from Eight Mile Flashboard Dam base

Photo D-127. Downstream from Eight Mile Flashboard Dam base

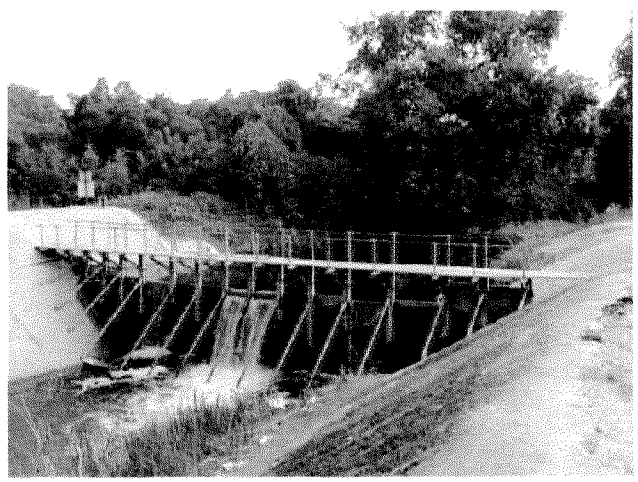


Photo D-128. Looking upstream at Eight Mile Flashboard Dam

Botsford Bridge #2 (Score 1)

Botsford Bridge #2 crosses perpendicular to the Calaveras River at river mile 21.7, downstream from the Calaveras Headworks (Photo D-129). The bridge is constructed with concrete abutments with a wooden road surface.

Botsford Bridge #2 spans 34 feet. The bridge does not contain piers, but has two concrete abutments at each bridge terminus. These abutments slightly constrict the active river channel. The active channel width is 32 feet and runs between the abutments. Under the bridge, the river channel deepens, and there is no apron. Here the river flow is slow, and areas contain algal growth.

Upstream of the bridge, the river channel becomes slightly wider and has a slight meander (Photo D-130). Both banks have a gentle slope and are lined with low lying grasses with a few intermixed riparian trees. Orchards are on both river banks upstream. The riparian vegetation provides minimal shade to the river channel.

Downstream of the bridge, the river channel slightly narrows and has a meander in the northerly direction (Photo D-131). Both banks have a gentle slope and are lined with low-lying grasses with intermixed riparian trees. An orchard is on the right bank downstream, and housing structures are on the left bank downstream. The riparian vegetation provides shade to the river channel.

Photo D-129. Botsford Bridge #2

Photo D-130. From Botsford Bridge #2 looking upstream

Photo D-131. From Botsford Bridge #2 looking downstream

Main Street Flashboard Dam (Score 1)

Main Street Flashboard Dam is on Mormon Slough, upstream of the Stockton Diverting Canal at river mile 4.9 (Photo D-132). The base provides support for flashboards during irrigation season. The flashboards usually are removed between October and March when Mormon Slough is a flood control channel (Photo D-133).

The Main Street Flashboard Dam spans 70 feet between two 10-foot abutments. The width of the abutments and pads is 10 feet. There is a 35-foot notch. In the notch, there are supports for flashboards. The notch has formed a low-flow channel and low benches at the toe of the channel banks upstream and downstream. The benches along this stretch of the channel are scoured next to the low-flow channel, and grass and weeds cover benches above the scour line. The upper banks have almost no riparian cover (Photo D-134).

There is no riprap protection at Main Street Dam. The channel bottom is a bare made up of silty-clay and some rock. The channel is a well-defined trapezoidal cross section, and there is no meander in the channel upstream or downstream. Under high flows, the channel is full and Main Street Dam is under water. At low flows, woody and trashy debris can be seen from the banks near the dam.

During irrigation season, 8-foot-high flashboards create a water surface difference between the dam crest and the plunge pool of 5.8 feet and an upstream wetted width of 86 feet (Photo D-135). The pool immediately downstream of the dam is 1.2 feet deep which does not meet the 2-foot minimum depth for juvenile salmonids. Budiselich dam model represents an assessment of fish passage at Main Street Dam.

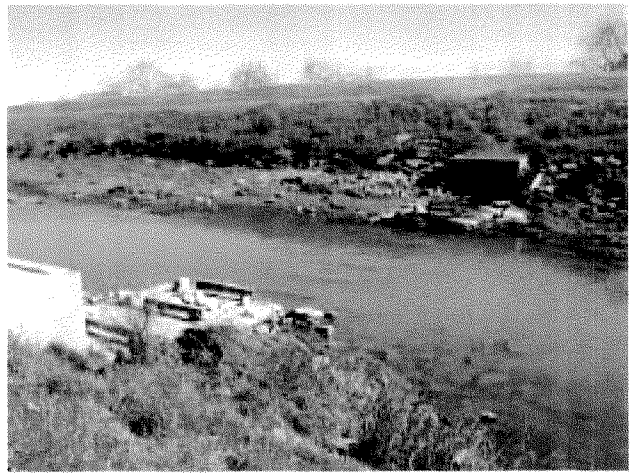


Photo D-132. Main Street Flashboard Dam looking upstream

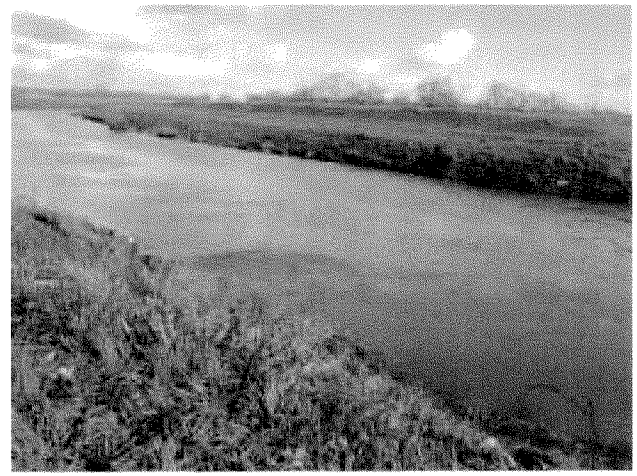


Photo D-133. Upstream of Main Street Dam at high flows

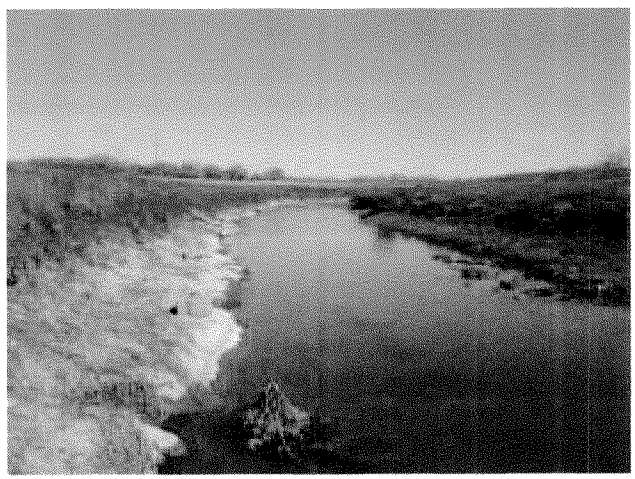


Photo D-134. Upstream from Main Street Dam at low flow

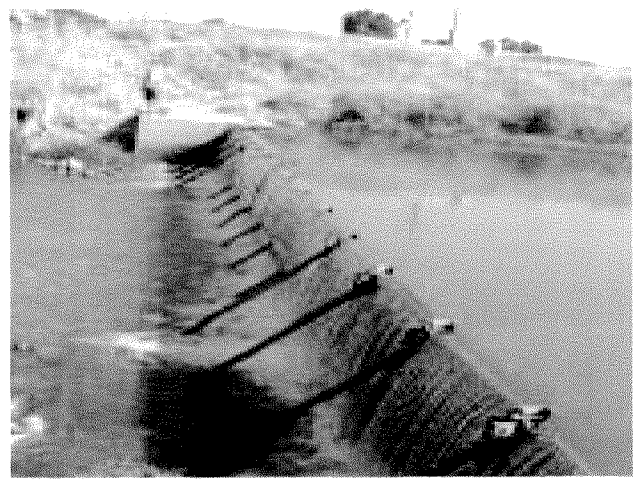


Photo D-135. Flashboards in place at Main Street Dam

APPENDIX E

Preliminary Designs- Three Structures

Preliminary Designs- Three Structures

Preliminary designs have been prepared for three, representative Tier 1 structures (Hosie Low Flow Crossing, Caprini Low Flow Crossing, and Central California Traction Railroad). Brief descriptions of the proposed improvements are described below followed by preliminary design diagrams. Final designs will be prepared in collaboration developed collaboratively with SEWD, USFWS, CDFG, CDWR, USACE, and other relevant agencies and non-governmental organizations (e.g., Fishery Foundation of California).

Hosie Low Flow Crossing (HLFC) is located at RM 18.7. The crossing is a concrete road prism with no culverts. It crosses the stream at an angle of 35 degrees from perpendicular. Riprap lines the channel bed downstream of the crossing for about 70 feet. The bed upstream of the crossing is also lined with riprap for 10 to 20 feet. HLFC is a significant barrier to upstream migration of salmonids because of insufficient depth over the riprap for flows <460 cfs and over the road crossing for flows <320 cfs (CDWR 2007). The proposed design for improving fish passage at the structure includes a new culvert installation (part of existing concrete road prism will be cut away and replaced with culverts) and channel reconstruction (riprap will be removed upstream and downstream of structure). These passage improvements will increase depths over the crossing and riprap and achieve acceptable velocities at the structure.

Caprini Low Flow Crossing (CLFC) is located at RM 12.7. The crossing consists of three 3-foot diameter corrugated metal culverts in a concrete road prism. Concrete aprons line the channel bottom upstream and downstream of the structure. Riprap lines the banks along the downstream apron and the bed downstream of the apron. CLFC is a significant barrier to upstream migration of adult salmonids because of velocities in excess of passage criteria through the culverts, over the downstream apron, and over the riprap. Current upstream fish passage at CLFC is unimpaired only when flows are >730 cfs. The proposed design to improve fish passage includes installing a replacement culvert and three grade-control structures which will overcome a 5-foot-drop downstream of the culvert outlet, increase shallow depths inside the culvert, and achieve acceptable velocities at the structure.

Central California Traction Railroad Crossing (CCTRC) is a bridge crossing located at RM 6.5. The CCTR has expressed an interest in assisting SEWD make improvements at this site and official written approval will be obtained prior to implementation. The crossing has a footing and apron structure for 16 piers. The crest of the apron is about five feet above the upstream channel invert and acts as a weir. A 6-foot-wide flume cuts the apron between the 5th and 6th pier to about 3 feet deep, allowing lower flows to pass and reducing the amount of backwater in the upstream channel. Downstream of the apron, flow spreads and runs over riprap before becoming channelized again. CCTRC presents a significant barrier to fish migration because the shallow flow depths below the crossing and across the apron weir significantly impair upstream migration for all species and life stages during flows <200 cfs and flows concentrated in the flume do not reach passage depths and velocities until channel flow reaches 1900 cfs. The proposed design for improving fish passage at the structure includes creating a ramped stream channel by installing seven grade control structures (i.e., boulder weirs). These passage improvements will concentrate flows into a low flow channel downstream of the weir meeting passage depth and velocity criteria, overcome the 5-foot-drop downstream of the apron/weir, and achieve acceptable velocities at the structure.

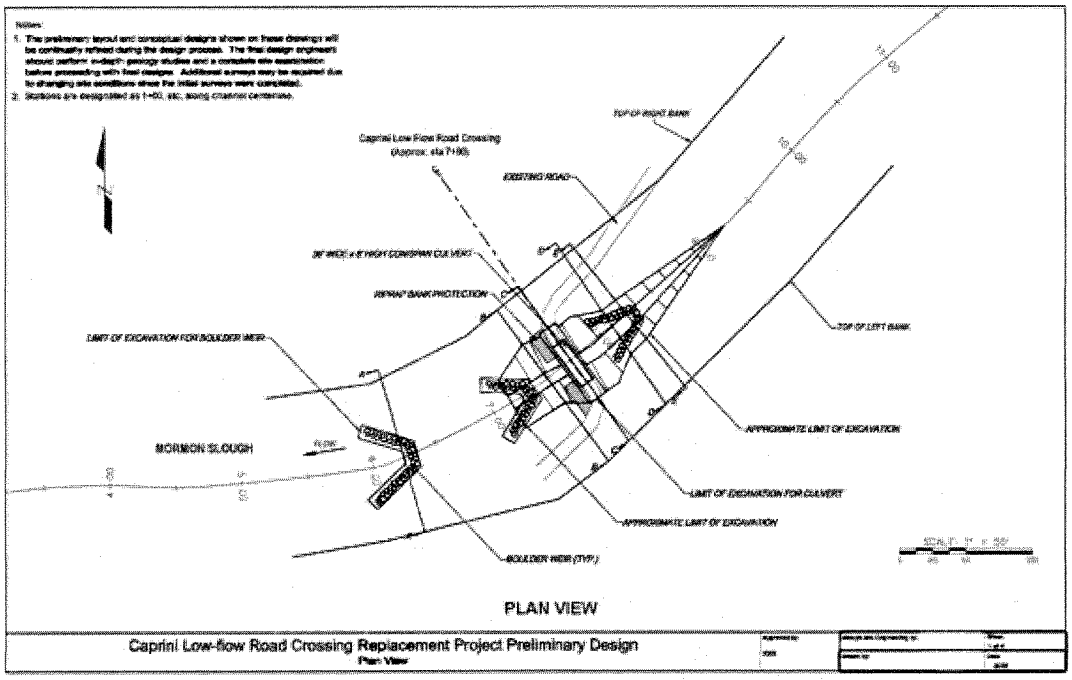


Figure E-1. Preliminary design drawing: plan view for Caprini Low Flow Road Crossing Structure Replacement Project. Source: CDWR 2007. Subject to revision.

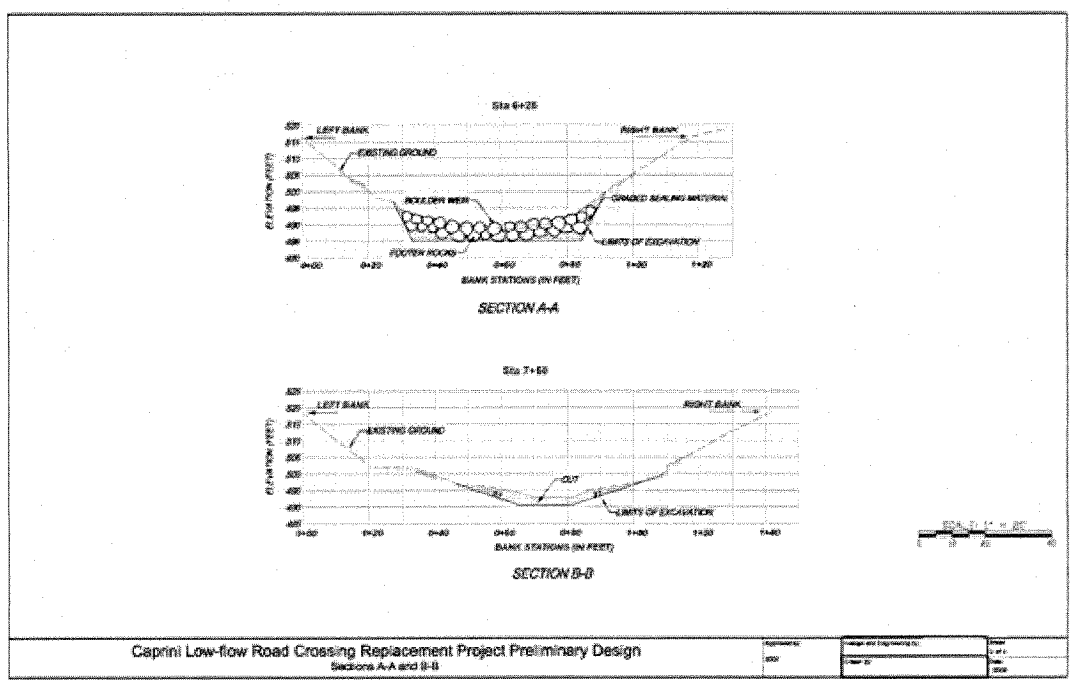


Figure E-2. Preliminary design drawing: Section A-A and B-B for Caprini Low Flow Road Crossing Structure Replacement Project. Source: CDWR 2007. Subject to revision.

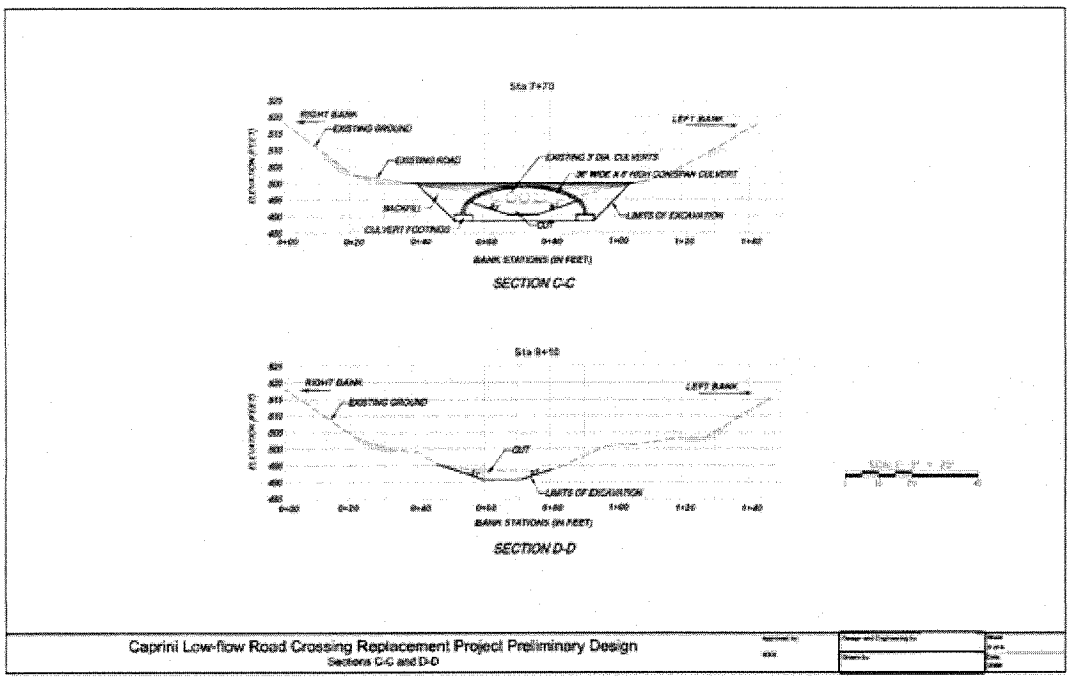


Figure E-3. Preliminary design drawing: Section C-C and D-D for Caprini Low Flow Road Crossing Structure Replacement Project. Source: CDWR 2007. Subject to revision.

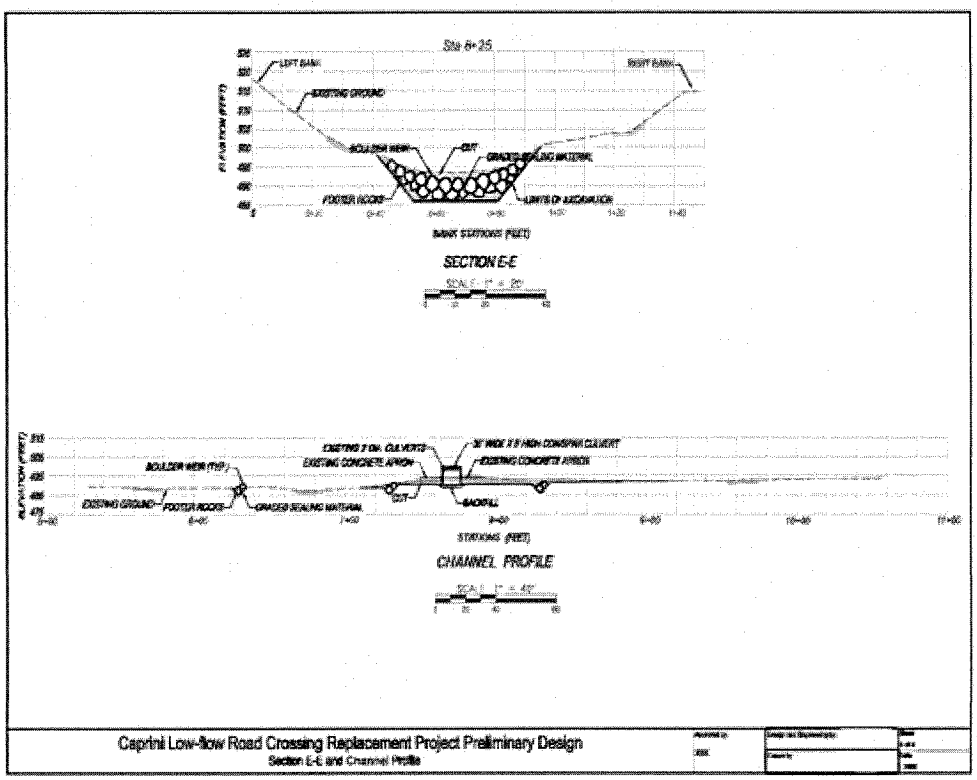


Figure E-4. Preliminary design drawing: Section E-E and Channel Profile for Caprini Low Flow Road Crossing Structure Replacement Project. Source: CDWR 2007. Subject to revision.

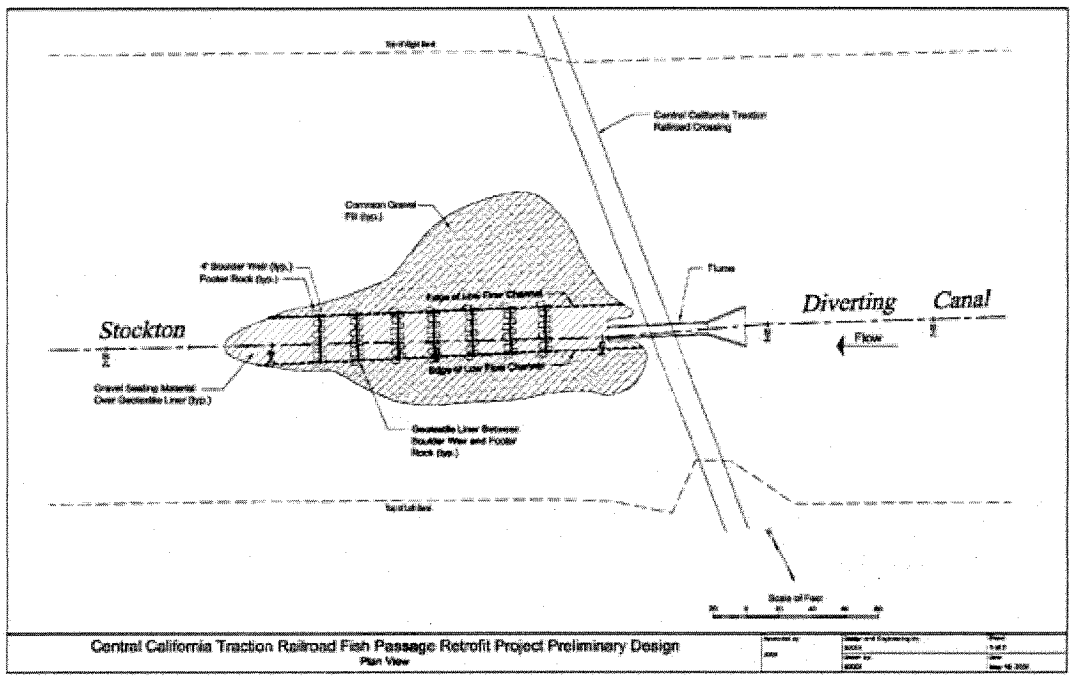


Figure E-5. Central California Traction Railroad retrofit project preliminary design: plan view. Source: CDWR 2007. Subject to revision.

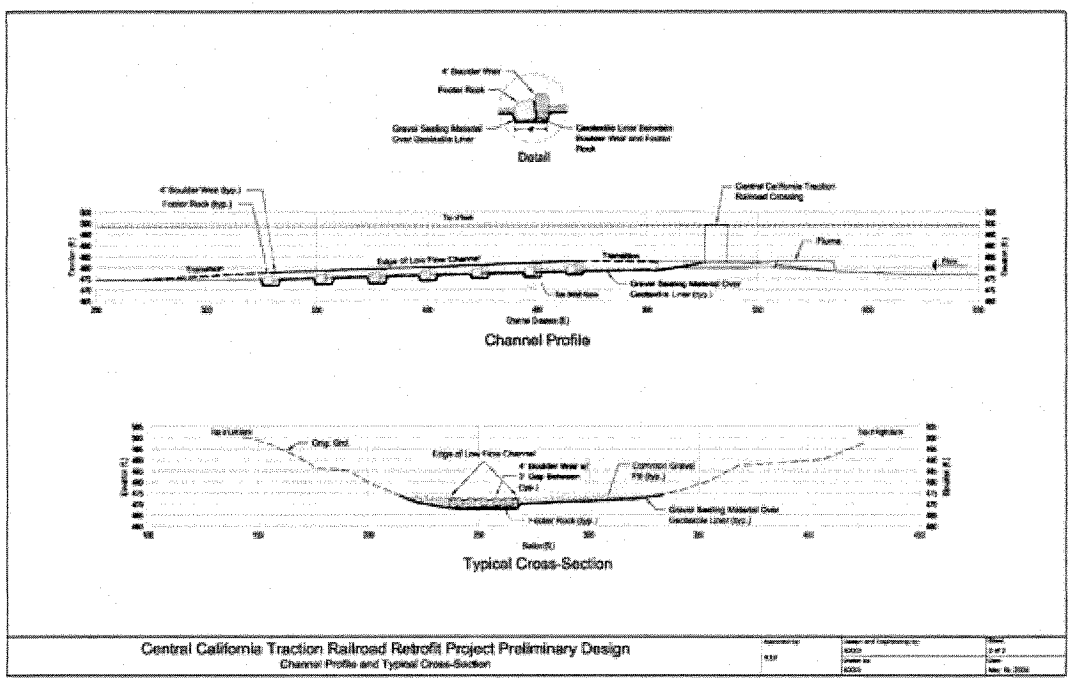


Figure E-6. Central California Traction Railroad retrofit project preliminary design: channel profile and typical cross-section. Source: CDWR 2007. Subject to revision.

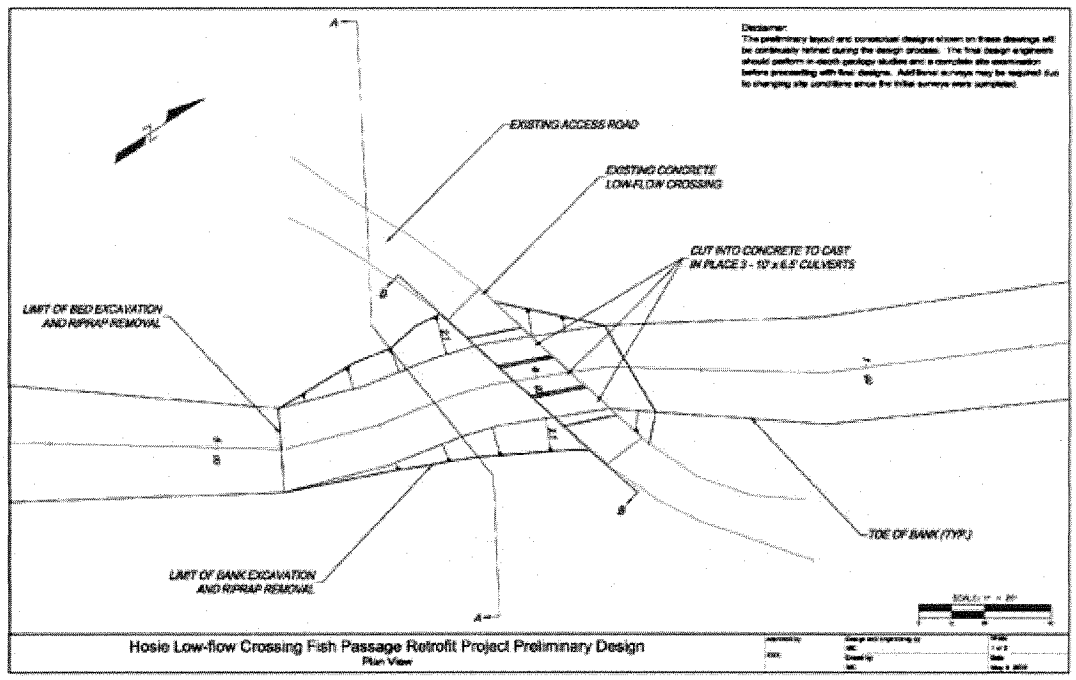


Figure E-7. Hosie low flow crossing fish passage retrofit project preliminary design: plan view. Source: CDWR 2007. Subject to revision.

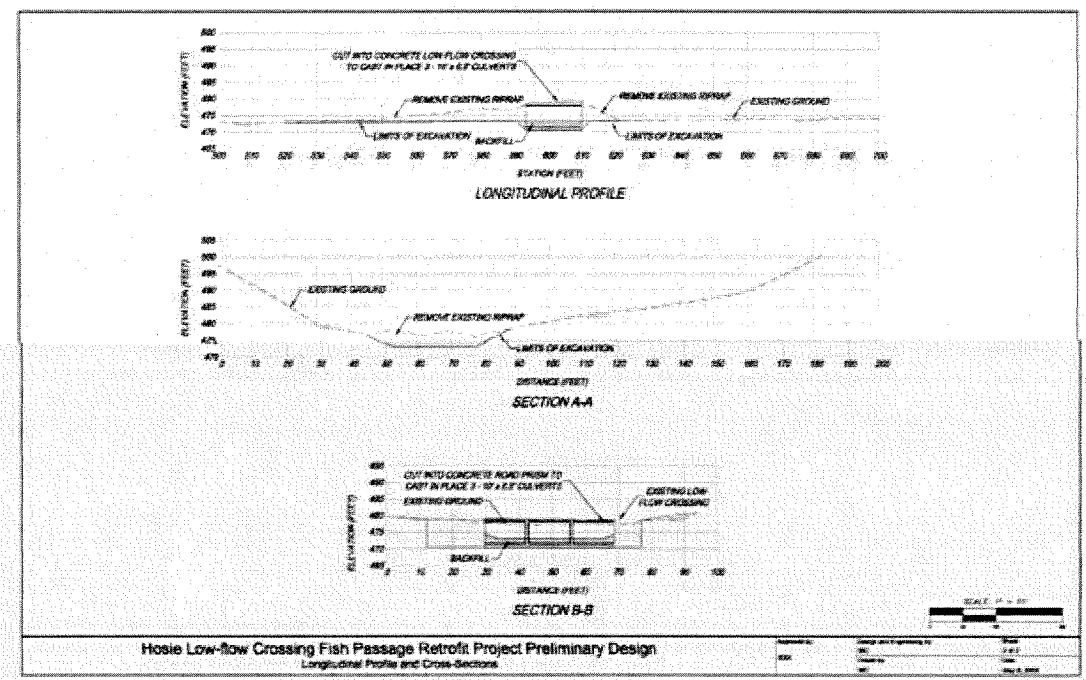


Figure E-8. Hosie low flow crossing fish passage retrofit project preliminary design: longitudinal profile and cross-sections. Source: CDWR 2007. Subject to revision.