

**FINAL**  
**MARYSVILLE RING LEVEE**  
**YUBA RIVER BASIN, CALIFORNIA**  
**ENVIRONMENTAL ASSESSMENT/ INITIAL STUDY**



**April 2010**



**US Army Corps  
of Engineers**



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**ENVIRONMENTAL ASSESSMENT**  
**INITIAL STUDY**

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**US Army Corps  
of Engineers**





REPLY TO  
ATTENTION OF

**DEPARTMENT OF THE ARMY**  
U.S. ARMY ENGINEERING DISTRICT, SACRAMENTO  
CORPS OF ENGINEERS  
1325 J STREET  
SACRAMENTO, CALIFORNIA 95814-2922

Environmental Resources Branch

**FINDING OF NO SIGNIFICANT IMPACT**  
**Marysville Ring Levee Improvements**  
**Yuba River Basin, California**

I have reviewed and evaluated the information in this Environmental Assessment/Initial Study (EA/IS) for the Marysville Ring Levee Improvements located in Marysville, California. The MRL Improvements is a cooperative effort between the U.S. Army Corps of Engineers, the State of California Central Valley Flood Protection Board, and the Marysville Levee District.

The proposed action would improve flood risk management through design modifications to address under- and through-seepage within the ring levee. The improvements would involve construction of cutoff walls, a stability berm, slope reshaping, a secant pile wall, and jet grouting. This work would be implemented between 2010 and 2013.

During this review, the possible consequences of the work described in this EA/IS have been studied with consideration given to environmental, socioeconomic, cultural, and engineering feasibility. I have also considered the views of other interested agencies, organizations, and individuals concerning the project. The environmental effects have been coordinated with the U.S. Fish and Wildlife Service, Feather River Air Quality Management District, California Department of Transportation, and the California State Historic Preservation Officer.

Compensation to reduce the effects on the Federally-listed threatened valley elderberry longhorn beetle (VELB) would include planting 2.5 acres of elderberry shrubs and transplanting 28 elderberry shrubs. There would be temporary effects to 33.70 acres of giant garter snake (GGS) upland habitat for the duration of Phase 1. Best management practices, avoidance protocols, and minimization and mitigation measures would be used during construction to reduce effects related to sensitive biological resources, including GGS and VELB; air quality; cultural resources; noise; and transportation.

The Bok Kai Temple is listed as a California Registered Historical Landmark and a State Point of Historic Interest. In addition, it is included in the California Inventory of Historic Resources, is listed in the National Register of Historic Places, and in 2001 the National Trust for Historic Preservation listed the Bok Kai Temple as one of America's 11 Most Endangered Historic Places. During the Phase 2 engineering design, and in accordance with stipulations contained in a Memorandum of Agreement for this undertaking, the Corps will conduct a more extensive analysis of the potential construction affects. The Corps will establish monitoring measures that can be implemented to protect the temple and ensure that there are no adverse effects to this resource.

Based on my review of the EA/IS and my knowledge of the project area, I have determined that the proposed improvements would have no significant, long-term effect on environmental or cultural resources. Based on these considerations, I am convinced that there is no need to prepare an environmental impact statement. Therefore, an EA/IS and Finding of No Significant Impact will provide adequate environmental documentation for the proposed action.

1/1/03  
Date

[Signature]  
P.E.

**CENTRAL VALLEY FLOOD PROTECTION BOARD**

3310 El Camino Avenue

Room 151

Sacramento, CA 95821

**NOTICE OF INTENT TO USE FINDING OF NO SIGNIFICANT IMPACT  
IN LIEU OF A MITIGATED NEGATIVE DECLARATION FOR  
THE MARYSVILLE RING LEVEE IMPROVEMENT PROJECT**

In lieu of preparing its own Mitigated Negative Declaration, the Central Valley Flood Protection Board (CVFPB), acting as lead agency under the California Environmental Quality Act (CEQA), intends to use the Environmental Assessment /Initial Study (EA)/(IS) and Finding of No Significant Impacts (FONSI), prepared by the U.S. Army Corps of Engineers Sacramento District (Corps), for a project to repair the existing levees surrounding the City of Marysville. The proposed project extends from Jack Slough levee mile 0.01 – 3.25, Feather River levee mile 25.81 – 27.08, and Yuba River levee mile 0.01 – 3.01, in Yuba County, California.

The proposed Marysville Ring Levee Improvement Project will improve flood risk management through design modifications to address under- and through-seepage within the ring levee. The improvements would involve construction of cutoff walls, a stability berm, slope reshaping, a secant pile wall, and jet grouting. This work which will be broken into four phases will be implemented between 2010 and 2013, and is described in detail in the EA/IS.

Under CEQA, state agencies are encouraged to use a FONSI prepared pursuant to the National Environmental Policy Act (NEPA) rather than preparing a new CEQA document, when the FONSI, prepared before a Negative Declaration or EIR, would otherwise be completed for the project; and the FONSI complies with CEQA Guidelines.

CEQA, Section 15225(a) further states that “where the federal agency circulated the EIS or Finding of No Significant Impact for Public review as broadly as state or local law may require and gave notice meeting the standards in Section 15072(a) or 15087(a), the lead agency under CEQA may use the federal document in the place of an EIR or Negative Declaration without recirculating the federal document for public review. One review and comment period is enough. Prior to using the federal document in this situation, the lead agency shall give notice that it will use the federal document in the place of an EIR or negative declaration and that it believes that the federal document meets the requirement of CEQA.”

The draft EA/IS and draft FONSI was circulated for 30 days, from February 1, 2010 to March 3, 2010, to agencies, organizations, and individuals who have an interest in the proposed project. Copies of the draft EA/IS and draft FONSI were filed with the State Clearinghouse, posted on the USACE website and the Marysville City Website, made available for viewing at

Marysville City Hall, the Yuba County Library in Marysville and the Sutter County Library in Yuba City, and provided by mail upon request. A newspaper release was provided to the local newspaper the, Marysville Appeal Democrat, identifying the locations to view or comment on the document and announcing a public meeting. All comments received were considered and incorporated into the final EA/IS, as appropriate (Appendix H of the EA/IS). This project has been coordinated with all relevant government resource agencies including USFWS, SHPO, CDFG, and the California Department of Water Resources. The public meeting was held on February 10, 2010 in the city of Marysville. The purpose of the meeting was to present the proposed project and obtain public input. The Corps had visual displays explaining the project location, schedule, and environmental and cultural considerations. The public was encouraged to submit comment sheets. Comments received during this meeting are included in Appendix H of the EA/IS. This meets the requirements of a 30-day public review period for an environmental document under CEQA.

This Notice is provided by the Central Valley Flood Protection Board, lead agency under CEQA, for the Marysville Ring Levee Improvement Project. The CVFPB intends to use the EA/IS and FONSI in lieu of preparing its own Mitigated Negative Declaration for the Project. The EA/IS and FONSI include a description of the Proposed Action and evaluate potential for adverse environmental impact. The EA/IS concludes the Proposed Action would have less than significant impacts to the environment with mitigation measures included.

Digital versions of the EA/IS and FONSI will be available on the CVFPB website, <http://www.cvfpb.ca.gov/reports/index.cfm>

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## ACRONYMS & ABBREVIATIONS

ADT	Average Daily Trips
APE	Area of Potential Effects
BMPs	Best Management Practices
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
Caltrans	California Department of Transportation
CAR	Coordination Act Report
CARB	California Air Resources Board
CCAA	California Clean Air Act
CDC	California Department of Conservation
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CNDDB	California Natural Diversity Database
CNEL	community noise equivalent level
CNPS	California Native Plant Society
CO	Carbon Monoxide
Corps	U.S. Army Corps of Engineers
CVFPB	Central Valley Flood Protection Board
CVRWQCB	Central Valley Regional Water Quality Control Board
CWA	Clean Water Act
dB	decibel
dBA	A-weighted decibel
EA	Environmental Assessment
EDR	Engineering Document Report
EA/IS	Environmental Assessment/Initial Study
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
ESA	Environmental Site Assessment
°F	degrees Fahrenheit
FEIS/EIR	Final Environmental Impact Statement/Environmental Impact Report
FESA	Federal Endangered Species Act
FONSI	Finding of No Significant Impact
FRAQMD	Feather River Air Quality Management District
GGS	giant garter snake
GHG	greenhouse gases
GPS	global positioning system
GRR	General Reevaluation Report

HAP	Hazardous Air Pollutants
HEP	Habitat Evaluation Procedure
HTRW	Hazardous, Toxic and Radiological Wastes
L <sub>eq</sub>	equivalent energy noise level
L <sub>dn</sub>	day-night average noise level
L <sub>max</sub>	peak noise level
LOS	Levels of Service
MBTA	Migratory Bird Treaty Act
MLD	Marysville Levee District
MRL	Marysville Ring Levee
msl	mean sea level
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NO <sub>2</sub>	Nitrogen Dioxides
NO <sub>x</sub>	Nitrogen Oxides
NPDES	National Pollutant Discharge Elimination System
NRCS	National Resource Conservation Service
NRHP	National Register of Historic Places
NSVAB	North Sacramento Valley Air Basin
O <sub>3</sub>	Ozone
Pb	Lead
PG&E	Pacific Gas and Electric Company
PM <sub>2.5</sub>	fine particulate matter
PM <sub>10</sub>	particulate matter less than 10 microns in diameter
RD	Reclamation District
ROG	reactive organic gases
SCB	soil, cement, and betonite mixture
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SO <sub>2</sub>	Sulfur Dioxide
SPCP	Spill Preventions and Countermeasure Plan
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
System Evaluation	Sacramento River Flood Control System Evaluation
TAC	Toxic Air Contaminants
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
VELB	valley elderberry longhorn beetle
WRDA	Water Resources Development Act

## **1.1 INTRODUCTION**

### **1.2 Proposed Action**

The Yuba River Basin Flood Risk Management Project, authorized by the Water Resources Development Act (WRDA) 1999 (Public Law 106-53) Section 101(a)(10) and WRDA 2007 (Public Law 110-114), Section 3041, is currently under reevaluation in the Yuba Basin General Reevaluation Report (GRR). During the project reevaluation, it was determined that the Marysville Ring Levee (MRL) was considered a separable element and could be constructed while the remainder of the GRR remains under investigation. This determination was made because the design of the MRL has not changed substantially from the 1999 authorized project, basic technical issues regarding the stability of the MRL have been resolved, the MRL is hydraulically separate from the rest of the Yuba GRR, and the MRL is common to all alternatives under consideration in the GRR.

The MRL Improvements are a cooperative effort between the U.S. Army Corps of Engineers (Corps), the State of California Central Valley Flood Protection Board (CVFPB), and the Marysville Levee District (MLD). The Corps, CVFPB, and MLD are proposing revised levee improvements around the MRL and this Environmental Assessment/Initial Study (EA/IS) evaluates the potential effects of the proposed design including the design refinements since the 1999 authorized project.

### **1.3 Project Area and Background**

The city of Marysville is located approximately 50 miles north of Sacramento, California in Yuba County (Plate 1). Marysville is surrounded by 7.5 miles of levee that protects it from the flooding of three water courses: the Yuba River to the south; Jack Slough to the north; and the Feather River to the west. These levees vary in height from 16 to 28 feet.

The Yuba River drains out of New Bullards Bar Dam in the Sierra Nevada and runs along the south edge of the MRL into the Feather River. Jack Slough runs a quarter mile northwest of the MRL and flows into the Feather River. The Feather River drains from Oroville Dam and Reservoir from the north along the along the western edge of the Maryville Ring Levee and then flows into the Sacramento River.

Construction of the Marysville levee system began in 1862 and by 1868 a levee completely surrounded the city. Further construction in 1875 realigned the levee to its current location. Originally, the height of the levee was approximately five feet high, but due to the accumulation of hydraulic mining debris in the river channels, the levee was raised numerous times to its current height to provide sufficient freeboard above the elevated river levels, and to provide greater protection against flooding.

Flooding has continued to be a problem along the Feather and Yuba Rivers in the Marysville area. Major floods generally occur during the winter months when intense

rainfall occurs after the ground is already saturated from previous rain events. Recent floods have occurred in 1950, 1955, 1964, 1986, and 1997. In addition to levee breaks and actual flooding, levee performance during flood events has been an ongoing issue. Boils, under-seepage, through-seepage, and cracking have affected the levees surrounding Marysville and other parts of the Yuba and Feather River levee systems.

After the floods of 1986, the Sacramento River Flood Control System Evaluation (System Evaluation) was initiated. This study evaluated the integrity of the Sacramento River Flood Control Project levees and was intended to restore the design level of flood protection provided by the levees. The System Evaluation was divided into five phases. Phase II included the populated Marysville/Yuba City areas. The results of the System Evaluation indicated that sections of project levees along the Feather and Yuba Rivers were susceptible to seepage problems and did not provide the level of protection originally authorized. The MRL portion of the System Evaluation included a 0.3 mile stretch of slurry wall along Jack Slough. Construction for Phase II was completed in 1998.

An additional 0.8 mile slurry wall was installed in 1999. This work is located just downstream of the System Evaluation work along Jack Slough near the confluence with the Feather River. This work was done as part of the PL 84-99 program because of observed boils in the area during flood events.

Further investigation into the MRL occurred in 1997 and 1998 as part of the Yuba River Basin Investigation. The Yuba River Basin Investigation Final Feasibility Report and the Yuba River Basin Investigation Final Environmental Impact Statement/Environmental Impact Report, April 1998 (FEIS/EIR) evaluated the feasibility and Federal interest in providing increased flood protection to the lower Yuba River basin, part of the Feather River basin below Oroville Dam, and the City of Marysville.

The Yuba River Basin project was authorized by Congress in 1999 and included modifications to 6.1 miles of levee along the Yuba River, 10 miles of levee along the Feather River, and 5 miles of the MRL. As part of the Yuba River Basin Investigation's geotechnical analysis, numerous levee deficiencies were identified around the MRL. These investigations resulted in the proposed modification of five miles of the MRL (Plate 2). The MRL modifications included the construction of slurry walls and stability berms. Additional studies during the detailed design phase resulted in updated and improved information indicating significant geotechnical concerns including levee under-seepage and through-seepage throughout the project area. Therefore, the Yuba Basin Project was not implemented. Currently, the Corps has initiated the GRR to further study and address these problems along the Yuba and Feather Rivers.

Although the MRL was one of the original elements identified for improvement in the 1999 congressionally-authorized Yuba River Basin project, the MRL portion was approved by the Corps of Engineers in 2008 to be a separable element from the Yuba River Basin Investigation GRR. The MRL can be considered a separable element because the MRL design modifications to address under-seepage and through-seepage,

were not significantly modified from the 1999 authorized project. Additionally, the MRL is hydraulically separate from the rest of the Yuba Basin Project. Therefore, the MRL Improvements are proceeding as a separable element while the remainder of the Yuba GRR remains under investigation. The Yuba GRR is expected to be presented to Congress for its reauthorization in 2010.

The design modifications to the MRL include deeper slurry walls and larger stability berms. These modifications address the basic technical issues regarding seepage and stability of the MRL. An Engineering Document Report (EDR) and Environmental Assessment (EA) are being prepared to document changes in design, costs, benefits, and environmental effects since last reported.

#### **1.4 Purpose and Need**

The MRL was originally part of the 1999 Yuba River Basin Project, which included five miles of levee modifications along the MRL to address under-seepage. Since authorization, design refinements have been proposed due to improved information indicating significant geotechnical concerns, including levee under-seepage and through-seepage in the MRL. This EA/IS describes the design refinements and evaluates the effects of the proposed action.

This Environmental Assessment/ Initial Study (EA/IS) (1) describes the existing environmental resources in the project area; (2) evaluates the effects and significance of the proposed action on the resources; and, (3) proposes measures to avoid, minimize, or mitigate any adverse effects to a less-than-significant level. This EA/IS is in compliance with the National Environmental Policy Act (42 U.S.C. § 4321 *et seq.*) (NEPA) and the California Environmental Quality Act (California Public Resources Code § 21000 *et seq.*) (CEQA), and provides full disclosure of the effects of the proposed action.

#### **1.5 Previous Environmental Documents**

There have been numerous planning and environmental documents completed related to flood management, studies, and actions in the Yuba and Feather River basins. The documents that are most pertinent to the MRL Improvements are listed below:

- Sacramento River Flood Control System Evaluation, Initial Appraisal Report – Marysville/Yuba City Area, U.S. Army Corps of Engineers, 1990.
- Sacramento River Flood Control System Evaluation, Phases II-V, Programmatic Environmental Impact Statement/Environmental Impact Report, U.S. Army Corps of Engineers, 1992.
- Sacramento River Flood Control System Evaluation, Phase II Marysville/Yuba City Area, Environmental Assessment/Initial Study, U.S. Army Corps of Engineers, 1993.

- Sacramento River Flood Control System Evaluation, Phase II Marysville/Yuba City Area, Environmental Assessment/Initial Study for Construction Contracts 2A and 2B, U. S. Army Corps of Engineers, 1997.
- Yuba River Basin, California, Final Environmental Impact Statement/Environmental Impact Report, and Final Feasibility Report, U.S. Army Corps of Engineers, 1998.
- Final Environmental Impact Report for the Yuba-Feather Supplemental Flood Control Project, Yuba County Water Agency, 2004.
- Final Environmental Impact Report for the Feather Bear Rivers Levee Setback Project, Three Rivers Levee Improvement Authority, 2004.
- Final Environmental Impact Report for the Feather River Levee Repair Project, and Element of the Yuba-Feather Supplemental Flood Control Project, Three Rivers Levee Improvement Authority , 2006.
- Environmental Assessment Feather River Levee Repair Project, California Segments 1 and 3, U.S. Army Corps of Engineers, 2007.
- 408 Permission and 404 Permit to Three Rivers Levee Improvement Authority for the Feather River Levee Repair Project, California, Segment 2, Three Rivers Levee Improvement Authority, 2008.

## **1.6 Decisions to Be Made**

The District Engineer, commander of the Sacramento District, must decide whether or not the proposed action qualifies for a Finding of No Significant Impact (FONSI) under NEPA or whether an Environmental Impact Statement (EIS) must be prepared. In addition, the CVFPB must decide if the proposed action qualifies for a Mitigated Negative Declaration under CEQA or whether an Environmental Impact Report (EIR) must be prepared.

## **2.1 ALTERNATIVES INCLUDING THE PROPOSED ACTION**

### **2.2 Introduction**

The authorized Yuba River Basin Flood Risk Management Project includes levee improvements for the MRL. The authorizing documents, Yuba River Basin Investigation, California Final Feasibility Report and FEIS/EIR (1998) included the development and analysis of a full range of alternatives. Although the MRL does contain design refinements, it has not changed substantially from the authorized project. Additionally, the MRL Improvements have been determined to be a separable element of the authorized project that can proceed to construction. Therefore, this chapter will summarize the alternatives considered for the authorized project. Additionally, this chapter will include a description of the design refinements incorporated into the proposed MRL Improvements.

### **2.3 Alternatives Previously Considered but Not Studied in Detail from the 1998 Authorizing Document**

The alternatives listed below were considered, but eliminated from further consideration in the 1998 study, because the costs exceeded the benefits or the alternative was not effective for reducing the flood risk. These alternatives included: nonstructural measures, large and small bypasses to divert water from the Yuba River into other watercourses for flood damage reduction, reregulating and/or raising existing dams, and constructing new reservoirs along the Yuba River.

### **2.4 Alternatives Considered in Detail from the 1998 Authorizing Document**

The components of the alternatives considered in detail included levee improvements such as slurry walls, levee raising, levee reshaping, and construction and modification of berms and drains. The selected plan from the 1998 document maximized net benefits and was the most cost effective plan.

### **2.5 Marysville Ring Levee Alternatives**

This section describes the no action alternative and the proposed action alternative for the Marysville Ring Levee improvements. The proposed action alternative is derived from design refinements to the 1998 authorizing document as described above.

#### **2.5.1 Alternative 1 (No Action)**

Under this alternative, the Corps would not participate in strengthening the MRL. Levee conditions would remain the same, and through-seepage and under-seepage problems would continue to threaten the integrity of the levee structure. If flooding were to occur, flood depths in Marysville could range from 20 to 25 feet and \$800 million in damages to property could result.

#### **2.5.2 Alternative 2 (Proposed Action)**

Alternative 2 is the proposed action for the MRL. This alternative is expected to decrease the flood risk to the city of Marysville to about a 0.36 percent chance of flooding in any given year, also stated as a 1 in 270 chance of a flood in any given year. The MRL Improvements would be constructed in up to four phases. It is expected that construction would take place over the next three to four years depending on Congressional authorization and funding. The availability of funding could affect construction sequencing and durations.

The proposed action is shown on Plate 3. A comparison of the proposed action and the authorized plan is shown in Table 1. The subsections below include features, construction details, staging and stockpile areas, borrow and disposal sites, construction workers and schedule, restoration and cleanup, and operation and maintenance for each of the four phases proposed.



**Table 1: Comparison of Authorized Plan with Current Plan**

Description	Authorized Project / Feasibility Study Plan				Current Plan				Phase
	Authorized Limits		Current Stationing		Current Limits		Description		
	Start Levee Mile	End Levee Mile	Approx. Start Station	Approx. End Station	Start Station	End Station			
Slurry Wall 30' depth, berm 5 x 12'	JS 3.25	JS 0.68	133+04	Approx. 0+00	65+50	83+00	Seepage cutoff wall to elevation -32 (Depth = 116') on CL of levee. Construct utilizing SCB and conventional open trench slurry wall with long stick excavator to 80 feet in combination with CSM or damshell to full depth	1	
No Work Area									
Slurry Wall 30' depth, berm 5 x 12'	JS 0.25	JS 0.25	133+04	155+74	83+00	122+50	Seepage cutoff wall to elevation -24 (Depth = 108') on CL of levee. Construct utilizing SCB conventional open trench slurry wall with long stick excavator to 80 feet in combination with CSM or damshell to full depth	--	
	JS 0.01	JS 0.01	168+94	155+74	133+00	196+00	No Work Area	4	
Slurry Wall 38' depth, berm 5 x 12'	FR 27.08	FR 26.21	214+88	168+94	196+00	205+00	7-ft tall by 15-ft wide landside stability berm on each side at Binney Junction. Project is located within triangle shaped LP embankments.	--	
	FR 27.08	FR 26.21	214+88	168+94	205+00	211+75	No Work Area	--	
Slurry Wall 28' depth, berm 5 x 12'	FR 26.21	FR 25.81 / YR 0.01	236+00	214+88	211+75	235+75	Seepage cutoff wall to elevation -33 (Depth = 118') on waterside of levee. Construct utilizing SCB and conventional open trench slurry wall with long stick excavator.	2	
	FR 26.21	FR 25.81 / YR 0.01	236+00	214+88	235+75	237+00	Seepage cutoff wall to elevation -33 (Depth = 118') on waterside of levee. Construct utilizing jet grout overlapping soil-cement columns at E Street Bridge.		
Slurry Wall 30' depth, berm 5 x 12'	YR 1.0	YR 1.0	236+00	288+80	237+00	247+50	Seepage cutoff wall to elevation -2 (Depth = 28') on waterside of levee. Construct utilizing SCB and conventional open trench slurry wall with long stick excavator.		
	YR 1.0	YR 1.0	236+00	288+80	247+50	248+75	Seepage cutoff wall to elevation -2 (Depth = 61') on the waterside of levee. Construct utilizing SCB and conventional open trench slurry wall with long stick excavator.		
	YR 1.0	YR 1.0	236+00	288+80	248+75	256+50	Seepage cutoff wall to elevation -2 (Depth = 85') on CL of levee. Construct utilizing jet grout overlapping soil-cement columns at Highway 70 Bridge.		
	YR 1.0	YR 1.0	236+00	288+80	256+50	267+50	Secant pile anchored bulkhead to 70 ft depth (Elev = 14') below levee crown CL.		
	YR 1.0	YR 1.0	236+00	288+80	267+50	274+00	Seepage cutoff wall to elevation -2 (Depth = 86') on CL of levee. Construct utilizing jet grout overlapping soil-cement columns at Railroad Bridge.		
	YR 1.0	YR 1.0	236+00	288+80	274+00	299+00	Secant pile anchored bulkhead to 70 ft depth (Elev = 16') below levee crown CL.		
	YR 1.0	YR 1.0	236+00	288+80	299+00	323+00	No Work Area		
	YR 1.0	YR 1.0	236+00	288+80	323+00	338+75	Seepage cutoff wall to elevation -22 (Depth = 108') on CL of levee. Construct utilizing SB and conventional open trench slurry wall with long stick excavator.		
No Work Area					338+75	369+75	Seepage cutoff wall to elevation 18 (Depth = 88') on CL of levee. Construct utilizing SB and conventional open trench slurry wall with long stick excavator.	3	
					369+75	394+41*	No Work Area		
					394+41*	400+00	Seepage cutoff wall to elevation 18 (Depth = 88') on CL of levee. Construct utilizing SB and conventional open trench slurry wall with long stick excavator.		
Slurry Wall 30' depth, berm 5 x 12'	YR 3.01 / JS 3.25	JS 0.68	133+04	Approx. 0+00	0+00*	2+25	Seepage cutoff wall to elevation 18 (Depth = 88') on CL of levee. Construct utilizing SCB and open trench slurry wall with long stick excavator		

\*Station equation 0+00=394+41

## Phase 1

### Features

Phase 1 extends for approximately 5,000 linear feet along the northwest portion of the levee (Plate 3). The proposed repair for this site involves a 60 to 120 foot deep slurry wall on the levee crown or along the levee slope, as well as reshaping the waterside slope. It is expected that East 26<sup>th</sup> Street/Jack Slough Road would need to be closed for about 14 days and the private driveway that meets the north end of Sampson Street would be temporarily rerouted during this time. Utility poles crossing the levee would be relocated for construction on a temporary basis.

### Construction Methods

Phase 1 construction would include installing a 60 to 120 foot deep, 4,600 foot long slurry wall and reshaping the waterside slope.

*Slurry Wall Construction.* The levee crown would be degraded down 4 to 12 feet to provide a 40 to 55 foot temporary work surface for construction equipment. A large hydraulic excavator would dig a 4 foot wide, 250 to 1,000 foot long trench along the levee. There are then two methods that could be used to construct the slurry wall: (1) the levee material would be removed from the trench and brought to a nearby location; mixed with the soil, Portland cement, and bentonite clay (SCB); then pumped back into trench, or (2) the trench is filled with the SCB slurry to stabilize the excavation sidewalls as digging occurs; after a section of the trench is dug, the SCB slurry is backfilled into the trailing end of the trench to form the slurry wall (Figures 1 and 2).



**Figure 1. Cutting Heads.**



**Figure 2. Soil Mixing.**

*Slope Reshaping Construction.* To reshape the waterside slope, material would be added to the slope and toe. The reshaping would push the current waterside toe out approximately 10 feet and would change the waterside slope ratio from 2.5:1 to 3:1. Conventional construction equipment such as loaders, scrapers, graders, and excavators would be used to perform the degrading, reshaping, and other earthwork.

### Access and Staging

The Phase 1 access roads would include the waterside toe of the levee, Jack Slough Road, Triplet Way, and Highway 70. Slurry wall construction would take place on the crown of the levee or the waterside slope; reshaping construction would take place on the waterside slope. The landside of the levee would also be used to maneuver equipment during construction.

Staging areas totaling approximately eight acres would be located north of the levee, west of Jack Slough Road, and approximately two acres adjacent to the Marysville High School sports fields. The existing use of this area is agriculture. Construction materials, equipment, topsoil, and excess material would be temporarily stored at the staging area during the construction period. A jobsite trailer would be established in this staging area, as would the construction workers' parking area. All construction supplies would be delivered to the staging area.

### Site Preparation

All construction areas and identified habitat would be fenced off prior to the start of construction to limit public access, including the staging area. The slopes and crown of the levee would be cleared and grubbed of all vegetation and surface material, including the existing levee maintenance road on the crown. Temporary construction easements would be needed for the equipment working area. The easement on the landside toe would be 25 to 40 feet, while the easement on the waterside toe would be 25 to 50 feet. K-Rails would be installed along the drainage ditch prior to construction along the waterside of the levee's temporary construction easement. Other temporary erosion control methods would be implemented to prevent soil from running onto adjacent properties and local waterways.

A spur of the historic Western Pacific Railroad is present parallel and perpendicular to the levee within Phase 1. The spur consists of the alignment and built up grade, but is missing all associated tracks and railroad ties. The spur runs roughly north-northeast along the levee until it crosses the levee near the northwestern corner. The spur continues in a northeastern direction past the levee, originally leading to a slaughterhouse and the town of Oroville. Although portions of the overall Western Pacific Railroad have been determined to be eligible for inclusion into the National Register of Historic Places, this current spur segment is not eligible individually or as a contributing factor to the overall railroad system. Therefore no special actions need to be taken to protect this resource.

### Restoration and Cleanup

Once the levee work is complete, all equipment and excess materials would be transported offsite via neighborhood streets and regional highways. The barren earth and levee slopes would be seeded with a native grass seed mix to promote re-vegetation and minimize soil erosion. The access ramps and staging areas would also be restored to pre-

project conditions. Any damage from construction activities would be repaired. Finally, the work sites and staging areas would be cleaned of all rubbish, and all parts of the work area would be left in a safe and neat condition suitable to the setting of the area. The procedures for restoration and clean-up are the same for all four phases.

#### Borrow and Disposal Sites

All disposal material would be temporarily stockpiled at the staging areas or disposed of at a commercial site or facility. The contractor would be responsible for determining and providing certification to the Corps that the material is free from contaminants and is suitable for disposal at a commercial facility.

The amount of unsuitable soil that would be disposed of is estimated to be 14,500 cubic yards. The amount of soil imported from a borrow site is estimated to be 57,650 cubic yards. The borrow and disposal areas are assumed to be located within 12 miles of the project area. The contractor would be responsible for determining the location of the borrow and disposal sites. If a site other than a commercial site is used, appropriate NEPA/CEQA documentation would be required along with evidence of compliance with all other applicable laws and regulations. The Corps would have to initiate Section 106 compliance, if appropriate.

There are four potential haul routes proposed for all material and equipment transportation: (1) Highway 70 to Triplett Way to the levee crown, (2) Jack Slough Road to the levee crown, (3) Highway 20 to the levee crown, and (4) the agriculture access road, north of the Ring Levee, to Jack Slough Road to the levee crown. These routes are discussed in detail in Section 3.3.6, Traffic and Circulation, and are shown on Plate 4.

#### Construction Workers and Schedule

Although the numbers of workers on site would vary during construction, an estimated 12 to 30 workers could be onsite each day during construction. These workers would access the area via regional and local roadways and would park their vehicles at the northwest corner staging area. Construction hours would be limited to the hours from 7 a.m. to 7 p.m. up to seven days a week. Phase 1 would take approximately two construction seasons to complete. Levee widening construction would occur between July/August and October 2010 and resume in June/August 2011 with the slurry wall work. The slurry wall work would be completed by October/November 2011. This construction schedule is necessary to avoid any potential adverse effects on species of concern or their habitat.

#### Operation and Maintenance

After construction is complete, responsibility for the project would be turned over to the State of California in conjunction with the Marysville Levee Commission, the non-Federal joint sponsors for the project. This would include operation, maintenance, repair, rehabilitation, and replacement of all project features. The Marysville Levee Commission

would operate and maintain the levee in accordance with current Corps criteria. The Corps would continue to work with the Marysville Levee Commission to ensure adequate lands are available for levee maintenance for the existing MRL. Regular maintenance activities would include mowing and spraying levee slopes, controlled burns, rodent control, clearance of maintenance roads, and levee inspections.

## **Phase 2**

### Features

Phase 2 would extend 8,700 feet on the southern portions of the MRL levee (Plate 3). The proposed repair for this site involves a 50 to 90 foot deep slurry wall on the waterside slope in three locations, jet grouting under four bridges, and a 70 foot deep secant pile wall through the levee crown or along the waterside hinge point in two locations.

### Construction Methods

Phase 2 construction would include installing a 50 to 90 foot deep, 4,200 foot long slurry wall and a 70 foot deep, 2,300 foot long secant pile wall. Jet grouting would occur at the 5<sup>th</sup> Street Bridge, Highway 70 Bridge and at two railroad bridges on the southwest and southeast corners of the levee. In this reach there are pipes that are located under the levee that connect to the water treatment facility. These pipes would be either relocated or protected in place by jet grouting between the pipe and the slurry wall.

Conventional construction equipment such as loaders, scrapers, graders, and excavators would be used to perform the degrading, reshaping, and other earthwork. For slurry wall construction methods, please see the Slurry Wall Construction section in Phase 1 under Construction Methods.

*Secant Pile Wall Construction.* A Secant Pile Wall system (Figure 3) is a structural wall constructed of overlapping drilled foundation piles of concrete that could be reinforced as an option. A structural wall is desirable in this location due to potential tunnels and deleterious material that could occur in the levee. Tunnels and deleterious material could create construction problems if a slurry wall were to be used in this location. An incidental benefit in selecting this construction method is a reduction of vibration from the slurry wall method of construction. Strong vibrations could affect the Bok Kai temple and other historic structures in this area.

The levee crown would be degraded 4 to 12 feet to provide a 40 to 55 foot temporary working area for construction equipment. A series of three- to four-foot diameter holes would be drilled into the earth by a drill rig. These holes may be cased with a steel pipe which can be vibrated or oscillated into the ground at the perimeter of the holes. The boreholes are backfilled with Portland cement concrete using a concrete pump truck. Steel reinforcing may be added to provide additional strength. This requires a large crane to place the steel in the boreholes. Secant piles may be anchored with steel

tendons, known as tiebacks. If needed, the tiebacks would be installed landward of the levee, and beneath landside structures within a distance of 50 to 75 feet.



**Figure 3. Secant Pile Wall.**

*Jet Grouting Construction.* Jet Grouting would be used to treat the ground in locations that are inaccessible to the other open trench methods. This method uses small drill rigs to bore holes in the soil. High-pressure, rotating water jets then inject SCB and water to form a soil-cement product.

#### Access and Staging

The Phase 2 access roads would be Levee Road for the secant pile wall construction; Bizz Johnson Drive for the slurry wall construction; and the levee crown and waterside toe for all construction including jet grouting.

Staging areas totaling approximately ten acres would be located within Riverfront Park and an approximately three acre staging area would be located at the old sand pit. Construction materials, equipment, topsoil, and excess material would be temporarily stored the proposed staging areas during the construction period, as well as provide parking for construction workers. All construction supplies would be delivered to the staging area.

#### Site Preparation

Prior to construction, all construction areas would be fenced off to limit access, including the staging area. A temporary construction easement of 20 to 100 feet from the waterside toe and a temporary construction easement of 10 to 25 feet from the landside toe would be needed for the equipment working area. Temporary erosion controls would be implemented on the waterside toe of the levee to prevent soils from running onto adjacent properties and into local waterways, as well as to separate the construction easement from the private residences near the site. Similar methods would be used

around the staging areas. The slopes and crown of the levee would be cleared and grubbed of all vegetation and surface material, including the existing levee maintenance road on the crown.

Structural analysis of each historic property within the area of impact would be completed prior to initiation of construction activities to determine the maximum threshold of vibration that each historic property is able to withstand before there is physical damage to the property. Concurrent vibration analysis would assess the overall area and level of disturbance due to construction. These studies will determine if any historic properties would need to be seismically monitored during construction.

#### Restoration and Cleanup

The procedures for restoration and clean-up are the same for all four sites. See the description of Restoration and Cleanup described under Phase 1 for details.

#### Borrow and Disposal Sites

All disposal material would be temporarily stockpiled at the staging areas or disposed of at a commercial facility within 12 miles of the project site. If a site other than a commercial site is used, appropriate NEPA/CEQA documentation would be required along with evidence of compliance with all other applicable laws and regulations. The Corps would have to initiate Section 106 compliance, if appropriate.

The contractor would be responsible for determining and providing certification to the Corps that the material is free from contaminants and is suitable for disposal at a commercial facility. The amount of soil that would be disposed of would be dependant upon how much the levee is degraded. The estimated amount of non-suitable soil to be disposed of would be 14,338 cubic yards. The estimated amount of soil imported from a borrow site would be 30,091 cubic yards.

There one potential haul route proposed for all material and equipment transportation: Highway 70 to 3<sup>rd</sup> Street to F Street to Bizz Johnson Drive to the waterside toe or the levee crown,. This route is discussed in detail in Section 3.3.6, Traffic and Circulation, and is shown on Plate 4.

#### Construction Workers and Schedule

Although the numbers of workers on site would vary during construction, an estimated 30 to 35 workers could be onsite each day during construction. These workers would access the area via regional and local roadways and would park their vehicles at one of the identified staging areas. Construction hours would be limited to the hours from 7 a.m. to 7 p.m. up to seven days a week. Construction would start between June and August 2012 and end in October or November 2012. This construction schedule is necessary to avoid any potential adverse effects on species of concern or their habitat.

## Operation and Maintenance

The procedures for operation and maintenance are the same for all four sites. See the description of Operation and Maintenance under Phase 1 for details.

### **Phase 3**

#### Features

Phase 3 would extend for approximately 11,100 feet along the east and northeast portion of the levee (Plate 3). The proposed repair for this site would be a 50 to 110 foot deep slurry wall installed through the crown of the levee or along the levee slope. This repair would require temporary road closures on Highway 20/Browns Valley Road, Simpson Lane, and Levee Road. Rerouting Highway 20 at its intersection with Levee Road may be required for approximately 7 working days at a time, depending on the method of construction. This would be accomplished by constructing temporary access roads or creating a detour around the city using other local roads.

#### Construction Methods

Phase 3 construction would consist of installing 50 to 110 foot deep slurry walls in two locations: (1) a 3,400 foot long slurry wall in the northeast corner of the levee, and (2) a 4,000 foot long slurry wall extending northeast from Ramirez Street / Simpson Lane. Conventional construction equipment such as loaders, scrapers, graders, and excavators would be used to perform the degrading, reshaping, and other earthwork. For slurry wall construction methods, please see the Slurry Wall Construction section in the Phase 1 Construction Methods.

#### Access and Staging

Phase 3 access roads would be Ramirez Street/ Simpson Lane to Levee Road for the southern slurry wall, Highway 20 to Levee Road for the northern slurry wall, and the waterside toe of the levee for the entire phase.

The staging areas would be approximately 13 acres and be located 250 feet out from the waterside toe of the levee, extending from stations 328+00 to 344+50 and from stations 388+00 to 394+41. During the construction period, construction materials, equipment, topsoil, and excess material would be temporarily stored the staging areas. The staging areas would also provide parking for construction workers. All construction deliveries would be placed in the staging areas.

#### Site Preparation

Prior to construction, all construction areas would be fenced off to limit access, including the staging area. A temporary construction easement of 12 to 40 feet and a localized lane shift of Highway 20 on the landside toe would be needed for the equipment



working area. A temporary construction easement of 15 to 100 feet from the waterside toe would be needed for the equipment working area. Erosion control measures would be implemented on the landside and waterside toe of the levee to prevent soils from entering adjacent properties and local waterways. The slopes and crown of the levee would be cleared and grubbed of all vegetation and surface material, including the existing levee maintenance road on the crown.

### Restoration and Cleanup

The procedures for restoration and clean-up are the same for all four sites. See the description of Restoration and Cleanup described under Phase 1 for details.

### Borrow and Disposal Sites

All disposal material would be temporarily stockpiled at the staging area or disposed of at a commercial facility within 12 miles of the project site. If a site other than a commercial site is used, appropriate NEPA/CEQA documentation would be required along with evidence of compliance with all other applicable laws and regulations. The Corps would have to initiate Section 106 compliance, if appropriate.

The contractor would be responsible for determining and providing certification to the Corps that the material is free from contaminants and is suitable for disposal at a commercial facility. The amount of soil that would be disposed of is dependant upon how much the levee is degraded. The estimated amount of non-suitable soil to be disposed of would be 12,466 cubic yards. The amount of soil imported from a borrow site would be approximately 17,306 cubic yards.

There are three potential haul routes proposed: (1) Ramirez Street/Simpson Lane to Levee Road (crown of levee) for the southern slurry wall, (2) Highway 20 to Levee Road for the northern slurry wall, and (3) Levee Road between slurry wall construction sites and staging. The waterside toe of the levee would be used for access for duration of the entire phase. These routes are discussed in detail in section 3.3.6, Traffic and Circulation, and are shown on Plate 4. Construction of temporary access ramps may be necessary for equipment access from the landside slope to the crown of the levee.

### Construction Workers and Schedule

Although the numbers of workers on site would vary during construction, an estimated 25 to 30 workers could be onsite each day during construction. These workers would access the area via regional and local roadways, and would park their vehicles at the northeast corner staging area. Construction hours would be limited to the hours from 7 a.m. to 7 p.m. up to seven days a week. Construction would start between June and August 2013 and end in October or November 2013. This construction schedule is necessary to avoid any potential adverse effects on species of concern or their habitat.

## Operation and Maintenance

The procedures for operation and maintenance are the same for all four sites. See the description of Operation and Maintenance under Phase 1 for details.

### **Phase 4**

#### Features

The proposed repair for Phase 4 would consist of the construction of two stability berms between the railroad trestles at Binney Junction (Plate 3). The construction site would extend approximately 15 feet out from the landside toe, encompassing about 17.6 acres of total disturbed area.

#### Construction Methods

Phase 4 construction would consist of two seven-foot tall seepage or stability berms. These berms would stabilize the levee by laterally retaining an existing railroad track and by resisting seepage uplift. The construction equipment required would be a loader, sheep foot roller, and small dozer.

#### Access and Staging

The Phase 4 access roads would be Highway 70 to the crown of the levee in the north and Bizz Johnson Drive to the crown of the levee in the west. The staging area would be accessed by taking Highway 70 to 14<sup>th</sup> street to Ellis Lake Drive.

The staging area would be located on the landside of the levee adjacent to the site and would be approximately five acres. Construction materials, equipment, topsoil, and excess material would be temporarily stored at the proposed staging area during the construction period. The staging area would also provide parking for construction workers. All construction deliveries would be placed in the staging area.

#### Site Preparation

Prior to construction, the staging area would be fenced off to limit access. Installation of the stability berms would require the site to be cleared and grubbed of all vegetation and surface material. Coordination between the Corps and Union Pacific Railroad would need to occur to gain access to the entire site. A temporary access ramp for equipment and workers would need to be installed to facilitate access over the railroad tracks.

#### Restoration and Cleanup

The procedures for restoration and clean-up are the same for all four sites. See the description of Restoration and Cleanup described under Phase 1 for details.

### Borrow and Disposal Sites

All disposal material would be temporarily stockpiled at the staging area or disposed of at a commercial facility. The contractor would be responsible for determining and providing certification to the Corps that the material is free from contaminants and is suitable for disposal at a commercial facility. Minimal material would be disposed of in this phase. The amount of soil imported from a borrow site would be approximately 7,336 cubic yards.

The borrow and disposal areas are assumed to be located within 12 miles of the project area. The contractor would be responsible for determining the location of borrow and disposal. If a site other than a commercial site is used, appropriate NEPA/CEQA documentation would be required along with evidence of compliance with all other applicable laws and regulations. The Corps would have to initiate Section 106 compliance, if appropriate.

The proposed haul routes would be Highway 70 to the crown of the levee in the north or Bizz Johnson Drive to the crown of the levee in the west. The staging area would be accessed by taking Highway 70 to 14<sup>th</sup> Street to Ellis Lake Drive. These routes are discussed in detail in Section 3.3.6, Traffic and Circulation, and are shown on Plate 4.

### Construction Workers and Schedule

Although the numbers of workers on site will vary during construction, an estimated 10 to 15 workers would be onsite each day during construction. These workers would access the area via regional and local roadways, and would park their vehicles at the staging area. Construction hours would be limited to the hours from 7 a.m. to 7 p.m. seven days a week. Construction activities are expected to begin between June and August 2013 and continue for approximately two months. It is anticipated that construction would be complete by October 2013. This construction schedule is necessary to avoid any potential adverse effects on species of concern or their habitat.

### Operation and Maintenance

The procedures for operation and maintenance are the same for all four sites. See the description of Operation and Maintenance under Phase 1 for details.

## **3.1 ENVIRONMENTAL EFFECTS AND AFFECTED RESOURCES**

### **3.2 Introduction**

This section describes the resources in the project area, as well as potential effects of the alternatives on those resources. As appropriate, the effects are discussed either by phase or for the project as a whole. This is because the effects on some of the resources

are realized over the entire project, rather than limited to a specific phase of the project construction.

Both beneficial and adverse effects are considered, including direct effects during construction and indirect effects resulting from the implementation. Each section contains a discussion of the methods used to analyze effects. In addition, the bases of significance (criteria) for each resource are identified to evaluate the significance of any adverse effects. When necessary, measures are proposed to avoid, minimize, or mitigate any significant adverse effects for each resource.

The bases of significance are based on NEPA and CEQA requirements. The Corps has integrated NEPA requirements into its regulations, policies, and guidance. Engineering Regulation 1105-2-100, "Planning Guidance Notebook," April 2000, establishes the following significance criteria:

- Significance based on institutional recognition means that the importance of the effects is acknowledged in the laws, adopted plans, and other policy statements of public agencies and private groups. Institutional recognition is often in the form of specific criteria.
- Significance based on public recognition means that some segment of the general public recognized the importance of the effect. Public recognition may take the form of controversy, support, conflict, or opposition expressed formally or informally.
- Significance based on technical recognition means that the importance of an effect is based on the technical or scientific criteria related to critical resource characteristics.

For this EA/IS, these three NEPA criteria apply to all resources and are not repeated for each resource. The CEQA requirements are more specific to the resource and are listed in Appendix G of the CEQA Guidelines. The CEQA criteria relevant to the project area, as well as other agency criteria and threshold of significance that apply to each resource, are identified under the appropriate resource.

### **3.3 Resources Not Considered in Detail**

Initial evaluation of the alternatives indicated there would likely be little to no direct, indirect, or cumulative effects on several resources. These resources are discussed in Sections 3.2.1 through 3.2.7 to add to the overall understanding of the environmental setting.

#### **3.2.1 Climate**

In general, the climates of California formed due to topography and the position of the semi-permanent subtropical cell, a center of high atmospheric pressure in the

Pacific Ocean off the California coast. During the summer, the cell moves over northern California and Nevada and effectively blocks the movements of the Pacific storm systems into California, creating drought-like conditions. During the winter, the cell retreats to the southwest, allowing storms and frontal systems to move into northern and central California. As a result, California winters are cool and wet, while the summers are typically hot and dry.

In the valley portions of Yuba County, about 85 percent of the annual rainfall occurs between October and March; about 95 percent falls between October and April. At Marysville, the average annual rainfall is 20.59 inches. The mean annual temperature in Marysville is 62 degrees Fahrenheit (°F). January is generally the coldest month with a mean low temperature of 35 °F and an average high temperature of 54 °F. July is the hottest month with an average high temperature of 96 °F and an average low of 61 °F. High temperatures commonly exceed 100 °F (Yuba County 1994).

During the winter, wind patterns in the Sacramento Valley are either northerly or southerly, depending on the direction of the storm system. Atmospheric inversions often occur in the winter, during which time the temperatures increase with elevation. Heavy fog (known in central California as “tule fog”) forms during this season, particularly in December and January. The air beneath the fog remains cool, while the air above the fog is warm, contributing to the inversion layering.

The project does not include any features or activities that would change the regional climate conditions. There would be no effect on the climate as a result of construction of the proposed project.

### **3.2.2 Geology and Seismicity**

Between the Sierra Nevada on the east and the Coast Ranges on the west, the Central Valley is a long narrow trough once filled with seawater, and now with sediments accumulated over millions of years. The surface of the Central Valley is composed of unconsolidated Pleistocene (2 to 3 million years ago) and Recent (10,000 years ago) sediments. The valley floor is composed of alluvial fan and channel deposits from various rivers in the area. Adjacent to the Feather River are the most recent sedimentary rocks overlying igneous rocks, while older sedimentary rocks are located farther east. The sedimentary rocks are both marine and continental in origin and are frequently imbedded with tuff-breccias.

The principal ground-water aquifers in the valley area are composed of continental sediments of Pleistocene and Recent Age. These sediments consist of as much as 100 feet of Pleistocene sands and gravels overlain by up to 125 feet of recent alluvial fan, flood plain, and stream channel deposits. Important aquifers are found near Marysville, Wheatland, and Beale Air Force Base in southeast Yuba County.

California is located in the circum-Pacific earthquake zone and is the most seismically active area in the United States. The western and eastern portions of the State

have the highest occurrence of seismic activity. Yuba County lies in east-central California, an area experiencing relatively low seismic activity. A fault is defined as a fracture zone in the earth's crust along which there has been displacement of the sides relative to one another. The two types of faults are active and inactive. Active faults have experienced displacement in historic time, with future fault movement expected. Inactive faults show no evidence of movement in recent geologic time, suggesting that these faults are dormant. The nearest active fault near Yuba County is the Cleveland Hill Fault, which is located about 20 miles northeast of Marysville. This fault was the source of the 5.7 magnitude earthquake in the Oroville area in 1975.

After the Oroville earthquake, Federal and State studies determined that the Foothills fault system within Yuba County is a continuation of the Cleveland Hill fault. Portions of the Foothills fault system are considered to be capable of seismic activity, but the activity is estimated to have a very long recurrence interval. As a result, the California Division of Mines and Geology determined that a special seismic zoning for the Foothills fault system was not necessary.

In the event of an earthquake, seismic hazards such as ground shaking, soil liquefaction, subsidence, and seiches, depending on the magnitude of the earthquake, may pose a potential threat to levee stability and failure. Since there are no active faults within 20 miles of the project area, it is unlikely that the MRL Improvements would have any effects due to potential seismic activity in the area.

### **3.2.3 Topography and Soil Types**

The study area is located within Yuba County on the east side of the Sacramento Valley. The valley is bounded by the Coast Range on the west and the Sierra Nevada on the east. Three physiographic areas are identified within Yuba County: the valley area, foothill area, and mountain area. The study falls within the relatively flat valley area, a flat flood plain for the Feather and Yuba Rivers. The elevation ranges from 30 feet above mean sea level (msl) on the valley floor to about 250 feet above msl in the eastern foothill area. The proposed levee refinements would not change the general topography of the area. As a result, the project would have no effect on the topographic features in the region.

Soils in the study area can be divided into two broad groups: (1) those derived from recent alluvial deposits, and (2) those derived from old alluvial fan or terraces. The majority of soils found on the valley floor are shallow to moderately deep, sloping, well-drained soils with very slow permeable subsoils underlain with hardpan such as San Joaquin and Redding-Corning-Pardee soils. They have good natural drainage, slow subsoil permeability, and slow runoff. Because their inherent fertility is low, these soils are primarily used for pasture, grains, and rice.

Soils found immediately adjacent to the Yuba and Feather Rivers are dominated by deep, nearly level, well-drained loamy Columbia-Holillipah soils. The natural drainage is good, and the soils have slow to moderate subsoil permeability. Runoff is

slow, and their inherent fertility is high. These soils are used for pasture, orchards, and row crops. The river terraces consist of Conejo-Kilaga soils, which are very deep, well-drained alluvial soils. These soils are used for irrigated orchards and cultivated crops such as walnuts, peaches, prunes, almonds, kiwis, tomatoes, dry beans, and melons. In the areas adjacent to the Yuba River where tailings are located, soil characteristics are variable. Mine tailings, which are very deep materials resulting from gold mining operations, are the main soil type (NRCS 2009).

Soils in the project area would be disturbed during construction due to excavation and stockpiling of soil material and reuse of the stockpiled material to construct the project. The contractor would be required to prepare an Erosion and Sediment Control Plan identifying specific best management practices (BMPs) to avoid or minimize soil erosion. All suitable material from excavation would be temporarily stored at the staging area(s) designated for each Phase and be reused in the project area to the extent feasible. All disposal material would be temporarily stockpiled at the staging area(s) and then disposed of at a commercial site or facility. The general soil composition in the project area is not expected to change due to construction activities with the implementation of BMPs and reuse of soil materials from the area.

### **3.2.4 Esthetics and Visual Resources**

An area's visual character is determined by the variety of the visual features present, the quality of those features, and the scope and scale of the scene. The visual components of a particular area consist of features such as landforms, vegetation, manmade structures, and land use patterns. The quality of these features depends on the relationship between them and their scale in the overall scene.

The project area has unique esthetic qualities, but the rivers and their associated vegetation are the predominant esthetic resource. The study area is characterized by orchards, crop lands, and the urban areas of Marysville. Visually, the rivers provide a focus for Marysville, giving it its unique character. Riparian vegetation adjacent to the rivers are visible from places in town and from Highways 20 and 70. The Sierra Nevada, North Coast Ranges, and Sutter Buttes are visible from Marysville except when weather or air quality conditions reduce visibility.

There is recreational use of the levees along the Feather River, Jack Slough, and at Riverfront Regional Park. The planned slurry walls, secant-pile walls, stability berms, and levee regrading would not result in any significant permanent adverse visual effects. Construction equipment and building materials would result in temporary impacts to esthetics and visual resources, but would be confined to the construction periods outlined in Section 2.4.2. The completed slurry wall and pile wall work, which are inside the levee, would not be visible. The stability berms along the levees would be constructed to a height of seven feet and would be visible to recreationists on the levees. These berms should not create a significant visual change because they would be constructed in a low lying area between the railroad tracks at Binney Junction and would not obstruct public view. Therefore, construction of the berms would not result in a significant adverse

effect. Levee regrading should not be a major visual change to the public since it would consist of modifying current levee features. The height of the levee would not change, therefore the view would remain the same.

### **3.2.5 Hazardous, Toxic, and Radiological Waste**

The Corps completed an Environmental Site Assessment (ESA) in September 1997 for the 1998 Yuba River Basin EIS/EIR to identify any potential sources of Hazardous, Toxic and Radiological Waste (HTRW) in the project area (Corps 1998). The 1997 search identified seven sites along the MRL and the east bank of the Feather River. The seven sites included a burn barrel, scattered garbage, pruning refuse, garbage dumps, abandoned vehicle gas tanks, blue plastic drums, a vehicle maintenance site, an abandoned trailer court, the Yuba Sand Company, and a pole-mounted transformer.

The Comprehensive Environmental Response, Compensation and Liability Act (42 U.S.C. § 9601 *et seq.*) and the Solid Waste Disposal Act (42 U.S.C. § 6901 *et seq.*), both promulgated by the USEPA, indirectly necessitate the ESA action. In October and November 2009, an ESA was conducted around the MRL (Appendix G). An ESA Report was prepared in January 2010. The ESA consisted of reviewing regulatory lists of HTRW sites, historical literatures, aerial photographs, websites, and conducting interviews with people who are knowledgeable about the project, the project site and the surrounding area. This ESA included record and document searches for any environmental conditions including hazardous substances or petroleum products that could indicate a release into structures, ground, groundwater, or surface waters.

Based on the site assessment, there are five areas that may pose a small probability of releasing hazardous substances on, at, in or to the project area, and include:

- The PG&E substation transformers, which may contain polychlorinated biphenyls.
- The PG&E maintenance yard contains petroleum products and hazardous materials.
- The Caltrans maintenance yard contains petroleum products and hazardous materials.
- The area east of Marysville, on the waterside, has several historic and existing structures that may pose a threat if flooding occurs.
- The sewage treatment plant.

The project footprint for the MRL Improvements lies outside of the areas identified in the ESA. Construction would not likely impact the release of substances from these sites. In addition, this ESA did not identify any known contamination due to



HTRW in the survey area. Therefore, construction activities would not result in a significant adverse affect.

### **3.2.6 Fisheries**

This section discusses the fisheries resources and habitat that occur in the Feather and Yuba Rivers near the project area. These water bodies provide important habitat for native anadromous and resident Central Valley fishes. Because the rivers support many of the same fish species, they are discussed together in this section. The fish found in these water bodies include species that are listed or are candidates for listing under the Federal Endangered Species Act (16 U.S.C. §1531) (FESA) and the California Endangered Species Act (Fish & Game Code §2050, *et seq.*) (CESA).

Both the Feather and Yuba Rivers are tributaries to the Sacramento River, a migratory path for anadromous fish. There are at least 28 species of anadromous and resident fish in both rivers (Table 2; UC Davis 2003). Anadromous species include Central Valley spring-run Chinook salmon, Sacramento River winter-run Chinook salmon, Central Valley steelhead, American Shad, delta smelt, striped bass, green and white sturgeon, Pacific lamprey, and river lamprey.

The Yuba River is very unique among California's large anadromous fish streams because it is managed as a chinook salmon and steelhead trout stream. The lower 24 miles of the river, extending from its confluence with the Feather River Upstream to Englebright Dam, contains excellent spawning gravels. Hatchery facilities and supplementation of reared stock are not needed, as with many of California's valley rivers.

Fishery resources in the Feather and Yuba Rivers are not expected to change from existing conditions with the preferred alternative of constructing the Marysville Levee improvements. The construction activities for levee reshaping, slurry wall, secant-pile wall, jet grouting, and berm work would take place from the waterside of the levee during low-flow conditions of the rivers. As a result, no aquatic effects are expected. The waterside of the levee is located approximately 200 to 1000 feet or greater from the Yuba and Feather Rivers and about 600 feet from Jack Slough. Activities within the construction easements would not disturb streamside vegetation. BMPs would be implemented to avoid debris, soils, or fuel spills; therefore fish habitat would not be affected. All irrigation ditches in Phase 1 would be protected by installing K-rails. The staging areas are within 200 feet of the levees, away from the water; therefore, no adverse fishery effects would occur.

**Table 2. Fish Species in the Lower Feather and Yuba Rivers.**

Common Name	Scientific Name	Native (N) / Introduced (I)
American shad	<i>Alosa sapidissima</i>	I
Bluegill	<i>Lepomis macrochirus</i>	N
California roach	<i>Hesperoleucus symmetricus</i>	N
Central Valley spring-run Chinook salmon	<i>Oncorhynchus tshawytscha</i>	N
Central Valley steelhead	<i>Oncorhynchus mykiss</i>	N
Delta smelt	<i>Hypomesus trasnpacificus</i>	N
Green sturgeon	<i>Acipenser medirostris</i>	N
Hardhead	<i>Mylopharodon conocephalus</i>	N
Hitch	<i>Lavinia exilicauda</i>	N
Largemouth Bass	<i>Micropterus salmoides</i>	I
Pacific lamprey	<i>Lampetra tridentate</i>	N
Prickly sculpin	<i>Cottus asper</i>	N
Riffle sculpin	<i>Cottus gulosus</i>	N
River lamprey	<i>Lampetra ayresi</i>	N
Sacramento blackfish	<i>Orthodon microlepidotus</i>	N
Sacramento pikeminnow	<i>Ptychocheilus grandis</i>	N
Sacramento River winter-run Chinook salmon	<i>Oncorhynchus tshawytscha</i>	N
Sacramento splittail	<i>Pogonichthys macrolepidotus</i>	N
Sacramento sucker	<i>Catostomus occidentalis</i>	N
Sacramento Squawfish	<i>Ptychocheilus grandis</i>	N
Smallmouth Bass	<i>Micropterus dolomieu</i>	I
Speckled dace	<i>Rhinichthys osculus</i>	N
Striped bass	<i>Morone saxatilis</i>	I
Threespine stickleback	<i>Gasterosteus aculeatus</i>	N
Tule perch	<i>Hysterocarpus traski</i>	N
Western brook lamprey	<i>Lampetra richardsoni</i>	N
White sturgeon	<i>Acipenser transmontanus</i>	N
White Catfish	<i>Ictalurus catus</i>	I
White Crappie	<i>Pmoxis annularis</i>	I

### 3.2.7 Socioeconomics, Land Use, and Environmental Justice

The city of Marysville is located within Yuba County, at the confluence of the Yuba and Feather Rivers. Yuba County had a population of 67,868 in 2008, a population growth of 11.3% since the 2000 Census (U.S. Census Bureau 2008). Comparatively, the city of Marysville had a population of 12,268 in 2000, and has since decreased approximately 4.6 percent from 2000 to a 2008 population of 11,700 (City-data.com 2009). Approximately 34.2 percent of the city's population consists of minorities.

Marysville has uniquely different population trends from the greater Yuba County area because its location limits the growth of the city due to the surrounding levees.

In 2009, the unemployment rate in Marysville was 16.3 percent (California Employment Development Department 2009). In 2000, the primary occupation types of the employed civilian residents (16 and over) were sales and office jobs with 28.4 percent, and management and professional jobs with 24.7 percent. The primary industry types for the same group were retail trade with 14 percent, and education, health, and social services with 25 percent. In 1999, 15.2 percent of families and 18.9 percent of individuals in Marysville were below poverty level (U.S. Census Bureau 2000).

The predominate land use in Marysville is residential, with some commercial, industrial and open space in the project area. The levee reshaping, in Phase 1, would push the waterside toe out up to 10 feet into the current waterside levee maintenance road in order to meet the new Corps standard of a 3 horizontal to 1 vertical (3H:1V) waterside slope. This reshaping would have minimal impact on land use. There is a 1.05-acre rice field that would be taken out of production for one season to accommodate project construction in phase 1. The landowner would be compensated for the use of this land and therefore, it would not be considered a significant adverse socioeconomic effect. The residential and commercial development adjacent to the levee in all phases would remain the same, and the staging areas would be returned to the pre-project uses after construction.

The proposed action would have no effect on the socioeconomics of the city of Marysville. The city of Marysville is a self-contained unit within the ring levee with no potential for future growth or expansion, nor would construction result in any long-term changes to land use. The proposed action would not have any effect on either current or future opportunities for agriculture, business, employment, or housing opportunities.

The proposed project would not adversely affect any minority or low-income populations. No relocations would be associated with this project and no populations would be displaced as a result of the construction of this project. Any minority or low-income populations within the project area would be benefited by the construction of this project as a result of the improved flood protection to the city of Marysville.

### **3.3 Resources Considered in Detail**

#### **3.3.1 Water Resources and Quality**

This section describes the existing conditions of the water resources that may be significantly affected and evaluates the effects of the proposed alternatives on the water resources and quality in the project area.

## **Existing Conditions**

### Regulatory Setting

Federal and State law mandates a series of programs for the management of surface water quality. The Clean Water Act (33 U.S.C. § 1251 *et seq.*) (CWA) is the Federal law that establishes the baseline that all state and local water quality laws must meet. The CWA also gives states the authority to adopt more stringent water quality programs to manage waters within the State. California's Porter-Cologne Water Quality Control Act (California Water Code, Division 7), which created the State Water Resources Control Board (SWRCB), regulates the California waterways and establishes pollution prevention plans and penalties.

The SWRCB is responsible for enforcing the State water quality laws and objectives, establishing beneficial uses for each State waterway, and developing and updating basin plans that protect water quality based on beneficial use. The project area falls within the jurisdiction of the Central Valley Regional Water Quality Control Board (CVRWQCB), which authorizes discharges into State waterways under the National Pollutant Discharge Elimination System (NPDES) permitting process. NPDES permits apply to stormwater discharges in the project area. Construction activities that disturb more than one acre of land would require a NPDES permit for potential stormwater discharges and construction dewatering.

Section 404 of the Clean Water Act regulates the discharge of dredged or fill material into wetlands and waters of the U.S. The Corps and the U.S. Environmental Protection Agency (USEPA) both have responsibilities in administering the program and typically issue permits for these regulated activities. Yuba and Feather Rivers both fall under the jurisdiction of the Clean Water Act

### Surface Water

The Yuba and Feather Rivers are part of the Sacramento River watershed along with numerous other streams and rivers that drain the western slopes of the Sierra Nevada and Cascades, emptying into the Sacramento River. In general, surface waters in the project area are of good to excellent quality, except for local degradation as streams pass through urban or agricultural areas (Corps 1992). Agriculture is the largest water user in the project area, and surface water is generally used for agricultural purposes.

In the Yuba and Feather Rivers, variations in overall water quality are usually correlated with fluctuations in flow rates throughout the year. During heavy storm runoff in the winter and spring, the turbidity and debris levels in the rivers are high. In the spring and early summer, the water quality is affected by agricultural drainage and natural runoff. During periods of low flows, specifically the late summer-early fall, water quality decreases due to higher water temperatures and concentrations of pollutants.

Surface water quality in the project area depends primarily on the amount of flow and the amount of pollutants discharged into the water from urban and agricultural areas. Creation of impervious ground surfaces through construction of pavements and buildings leads to excessive surface runoff during storms where natural ground surfaces had previously acted to absorb or slow this runoff. In urban areas, pollutants from motor vehicles, including petroleum hydrocarbons, glycol (from radiator coolants and anti-freezes), and dissolved heavy metals such as lead and zinc from automotive batteries, are often deposited on pavements. Stormwater runoff picks up these pollutants, and without proper controls, carries them into streams and lakes.

Agricultural runoff is also discharged into the streams and rivers. Pollutants such as pesticides, fertilizer residues, and other hazardous substances from agricultural lands contribute to surface water quality problems in the project area. Irrigation ditches are found throughout the project area. They are used to convey agricultural water and generally have poor water quality due to high temperatures and high nutrient loads.

### Groundwater

Groundwater in the foothill and mountain areas of Yuba County is not well defined. The valley floor is governed by an alluvial aquifer system that contains significant quantities of groundwater, while the foothill and mountain areas are governed by a fractured rock aquifer, which may yield small quantities of water to wells (YCWA 2002).

Groundwater in Yuba County is divided into two subbasins of the larger Sacramento Valley groundwater basin: the North Yuba Subbasin and the South Yuba Subbasin. The North Yuba Subbasin is found in the northwest portion of Yuba County, bounded on the south by the Yuba River, on the west by the Feather River, by Honcut Creek on the north, and the Sierra Nevada on the east. The overall subbasin covers 50,000 acres and includes Marysville and most of its sphere of influence. Groundwater levels in the North Yuba Subbasin range from approximately 50 feet above msl (mean sea level) near the City of Marysville to 130 feet above msl near the Yuba River. Groundwater levels are about 70 feet above msl near the center of the subbasin (YCWA 2002).

Due to the availability of surface water in the project area, groundwater levels have stayed fairly constant since monitoring began in 1960 (DWR 2009). The quality of the groundwater supplies is good although the possibility exists for contamination from pesticides, fertilizer residues, road run-off, and hazardous materials such as heavy metals (Yuba County 2008). Currently, there are no confirmed contaminant plumes in the Marysville area.

### Jurisdictional Wetlands and Other Waters of the U.S.

Regulated or jurisdictional waters include all navigable waters, interstate waters, their tributaries, and adjacent wetlands. Any discharge of dredged or fill materials into

these jurisdictional waters would be subject to compliance under CWA Sections 404 and 401 (33 U.S.C. §1251 et seq. [1972]).

A wetland delineation was done for the Corps by USFWS in September 2009 (Appendix A). The wetland delineation focused on the waterside of the levee near Jack Slough in Phase 1 of the project area. The jurisdictional wetlands in the project area include limited areas of seasonal wetlands typically located within or adjacent to streams, swales, or other drainages. Other waters of the United States include the Feather and Yuba Rivers, Jack Slough, and an irrigation ditch. Based on the delineation, there are 2.90 acres of jurisdictional wetlands in the project area that would be subject to regulation under Section 404 of the CWA (Appendix A). A complete description of jurisdictional wetlands in the project area can be found in Section 3.3.3, Vegetation and Wildlife.

## **Environmental Effects**

### Significance Criteria

Adverse effects on water quality were considered significant if an alternative would result in any of the following:

- Alter the quantity and quality of surface runoff.
- Degrade water quality.
- Violate any water quality standards or waste discharge requirements.
- Substantially alter the existing drainage pattern of the site or area, such that the flood risk and/or erosion and siltation potential would increase.
- Place structures that would impede or redirect flood flows within a 100-year flood plain.
- Expose people, structures, or facilities to significant risk from flooding, including flooding as a result of the failure of a levee or dam.
- Create or contribute to runoff that would exceed the capacity of an existing or planned storm water management system.
- Reduce groundwater quantity or quality.

### Alternative 1 (No Action)

Under the no action alternative, the Corps would not participate in constructing the MRL improvements. As a result, the existing water quality in the project area would continue to be affected by local conditions such as storm water, urban runoff, and

agricultural runoff. Water quality may also be affected by any potential floodwaters that could occur if the levees are not stabilized.

### Alternative 2 (Proposed Action)

Construction activities associated with the MRL improvements would disturb approximately 162 acres of land, exposing bare soil until construction is completed. Exposed soil could result in erosion or runoff, causing turbidity in local waterways. In addition, debris and inadvertent spills of fuels, oils or slurry mixture from construction equipment could be a source of contamination into adjacent waterways at work or staging areas. Any areas disturbed during construction would be re-seeded at the completion.

Slurry and secant pile wall construction is not expected to intercept groundwater supplies in or near Marysville. At this time, there is limited information on the possible effects that slurry and secant pile wall construction would have on groundwater supplies, and the Corps is in the process of investigating this further. Based on other slurry wall installation projects done by the Corps, no effects to groundwater have occurred (Esparza 2009). If new information is found, it would be addressed in the final Environmental Assessment/Initial Study.

The contractor would be required to obtain a NPDES permit from the CVRWQCB, because the project would disturb more than one acre of land. The contractor would also prepare a Storm Water Pollution Prevention Plan (SWPPP) prior to initiating construction activities. No known groundwater contaminant plumes exist in the area. If a plume is identified, further investigations would follow and would be addressed in the final document. Site specific details are discussed below.

There would be no adverse effects to groundwater supply due to construction of the MRL improvements. The City of Marysville pumps surface water from the Yuba River to maintain the water level of Ellis Lake, which artificially maintains groundwater levels inside the MRL. Additionally, any significant adverse effects to groundwater supply would be minimized because the regional groundwater flow can still pass beneath some of the slurry walls and secant pile wall in deeper permeable layers. The walls would not be consistently installed into a permeable layer around the levee. Areas that have been identified as contributing to under-seepage piping and uplift have walls installed into a permeable layer. These “windows” between the proposed walls would allow the groundwater to pass between the walls, resulting in no net loss of groundwater supply.

There are numerous irrigation and domestic wells located landside of the MRL. Construction pump tests would be done on city wells prior to construction to verify their production capability. Subsequent post-construction tests would also be done to determine any change in pumping capability. If a significant change is identified due to project-related activities, there would be mitigation measures developed that could include relocation of the well or modifying the operation of the well. Potential effects to specific wells are discussed below as appropriate.

*Phase 1.* Construction activities for Phase 1 would occur on the water side of the levee, above the ordinary high water mark. There are two irrigation ditches and adjacent rice fields within 50 to 100 feet from the existing waterside levee toe; therefore, no in-water work would be conducted. There is a potential for fugitive dust and construction runoff to enter these waterways due to soil excavation, equipment use, slurry wall work, and movement of trucks in the project area and along the haul routes. However, K-rails would be installed adjacent to the irrigation ditches to prevent any construction related materials or vehicles from entering the waterways.

One of the rice fields (approximately 1.05 acres) would not be planted with rice in the season prior to construction. Postponing rice production in this area would allow for dry-ground conditions to enable construction equipment to use the area without compromising water quality. The remaining rice fields are outside of the area needed for construction equipment and therefore would not be affected.

Additionally, there are three seasonal wetlands on the waterside of the levee within 20 feet of the project area. These areas would be protected by the K-rails and the construction-related activities for this project would not include discharging dredge or fill material into wetlands, therefore, this project is in compliance with Section 404 of the CWA.

*Phase 2.* Construction in Phase 2 would occur on the water side of the levee. Slurry wall, secant-pile wall, and jet grouting construction may create fugitive dust and construction runoff into street drainages along Bizz Johnson Road and onto residential and private properties. The Yuba River flows south of the project area, adjacent to the haul route (approximately 40 to 100 feet from the water's edge). The Feather River flows west of Phase 2 and is within 200 feet of the project area. The haul route is elevated from the Yuba River with a vegetated slope, which is expected to prevent debris from falling into the river. In addition, haul routes and construction activity near Riverfront Park are far from the Feather River. Therefore, debris, soil, or oil and fuel spills from construction activities are not expected to adversely affect water quality in the rivers.

*Phase 3.* Phase 3 construction would occur on the waterside of the levee. On the northeast portion of Phase 3, there is an irrigation ditch and adjacent rice field approximately 10 to 25 feet from the existing waterside levee toe. K-rails would be installed adjacent to the irrigation ditches to prevent any construction related materials or vehicles from entering the waterways. Excavation, slurry wall construction, equipment use, and truck movement within the project area and along haul routes may produce fugitive dust and construction runoff to enter these waterways. Therefore, debris, soil, or oil and fuel spills could temporarily adversely affect water quality in the irrigation ditch and rice field. The Yuba River flows east of the project area, however, it is far enough away (approximately 300 feet) that construction activities would not directly affect water quality.



Based on known well locations, there is one well in the Phase 3 reach that may be affected by the project. This well is located within 100 feet of the levee. The well is about the same depth as the proposed slurry wall. Project-related effects to this well are not expected due to the artificially maintained groundwater levels inside the MRL. However, during the final design of this phase, the groundwater flow to the well would be evaluated to determine if there are any project-related effects to the well. If a significant effect is identified (a loss of 15% to 25% of the total well's volume), alternatives to mitigate any adverse effects of the project on the well would be developed. These alternatives may include relocating the well from the landside to the waterside of the levee, reoperation of the existing well so that it could act as a pumped relief well during flood events, or relocating the well away from the area entirely. These measures would mitigate any adverse effects on the well to less than significant.

*Phase 4.* Construction activities for Phase 4 would occur on both the landside and waterside of the levee. Berm construction, equipment use, and truck movement along haul routes may create fugitive dust and construction runoff into street drainage along Ellis Lake Drive/18<sup>th</sup> Street. Therefore, debris, soil, or oil and fuel spills could temporarily adversely affect water quality. Jack Slough flows approximately 800 feet west of the project area. Railroad tracks and the levee separate the construction area from Jack Slough, so any construction related effects such as fuel spills or debris would be avoided. Therefore, no adverse effects to water quality are anticipated for the slough.

### **Mitigation**

The following BMPs would be implemented to avoid or minimize any effects of construction on surface waters. There may be additional BMPs identified as part of the NPDES permit. Implementation of all of the BMPs would ensure that the effects on water quality would remain at less-than-significant levels.

- A concrete and fuel spill management plan would be developed for the project.
- Implement appropriate measure to prevent any debris, soil, rock, or other construction activities from getting into the water. The contractor would use a water truck or other appropriate measures to control dust on haul roads, construction areas, and stockpiles.
- Properly dispose of oil or liquid wastes.
- Fuel and maintain vehicles in specified areas that are designed to capture spills. These areas cannot be near any ditch, stream, or other body of water or feature that may convey water to a nearby body of water.
- Fuels and hazardous materials would not be stored on site.
- Inspect and maintain vehicles and equipment to prevent dripping of oil or other fluids.

- Schedule construction to avoid as much of the wet season as possible. Ground disturbance activities are expected to begin in the summer of 2010. If rains are forecast during the construction period, erosion control measures would be implemented.
- Maintain sediment and erosion control measures during construction. Inspect control measures before, during, and after a rain event.
- Train construction personnel in stormwater pollution prevention practices.
- Revegetate and restore areas cleared by construction in a timely manner to control erosion.

Additional implementation of the measures in the Spill Prevention and Response Plan and the Erosion and Sediment Control Plan would prevent any significant adverse effects to water quality in the project area. The inclusion of the above mitigation measures would reduce any impacts to a less-than-significant level.

### **3.3.2 Air Quality**

Air quality is affected by the rate, amount, and location of pollutant emissions and the associated meteorological conditions that influence pollutant movement and dispersal. Atmospheric conditions (wind speed, wind direction, and air temperature) in combination with local surface topography (geographic features such as mountains and valleys) determine how air pollutant emissions affect local air quality.

This section describes the existing air quality conditions in and near the project area. This includes the regional setting, regulatory setting, existing air quality, and sensitive receptors.

#### **Existing Conditions**

##### Regional Setting

The project area lies within the Northern Sacramento Valley Air Basin (NSVAB). The topographic features giving shape to the NSVAB are the Coast Range to the west, the Sierra Nevada to the east, and the Cascade Range to the north. These mountain ranges channel winds through the NSVAB, but also inhibit the dispersion of pollutant emissions.

The predominant annual and summer wind pattern is the full sea breeze, commonly referred to as Delta breezes (CARB 1984). These cool winds originate from the Pacific Ocean and flow through a sea-level gap in the Coast Range called the Carquinez Straits. In the winter (December to February), northerly winds predominate. Wind directions in the Sacramento Valley are influenced by the predominant wind flow pattern associated with each season. During about half the days from July through

September, the Schultz Eddy prevents the Delta breezes from transporting pollutants north and out of the Sacramento Valley by causing the wind pattern to circle back south and keep air pollutants in the valley.

The vertical and horizontal movement of air is an important atmospheric component involved in the dispersion and subsequent dilution of air pollutants. Without movement, air pollutants can collect and concentrate in a single area, increasing the associated health hazards. For instance, in the winter, the NSVAB typically experiences calm atmospheric conditions that result in stagnant basin air and increased air pollution. As a result, persistent inversions occur frequently in the NSVAB, especially during autumn and early winter, and restrict the vertical dispersion of pollutants released near ground level.

The primary sources of pollutants in Yuba County are vehicular emissions and agricultural activities. Light industry and aircraft emissions from Beale Air Force Base also contribute to reduced air quality in the region.

### Regulatory Setting

Air quality management exists at Federal, State, and local levels of government. Air quality planning programs have generally been developed in response to requirements established by the Federal Clean Air Act (42 U.S.C. § 7401 *et seq.*) (CAA) and subsequent amendments to the act; however, the enactment of the California Clean Air Act (California Health and Safety Code § 40910 *et seq.*) (CCAA) of 1988 resulted in additional changes in the structure and administration of air quality management programs in California.

At the Federal level, the CAA is administered by the U.S. Environmental Protection Agency (USEPA). In California, the CCAA is administered by the California Air Resources Board (CARB) at the state level and by the Air Quality Management Districts at the regional and local levels. The Feather River Air Quality Management District (FRAQMD) is the agency principally responsible for monitoring the attainment and maintenance of Federal and State standards in Yuba County (CARB 2008b). The project area is included in the Federally-delineated NSAVB. The FRAQMD is also subject to regulations and attainment goals and standards of the NSVAB, the CARB, and USEPA.

*Federal Air Quality Management.* Air quality in the United States is governed by the CAA, which resulted in the adoption of Federal air pollutant standards, known as National Ambient Air Quality Standards (NAAQS), for pollutants including carbon monoxide (CO), ozone (O<sub>3</sub>), sulfur dioxides (SO<sub>2</sub>), nitrogen dioxides (NO<sub>2</sub>), lead (Pb), particulate matter less than 10 microns in diameter (PM<sub>10</sub>), and fine particulate matter (PM<sub>2.5</sub>). The NAAQS are available in Appendix B.

Federal projects are subject to the General Conformity Rule (40 CFR 51, Subpart W). The purpose of the General Conformity Rule is to ensure that Federal projects

conform to applicable state implementation plans (SIP) so that they do not interfere with strategies used to attain the NAAQS. The rule applies to Federal projects in non-attainment areas for any of six criteria pollutants for which the EPA has established these national standards and in areas designated as “maintenance” areas. The rule covers direct and indirect emissions of criteria pollutants or their precursors that result from a Federal project, are reasonably foreseeable, and can be practicably controlled by the Federal agency through its continuing program responsibility.

The project area is in non-attainment of Federal ozone and Federal PM10. If the applicable Federal project would result in total direct and indirect emissions in excess of the *de minimis* emission rates, it must be demonstrated through conformity determination procedures that the emissions conform to the applicable SIP for each affected pollutant.

A Federal project that does not exceed the *de minimis* threshold rates may still be subject to a general conformity determination if the sum of direct and indirect emissions would exceed 10 percent of the emissions of the non-attainment or maintenance area. If emissions would exceed one percent, the Federal project is considered “regionally significant,” and thus general conformity rules apply. This allows regulatory agencies to address those Federal projects that would not exceed the *de minimis* levels but would have the potential to adversely affect the air quality of a region. If the emissions would not exceed the *de minimis* levels and are not regionally significant, then the project is assumed to conform, and no further analysis or determination is required. FRAQMD has established pollution thresholds for development projects within its jurisdiction. Table 3 summarizes the State and Federal emissions thresholds applicable to this study.

*State Air Quality Management.* In addition to being subject to the requirements of the CAA, air quality in California is also governed by more stringent regulations under the CCAA. The California air pollutant standards are known as the California Ambient Air Quality Standards (CAAQS) and are generally more stringent than the NAAQS. CAAQS are shown in Table 3.

**Table 3. Air Emission *de minimis* Federal and State Thresholds**

<b>Criteria Pollutant<sup>1</sup></b>	<b>Federal Threshold (tons/year)</b>	<b>FRAQMD Threshold (lbs/day)</b>
ROG	50	25
NO <sub>x</sub>	100	25
PM10	100	80

<sup>1</sup>NO<sub>x</sub> = nitrogen oxides

ROG = reactive organic gases (precursor compounds to ozone and smog)

Source: FRAQMD 2004

The CARB manages air quality, regulates mobile emissions sources, and oversees the activities of county and regional air pollution control districts and air quality management districts. CARB regulates local air quality indirectly by establishing CAAQS and vehicle emissions and fuel standards, and by conducting research, planning, and coordinating activities.

The CAA requires each state to prepare a SIP, a planning document containing emission inventories, emission standards for motor vehicles and consumer products, and attainment plans adopted by local districts and approved by CARB for inclusion in the SIP. The USEPA must review each SIP to determine its compliance with the CAA and CAAQS. Amendments to the CAA further required states containing areas that are in non-attainment for NAAQS to amend their SIPs to add additional control measures. Although the State prepares the majority of the SIP, local districts are responsible for adopting air quality attainment plans that are included in the SIP. Each attainment plan must demonstrate its compliance with the CAA and air quality standards.

Pursuant to Section 39606(b) of the California Health and Safety Code, California has adopted ambient air standards that are more stringent than the national standards for some criteria air pollutants (PM10 daily and annual average standards). In July 2003, the CARB's new annual standards for PM10 and PM2.5 took effect. The annual PM10 standard was revised from 30 to 20  $\mu\text{g}/\text{m}^3$ , and the annual PM2.5 standard was revised from 15 to 12  $\mu\text{g}/\text{m}^3$ . The State standards are also shown in Table 3.

California law defines toxic air contaminants (TAC) as air pollutants having carcinogenic effects. A total of 243 substances have been designated as TACs under the State Air Toxics Program. These substances include the 189 Federal Hazardous Air Pollutants (HAP) adopted in accordance with AB 2728. The Air Toxics "Hot Spots" Information and Assessment Act of 1987 (AB 2588) seeks to identify and evaluate risk from air toxics sources; AB 2588 does not regulate air toxics emissions.

Under the CCAA, which has been patterned after the CAA, areas are designated as attainment or non-attainment with respect to the State standards. Yuba County is designated as non-attainment for State ozone and PM10 standards (CARB 2006a). The County is designated as attainment or unclassified for all other criteria pollutants (Table 3).

*Local Air Quality Management.* The regional and county air districts are primarily responsible for developing local air quality plans and regulating stationary emission sources and facilities. Both the CAA and the CCAA require plans to be developed for areas designated as non-attainment (with the exception of areas designates as non-attainment for the State PM10 standard). The project area lies within the jurisdiction of the FRAQMD. The Yuba County portion of the FRAQMD is in attainment or unclassified for all Federal and State criteria pollutants except ozone and PM10 (CARB 2006a, 2006b). The project area lies within Yuba County, which forms part of the Yuba-Sutter Federal ozone attainment area (FRAQMD 2009).

The FRAQMD is designated as being in non-attainment for both ozone and PM10. Additionally, the FRAQMD is in "transitional non-attainment" for the 1-hr ozone standard. Attainment status is based on the CAAQS and whether the pollutant levels are below or exceed the standards. "Unclassified" indicates that there is insufficient data for determining attainment or non-attainment.

The closest air quality monitoring station is located at Almond Street in Yuba City. This station monitors CO, NO<sub>2</sub>, O<sub>3</sub>, PM<sub>10</sub>, PM<sub>2.5</sub>, and several weather parameters (CARB 2008a). Data are no longer being collected at the Agricultural Building at the Sutter County Fairgrounds mentioned in the 1998 EIS/EIR. Table 4 summarizes air quality data between 2000 and 2008.

**Table 4. Summary of Air Quality Monitoring Data in Yuba City (2000-2008).<sup>1</sup>**

<b>Pollutant</b>	<b>Year</b>	<b>Average Period (hr)</b>	<b>Maximum Concentration</b>	<b>No. of Violations of State Standard</b>
Ozone	2000	1	0.108 ppm	3
	2001	1	0.104 ppm	4
	2002	1	0.108 ppm	3
	2003	1	0.090 ppm	0
	2004	1	0.098 ppm	2
	2005	1	0.092 ppm	0
	2006	1	0.102 ppm	1
	2007	1	0.095 ppm	1
	2008	1	0.092 ppm	0
	PM <sub>10</sub>	2000	1	54.96 µg/m <sup>3</sup>
2001		1	73.46 µg/m <sup>3</sup>	11
2002		1	69.15 µg/m <sup>3</sup>	6
2003		1	57.65 µg/m <sup>3</sup>	5
2004		1	44.87 µg/m <sup>3</sup>	0
2005		1	— <sup>2</sup>	—
2006		1	—	—
2007		1	—	—
2008		1	—	—

<sup>1</sup>Almond Street monitoring station

<sup>2</sup>Data not available for PM<sub>10</sub> from 2005 to 2008.

Source: CARB 2009a

### Existing Air Quality

Air quality in the Sacramento metropolitan area (which includes FRAQMD) primarily reflects emissions generated within the metropolitan area. However, it is also affected by wind-driven pollutant transport from the San Francisco Bay Area and the San Joaquin Valley (CARB 2001). Conversely, emissions generated within the Sacramento area occasionally contribute to air quality problems in the Mountain Counties Air Basin, upper Sacramento Valley, San Joaquin Valley, and the San Francisco Bay Area.

### Criteria Air Pollutants

*Ozone.* Ozone is a reactive pollutant. It is not emitted directly into the atmosphere, but is a secondary air pollutant produced in the atmosphere through a complex series of

photochemical reactions involving ROG and NO<sub>x</sub>. ROG and NO<sub>x</sub> are precursor compounds for ozone. Significant ozone production generally requires ozone precursors to be present in a stable atmosphere with strong sunlight for approximately three hours.

Ozone is a regional air pollutant because it is not emitted directly by sources, but is formed downwind of sources of ROG and NO<sub>x</sub> under the influence of wind and sunlight. Ozone concentrations tend to be higher in the late spring, summer, and fall, when the long sunny days combine with regional subsidence inversions to create conditions conducive to the formation and accumulation of secondary photochemical compounds, like ozone. Ozone is a respiratory irritant and an oxidant that increases susceptibility to respiratory infections and that can cause substantial damage to vegetation and other materials.

Once formed, ozone remains in the atmosphere for one or two days. Ozone is then eliminated through chemical reactions with plants (reacts with chemicals on the leaves of plants), rainout (attaches to water droplets as they fall to earth), and washout (absorbed by water molecules in clouds and later falls to earth with rain). The NSVAB is designated as non-attainment area for ozone, based on both national and State standards.

*Particulate Matter.* PM<sub>10</sub> and PM<sub>2.5</sub> represent fractions of particulate matter that can be inhaled into the air passages and the lungs and potentially cause adverse health effects. Particulate matter in the atmosphere results from many kinds of dust- and fume-producing industrial and agricultural operations, grading and construction, and motor vehicle use. Some sources of particulate matter, such as demolition and construction activities, are generally local in nature, while others such as vehicular traffic have a more regional effect. Very small particles of certain substances (sulfates and nitrates) can cause lung damage directly or can contain adsorbed gases (chlorides or ammonium) that may be injurious to health. Particulates can also damage materials and reduce visibility.

PM<sub>10</sub> concentrations in Yuba County are a result of a mix of rural and urban sources including agricultural activities, industrial emissions, dust suspended by vehicular traffic, and secondary aerosols formed by reaction in the atmosphere. Particulate concentrations near residential sources generally are higher during the winter when more fireplaces are used and when meteorological conditions prevent the dispersion of directly emitted contaminants.

*Toxic Air Contaminants.* Non-criteria air pollutants or TACs are airborne substances capable of causing short-term (acute) or long-term, chronic, or carcinogenic (cancer-causing) illnesses. TACs include both organic and inorganic chemical substances. They may be emitted from a variety of common sources including gasoline stations, automobiles, diesel engines, dry cleaners, industrial operations, and painting operations. TACs are regulated separately from the criteria air pollutants at both the Federal and State levels.

### Sensitive Receptors

Some receptors are considered more sensitive than others to air pollutants. The reasons for greater than average sensitivity include pre-existing health problems, proximity to the emission source, or duration of exposure to air pollutants. Schools, hospitals, and convalescent homes are considered to be relatively sensitive to poor air quality because children, elderly people, and the infirm are more susceptible to respiratory infections and other air quality-related health problems than the general public.

Residential areas are also sensitive to poor air quality because people usually spend extended periods of time at home. The nearest residences are located primarily on the landside toe of the levee in Phase 1, with the exception of a few homes on the waterside toe near Highway 20 in Phase 2. The closest homes are within 15 to 100 feet of the construction areas. Residential uses also occur along the haul routes. Please refer to Section 2.3.2 for haul route information for each phase.

### **Environmental Effects**

This section evaluates the effects of the proposed alternatives on the air quality in the project area. This is a quantitative evaluation of the types and levels of emissions associated with the construction activities.

### Significance Criteria

Adverse effects on air quality standards would be considered significant if the alternative would:

- Conflict with or obstruct implementation of the applicable air quality plan.
- Violate any air quality standard or contribute substantially to an existing or projected air quality violation.
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in non-attainment under an applicable Federal or State ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors).
- Expose sensitive receptors to substantial pollutant concentrations.
- Create objectionable odors affecting a substantial number of people.



### Alternative 1 (No Action)

Under this alternative, the Corps would not participate in strengthening the Marysville Ring Levee. Air quality would continue to be influenced by climatic conditions, vehicle emissions, agricultural activities, and industry.

### Alternative 2 (Proposed Action)

The MRL improvements would result in temporary, short-term air quality effects. Short-term construction activities would primarily result in the generation of ROG, NO<sub>x</sub>, PM10, and CO<sub>2</sub>. The project would not include any long-term operational emission sources other than the nominal vehicle emissions associated with routine inspection and maintenance of the proposed project.

Short-term construction emissions were calculated by obtaining an estimated inventory of required construction equipment, the hours of operation, and the horsepower of each piece of equipment for each construction phase. These data were then incorporated in the SMAQMD Road Construction Emission Model, Version 6.3.2 (October 2009), recommended by FRAQMD for levee construction projects. This model was used in favor of the Urban Emissions Model, Version 7.5, as it applies to linear construction activities such as levee construction. FRAQMDs standard emission thresholds and the USEPA's *de minimis* conformity thresholds (Table 3) were then used to determine the significance of the calculated air quality emissions. The amount of each pollutant generated during construction of the proposed alternative was compared to these thresholds. The results of this comparison are described below, as are other criteria used to determine the overall significance of the proposed project on air quality.

Combustion emissions would result from the use of construction equipment, truck haul trips, and worker vehicle trips to and from the construction site. Exhaust emissions from these sources would include ROG, NO<sub>x</sub>, and PM10. Exhaust emissions would vary depending on the number and type of equipment, the duration of its use, and the number of construction worker and haul trips to and from the construction sites. Combustion emissions from heavy equipment and construction worker commute trips would vary from day to day, and would temporarily contribute incrementally to regional ozone concentrations over the construction period.

Each phase is expected to be constructed in different construction seasons and the air quality modeling results are displayed for each construction year in Tables 5 and 6, Federal and local existing thresholds, respectively. Phase 1 would be constructed in two different construction seasons and therefore was separated into Phase 1A and Phase 1B for modeling purposes. The outputs are also combined to display results for the entire project (Table 7). Details and results of the calculations for each phase are provided in Appendix B.

**Table 5. Summary of Maximum Annual Average Construction Emissions (Federal Threshold) with Mitigation Incorporated.**

Total Emissions	Pollutant (tons/year)			
	ROG	NOx	PM10	CO2
<b>2010 Construction Activity</b>				
Total Unmitigated	0.2	1.3	0.2	142.0
Total Mitigated <sup>1</sup>	0.19	1.04	0.09	–
<b>2011 Construction Activity</b>				
Total Unmitigated	0.5	3.3	0.7	341.0
Total Mitigated <sup>1</sup>	0.25	2.64	0.24	–
<b>2012 Construction Activity</b>				
Total Unmitigated	0.6	4.4	0.6	565.8
Total Mitigated <sup>1</sup>	0.57	3.52	0.18	–
<b>2013 Construction Activity</b>				
Total Unmitigated	0.6	3.4	0.8	440.2
Total Mitigated <sup>1</sup>	0.57	2.72	0.7	–
<b>Federal De Minimis Threshold</b>	50	50	100	N/A
<sup>1</sup> Based on a 5% reduction in ROG emissions from construction equipment, 20% reduction in NO <sub>x</sub> emissions from construction equipment, 45% reduction in PM10 emissions from construction equipment, and 75% reduction in fugitive dust emissions (SMAQMD 2004).				

Based on the air quality analysis performed the estimated emissions for each phase and for the entire project before and after the mitigation reduction meets the Federal threshold. For the existing FRAQMD thresholds, the maximum daily average emissions for are over the threshold for NO<sub>x</sub> (Table 7). The project would be eligible to participate in the FRAQMD off-site mitigation program for these emissions.

#### Global Warming and Climate Change

In the California Warming Solutions Act of 2006 (California Health and Safety Code § 35000 *et seq.*), the California Legislature recognized California’s vulnerability to weather events triggered by global warming. The Legislature found that global warming will “have detrimental effects on some of California’s largest industries.” Assembly Bill 32 mandates that emissions of greenhouse gases (GHGs) be reduced to 1990 levels by 2020.

The construction activities associated with the project would contribute to global warming by using equipment that uses carbon-based fuel that releases some greenhouse gases. The term “greenhouse gas” or “greenhouse gases” includes but is not limited to: carbon dioxide, methane (CH<sub>4</sub>), nitrous oxide, hydroflourocarbons, chloroflourocarbons and sulfur hexafluoride (Yuba County 2007).

**Table 6. Summary of Maximum Daily Average Construction Emissions (FRAQMD Threshold) with Mitigation Incorporated.**

Total Emissions	Pollutant (lbs/day)			
	ROG	NOx	PM10	CO2
<b>2010 Construction Activity</b>				
Total Unmitigated	6.9	43.0	7.3	4,564.5
Total Mitigated <sup>1</sup>	6.5	34.4	2.3	–
<b>2011 Construction Activity</b>				
Total Unmitigated	9.1	64.1	12.1	6,444.7
Total Mitigated <sup>1</sup>	8.6	51.3	4.59	–
<b>2012 Construction Activity</b>				
Total Unmitigated	9.4	61.7	16.0	8,553.4
Total Mitigated <sup>1</sup>	8.93	49.3	6.1	–
<b>2013 Construction Activity</b>				
Total Unmitigated	12.4	87.9	30.6	10,654.4
Total Mitigated <sup>1</sup>	11.7	70.3	10.4	–
<b>FRAQMD Threshold</b>	25	25	80	N/A
<sup>1</sup> Based on a 5% reduction in ROG emissions from construction equipment, 20% reduction in NO <sub>x</sub> emissions from construction equipment, 45% reduction in PM10 emissions from construction equipment, and 75% reduction in fugitive dust emissions (SMAQMD 2004).				

Carbon dioxide is designated as a contributor to greenhouse gas emissions. California is the 12th to 16th largest emitter of CO<sub>2</sub> in the world (Yuba County 2007). For projects that occur in, and around, the Sacramento Valley area, SMAQMD has emissions models that calculate several air emissions based on various input criteria (construction phase, duration, type of equipment, project area, etc.). Due to the linear nature of many of the levee upgrade projects being undertaken by the Corps, SMAQMD has suggested the use of their Road Construction Emissions Model. The outputs of these models address criteria pollutants associated with the NAAQS as well as those associated with CAAQS, which are considered more stringent than the Federal standards.

In response to the concerns regarding greenhouse gas emissions, the most recent version of the SMAQMD Road Construction Emissions Model (v. 6.3.2) now generates an output for CO<sub>2</sub> (see Tables 5 and 6 for results). Although CO<sub>2</sub> emissions can now be calculated, there is no Federal standard, or any State or local threshold to meet, and therefore analyze, under NEPA and CEQA. Because the focus on CO<sub>2</sub> emissions is a new requirement, specific mitigation measures as they relate to construction are not fully developed. For these reasons, the BMPs and mitigation measures listed below would also be employed to minimize CO<sub>2</sub> and other greenhouse gas emissions.

**Table 7. Estimated Air Emissions for Proposed Project Construction Compared to Local and Federal Thresholds.**

	Phase	Year	ROG	NO <sub>x</sub>	PM10	CO <sub>2</sub>
Site Preparation & Construction Total Emissions (tons/year)	<b>1A</b>	2010	0.2	1.3	0.2	142.0
	<b>1B</b>	2011	0.5	3.3	0.7	341.1
	<b>2</b>	2012	0.6	4.4	0.6	565.8
	<b>3</b>	2013	0.5	3.0	0.6	386.1
	<b>4</b>	2013	0.1	0.4	0.2	54.1
<b>Total Emissions, Unmitigated (tons/year)</b>			<b>1.9</b>	<b>12.4</b>	<b>2.3</b>	<b>1,489</b>
<b>Total Emissions, Mitigated (tons/year)</b>			<b>1.6</b>	<b>10.0</b>	<b>0.58</b>	N/A
Federal Standards (tons/year)			50	50	100	N/A
Site Preparation & Construction Total Emissions (lbs/day)	<b>1A</b>	2010	6.9	43.0	7.3	4,564.5
	<b>1B</b>	2011	9.1	64.1	12.1	6,444.7
	<b>2</b>	2012	9.4	61.7	16.0	8,553.4
	<b>3</b>	2013	8.8	58.9	11.9	7,368.2
	<b>4</b>	2013	3.6	29.0	18.0	3,290.2
<b>Total Emissions, Unmitigated (lbs/day)</b>			<b>37.8</b>	<b>256.7</b>	<b>65.3</b>	<b>30,222</b>
<b>Total Emissions, Mitigated (lbs/day)</b>			<b>35.7</b>	<b>205.3</b>	<b>23.4</b>	N/A
FRAQMD Thresholds (lbs/day)			25	25	80	N/A

Note: Estimates rounded. See Appendix B.

### Mitigation

Construction projects that substantially contribute to existing violations of State or Federal air quality standards are considered to have a significant adverse impact on air quality. Projects that exceed the existing daily average construction emissions by FRAQMD could result in a detrimental impact to air quality, but they are unlikely to be determined as significant adverse air quality impacts, particularly with incorporation of mitigation measures. FRAQMDs Indirect Source Review Guidelines provide mitigation measures for reducing short-term air quality impacts. Implementation of the mitigation measures listed below would reduce air emissions and ensure that the project emissions would be reduced to less-than-significant levels.

- Equipment operation, activities, or processes performed by the contractor would be in accordance with all Federal and State air emission and performance laws and standards.

- Use diesel-fueled equipment manufactured in 2003 or later, or retrofit equipment manufactured prior to 2003 with diesel oxidation catalysts; use low-emission diesel products, alternative fuels, after-treatment products, and/or other option as they become available; use of clean fuel vehicles in vehicle fleet.
- Limit vehicle and equipment idling time to five minutes, which would save fuel and reduce emissions.
- Any equipment found to exceed 40% opacity (or Ringelmann 2.0) would be repaired within 72 hours or removed from service. The Corps and FRAQMD would be notified within 48 hours of identification of non-compliant equipment. Failure to comply would result in a Notice of Violation.
- The primary contractor would ensure that all construction equipment is properly tuned and maintained prior to and for the duration of onsite operation.
- A visual survey of all in-operation equipment would be made at least weekly, and a summary of the visual survey results (including the quantity and type of vehicles surveyed as well as the dates of each survey) would be submitted monthly throughout the duration of the project. The monthly summary would not be required for any 30-day period in which no construction activity occurs.
- Any remaining emissions over the NO<sub>x</sub> threshold could be reduced by providing funds to FRAQMD to implement an off-site mitigation program. The cost would be determined by the FRAQMD. The contractor would be responsible for coordinating with the FRAQMD for actual equipment used during construction and for any administrative or mitigation fees that apply.
- The contractor would be required to utilize existing power sources (e.g., power poles) for project construction.
- Develop and implement a traffic plan to minimize traffic flow interference from construction activities. The plan may include advance public notice of routing, use of public transportation, and satellite parking areas with a shuttle service. Schedule operations affecting traffic for off-peak hours. Minimize obstruction of through-traffic lanes. Provide a flag person to guide traffic properly and ensure safety at construction sites.
- Portable engines and portable engine-driven equipment units used at the project work site, with the exception of on-road and off-road motor vehicles, may require CARB Portable Equipment Registration with the State or a local district permit. The owner/operator would be responsible for arranging appropriate consultations with the CARB or the FRAQMD to determine registration and permitting requirements prior to equipment operation at the site.

- The proponent would assemble a comprehensive inventory list (i.e., make, model, engine year, horsepower, and emission rates) of all heavy-duty off-road (portable and mobile) equipment (50 horsepower and greater) that would be used an aggregate of 40 or more hours for the construction project and apply the following mitigation measure:
  - The project would provide a plan for approval by FRAQMD demonstrating that the heavy-duty (equal to or greater than 50 horsepower) off-road equipment to be used in the construction project, including owned, leased and subcontractor vehicles, would achieve a project-wide fleet-average 20% NO<sub>x</sub> reduction and 45% particulate reduction compared to the most recent ARB fleet average at time of construction.
- The contractor would also prepare a fugitive dust control plan and submit it to the FRAQMD for review before initiating construction activities (FRAQMD 1998).

Implementation of the BMPs listed below would reduce air quality degradation caused by dust and other contaminants:

- Dust particles, aerosols, and gaseous by-products from construction activities, and processing and preparation of materials, would be controlled at all times, including weekends, holidays, and hours when work is in progress. The contractor must have sufficient, competent equipment available to accomplish these tasks. Particulate control would be performed as the work proceeds and whenever a particulate nuisance or hazard occurs. The contractor would comply with all State and local visibility regulations.
- Operations including all earthmoving, ground disturbing, soil dumping, and grading on a project should be suspended when winds carry dust beyond the project easement line despite implementation of all feasible dust control measures. Consideration should be given to suspending all project grading when winds exceed 20 mph to minimize the risk of dust being carried beyond the project easement line.
- Construction sites would be watered as directed by the Yuba County Department of Public Works or FRAQMD and as necessary to prevent fugitive dust violations.
- An operational water truck should be on-site at all times. Apply water to control dust as needed to prevent visible emissions violations and offsite dust impacts.
- On-site dirt piles or other stockpiled particulate matter should be covered, wind breaks installed, and water and/or soil stabilizers employed to reduce windblown dust emissions. Incorporate the use of approved nontoxic soil stabilizers according to manufacturer's specifications to all inactive construction areas.

- Apply chemical soil stabilizers according to the manufacturers' specifications, to all inactive construction areas (previously graded areas that remain inactive for 96 hours) including unpaved roads and employee/equipment parking areas. Where an applicable surface water quality oversight agency, such as the RWQCB, has approval authority over the application of chemical soil stabilizers, application of the stabilizers would not be initiated until necessary approvals are received.
- All trucks hauling dirt, sand, soil, or other loose material should be covered or should maintain at least two feet of freeboard (i.e., minimum vertical distance between top of the load and top of the trailer) in accordance with the requirements of California Vehicle Code Section 23114. This provision would be enforced by local law enforcement agencies.
- Paved streets would be swept (water sweeper with reclaimed water recommended) at the end of each day if substantial volumes of soil material have been carried onto adjacent paved, public roads from the project site.
- Wheel washers would be installed where project vehicles and/or equipment exit onto paved streets from unpaved roads. Vehicles and/or equipment would be washed prior to each trip.
- Provide temporary traffic control as needed during all phases of construction to improve traffic flow, as deemed appropriate by the Yuba County Department of Public Works and/or the California Department of Transportation (Caltrans), and to reduce vehicle dust emissions.
- Reduce traffic speeds on all unpaved surfaces to 15 mph or less and reduce unnecessary vehicle traffic by restricting access. Provide appropriate training, on-site enforcement, and signage.
- Prior to final occupancy, reestablish ground cover on the construction site through seeding and watering.
- No open burning of vegetative waste (natural plant growth wastes) or other materials (trash, demolition debris, etc.) may be conducted at the project site. Materials also may not be hauled off-site for disposal by open burning. Vegetative wastes should be chipped or delivered to waste or energy facilities (permitted biomass facilities), mulched, composted, or used for firewood.

Any project-related effects to air quality would be temporary, and mitigation measures would reduce effects to less than significant.

### 3.3.3 Vegetation and Wildlife

This section discusses vegetation and wildlife resources in the study area. The discussion includes a description of the biological habitat types, including waters of the U.S. that occur in the study area as well as plant and animal species associated with these habitat types.

The biological surveys performed for this EA/IS included surveys for the Habitat Evaluation Procedure (HEP) analysis and a jurisdictional wetland delineation. Corps and USFWS biologists conducted these surveys of the study area on July 29, August 20, and September 3, 2009.

#### Existing Conditions

##### Regulatory Setting

The Fish and Wildlife Coordination Act (16 U.S.C. 661 *et seq.*), requires the Corps to consult with USFWS before undertaking or approving any projects that control or modify surface water. This consultation is intended to promote the conservation of wildlife resources by preventing loss or damage to fish and wildlife resources and to provide for the development and improvement of these resources in connection with water resource projects. Recommended measures from USFWS are provided in a Coordination Act Report (CAR), and the Corps is required to fully consider these recommendations and to include measures to reduce effects on wildlife in project plans.

##### Environmental Setting

A land cover-type represents the dominant features of the land surface and can be defined by natural vegetation, water, or human uses (e.g., agricultural lands, roadways/railways). Four major land cover-types were identified in the project area: woodland, annual grassland, agriculture, and other. The land cover-types are listed below and described in the following sections, including the wildlife species that utilize each cover-type. The land cover-type “other” includes roadways, railways, parking lots, dirt tracks, rip-rap, buildings and other structures. In addition, jurisdictional wetlands and other waters of the United States are described. Table 9 at the end of this section summarizes the habitat types and acreages in the study area by Phase.

*Woodland.* Woodland habitat is found throughout the project area and includes habitat types such as valley foothill riparian and valley oak woodland. Woodland habitat is found on the waterside of the levee within Phase 1 near a jurisdictional wetland and irrigation ditch; along the Yuba River in Phase 2; on the waterside levee toe in Phase 3; and in small patches in Phase 4 (Figures 4 and 5). The upper canopy is dominated by several species including box elder (*Acer negundo*), blue elder (*Sambucus cerulean*), white alder (*Alnus rhombifolia*), northern California black walnut (*Juglans californica* var. *hindsii*), sycamore (*Platanus racemosa*), Fremont cottonwood (*Populus fremontii*), valley oak (*Quercus lobata*), interior live oak (*Quercus wislizeni*), Goodding’s willow (*Salix*



*gooddingii*), and other willow species. The lower shrub canopy is dense and thicket-like, with dominant species including California rose (*Rosa californica*), blackberry (*Rubus ursinus*), blue elderberry (*Sambucus mexicanus*), coyote brush (*Baccharis pilularis*), and shrub-like forms of the various willow species. Lianas species such as California grape (*Vitis californica*) and virgin's bower (*Clematis ligusticifolia*) are also present in the shrub layer. The herbaceous understory ranges from very developed to sparse depending on the amount of light filtering through the upper canopies, but typically includes various grasses, sedges, and rushes.



**Figure 4. Phase 1 Waterside Levee Slope and Surrounding Woodland Habitat.**

Riparian habitats are considered to be among the most productive wildlife habitats in California and typically support the most diverse wildlife habitats. In addition to providing important nesting and foraging habitat, riparian habitats function as wildlife movement corridors, Riparian habitat has been designated by the California Department of Fish and Game (CDFG) as a habitat of special concern in California because of its limited abundance and high value to wildlife.



**Figure 5. Phase 2 Waterside Levee Slope and Surrounding Woodland Habitat.**

Overstory trees may be used for nesting and roosting by numerous raptors, including Swainson's hawk (*Buteo swainsoni*), white-tailed kite (*Elanus leucurus*), red-tailed hawk (*Buteo jamaicensis*), barn owl (*Tyto alba*), great horned owl (*Bubo virginianus*), and American kestrel (*Falco sparverius*). Overstory trees also provide suitable habitat for other birds – herons (*Ardea* sp.), egrets (*Ardea* and *Egretta* spp.), and numerous songbirds, such as Bullock's oriole (*Icterus bullockii*) and swallows (*Tachycineta* spp., *Hirundo* sp., and *Petrochelidon* sp.). Riparian forests and oak woodlands also provide important nesting and foraging habitat for resident, migratory, and wintering songbirds. Several mammal species can also be found within these woodland habitats, such as raccoon (*Procyon lotor*), Virginia opossum (*Didelphis virginiana*), and striped skunk (*Mephitis mephitis*). Woodland habitat provides cover and foraging habitat for reptiles and amphibians, such as western terrestrial garter snake (*Thamnophis elegans*), gopher snake (*Pituophis catenifer*), Pacific tree frog (*Pseudacris regilla*), and western toad (*Bufo boreas*).

*Annual Grassland.* Annual grassland occurs in all phases of the project on both the landside and waterside of the levee, composing about 60% of the Phase 1 and Phase 2 project footprints, 73% of the Phase 3 footprint, and 68% of the Phase 4 footprint. Areas with annual grassland vegetation in the project area are dominated by a mixture of annual grasses and herbaceous, nonnative, weedy species. This cover type generally occurs in disturbed areas subject to periodic disturbance. Introduced grasses are the dominant plant species and include the following on the levee and surrounding areas: wild oats (*Avena fatua*), creeping wildrye (*Leymus triticoides*), red brome (*Bromus madritensis*), ripgut brome (*Bromus diandrus*), soft chess (*Bromus hordeaceus*), wild barley (*Hordeum vulgare*), foxtail fescue (*Vulpia myuros*), Johnson grass (*Sorghum halepense*), Bermuda

grass (*Cynodon dactylon*), western ragweed (*Ambrosia psilostachya*), tumbleweed (*Salsola tragus*), and yellow star-thistle (*Centaurea solstitialis*). The levee slopes are regularly maintained through prescribed fire and/or mowing, limiting the cover to grasses and forbs (Figures 6 and 7).



**Figure 6. Phase 3 Waterside Levee slope and Surrounding Annual Grassland Habitat.**

Annual grasslands provide nesting and foraging habitat for several species of resident and wintering songbirds, including savanna sparrow (*Passerculus sandwichensis*), white-crowned sparrow (*Zonotrichia leucophrys*), and several species of raptors. They also provide foraging habitat and haul-out areas for aquatic wildlife species such as giant garter snake and potential nesting habitat for western pond turtles. Several mammal species utilize grasslands for nesting, cover, and foraging including California vole (*Microtus californicus*), house mouse (*Mus musculus*), and gophers (*Thomomys* sp.).

*Agriculture.* Agricultural lands exist on the waterside of the project area and account for about 15% of the Phase 1 footprint and 6% of the Phase 3 footprint. Major crops and cover types in agricultural production include orchard crops, vineyards, and field crops. Orchard crops in the area include various fruit and walnut trees that surround the project limits of Phase 1. Also adjacent to Phase 1 is a small vineyard. Phase 3 contains a fallow field where an orchard had been planted in previous years. Field crops include rice within portions of Phase 1 and Phase 3 (Figure 8). The rice field is also considered a seasonal wetland, as described below.



**Figure 7. Phase 4 Waterside Levee Slope and Surrounding Annual Grassland Habitat.**



**Figure 8. Agricultural Rice Field and Orchard in Phase 1.**

Agricultural lands provide foraging habitat for many of the species that occur in the project area. The forage value for species varies seasonally and annually, depending on the crop cycle and on the vegetative cover present at the site. Agricultural lands provide foraging habitat for several bird species, including resident and wintering raptors, songbirds, shorebirds, and wading birds. Agricultural lands also provide foraging habitat for small rodents, coyote, raccoon, opossum, and gopher and garter snakes.

*Other.* This cover-type is found throughout the project area and consists of roads, railways, parking lots, dirt tracks, rip-rap, buildings, and other structures. Depending on the type of cover, and other surrounding habitat, the value of roads, railways, buildings and other structures to wildlife, varies considerably. The value of this cover type is not described in detail except in the environmental effects analysis below for Phase 1.

#### Jurisdictional Wetlands and Other Waters of the U.S.

*Perennial aquatic.* Phase 1 contains an irrigation ditch on the waterside of the levee providing perennial aquatic habitat in the project area (Figure 9). Perennial aquatic habitat includes the open water areas of this waterway. This waterway is subject to Corps jurisdiction under Section 404 of the CWA as “other waters of the U.S.” This irrigation ditch is a perennially flowing drainage consisting of open-water habitat containing natural substrates supporting adjacent riparian vegetation and adjacent scrub-shrub habitat.



**Figure 9. Perennial Aquatic Habitat in Phase 1.**

The open water areas of the irrigation ditch provides potential habitat for several wildlife species such as birds, fish, amphibians, and reptiles. Open water areas may provide foraging habitat for wading birds and waterfowl. These areas could also provide rearing, escape cover, and foraging habitat for reptiles and amphibians such as giant garter snake (*Thamnophis gigas*) (GGS). The adjacent riparian vegetation provides nesting, roosting and foraging habitat for raptors and songbirds. Several bird species were observed in these habitats including white-tailed kite, red-tailed hawk, American kestrel, black phoebe (*Sayornis nigricans*), great blue heron (*Ardea Herodias*), song sparrow (*Melospiza melodia*), and Nuttall’s woodpecker (*Picoides nuttallii*).

*Seasonal Wetland.* The seasonal wetland habitat occurs in areas that are ephemerally or seasonally inundated or saturated with water. These wetlands are limited to Phase 1 and Phase 3 of the project area and are subject to Corps jurisdiction under Section 404 of the CWA as “other waters of the U.S.” These wetlands include a rice field adjacent to the waterside levee toe of Phase 1, east of Jack Slough Rd. (Figures 10 and 11). The dominant vegetation consists of rice (*Oryza* sp.), and may also include patches of sedges (*Carex* sp.) and rushes (*Juncus* sp.). Seasonal wetlands are also present northwest of Sampson Street along the waterside levee toe maintenance road. These areas consist of low-lying depressions that temporarily pond water during the wet, winter season but become dry as the river levels and precipitation decreases in the spring and summer. The dominant wetland vegetation includes willow, curly dock (*Rumex crispus*), sedges, rushes, ryegrass (*Lolium perenne*), soft chess, ripgut brome, turkey tangle fogfruit (*Phyla nodiflora*), and annual hairgrass (*Deschampsia danthonioides*).



**Figure 10. Phase 1 Waterside Rice Field.**



**Figure 11. Phase 1 Seasonal Wetland.**

Although these seasonal wetlands do not occur in large continuous patches, they can provide wildlife habitat functions and values in the project area. These habitats may provide seasonal foraging habitat for waterfowl and wading birds, breeding and rearing areas for frogs and toads, seasonal foraging areas for garter snakes (*Thamnophis* sp.), and potential seasonal foraging habitat for giant garter snake.

Three seasonal wetlands and a rice field occur within 50 feet of the study area and are jurisdictional waters of the U.S. (Plate 4). The seasonal wetlands were delineated by USFWS in September 2009 for the Corps. Table 8 summarizes the wetland acreage within the study area.

**Table 8. Acreage of Seasonal Wetlands Within 50 feet of the Study Area.**

	<b>Acreage</b>	<b>Linear Feet</b>
Wetland 1	0.08	N/A
Wetland 2	0.04	194
Wetland 3	2.78	N/A
<b>Total</b>	<b>2.90</b>	<b>194</b>

## **Environmental Effects**

### Significance Criteria

Adverse effects on vegetation and wildlife would be considered significant if the alternative would result in any of the following:

- Substantial loss, degradation, or fragmentation of any natural communities or wildlife habitat.
- Substantial adverse impact on a sensitive natural community including federally protected wetlands and other waters of the U.S. as defined by Section 404 of the CWA including seasonal wetlands, rice fields, and irrigations ditches through direct removal, filling, hydrologic interruption, or other means.
- Substantial reduction in the quality or quantity of important habitat, or access to such habitat, for wildlife species.

### Alternative 1 (No Action)

Under the no action alternative, the MRL improvements would not be constructed by the Corps. Therefore, this alternative would have no effect on existing vegetation and wildlife in the project area. The vegetation communities and associated wildlife would remain the same.

### Alternative 2 (Proposed Action)

Under the preferred alternative, construction activities would have permanent effects on about 6.61 acres of woodland habitat throughout the entire project. Riparian woodlands are identified as sensitive and important habitats for species in the area. A total of 155.04 acres of temporary impacts to agriculture, annual grassland, and other, would be affected by construction activities throughout the project area. Specific acreages and impacts for each phase are summarized in Table 9, and described in more detail below.

*Phase 1.* Construction activities would permanently impact about 1.98 acres of woodland habitat on the waterside of the levee. These losses would result from the construction of a slurry wall along the northwest corner of the levee. This impact would not be considered as substantial loss, degradation, or fragmentation of a natural community or wildlife habitat. The amount of woodland habitat affected is small in comparison to the available adjacent habitat in the area (approximately 13 acres), and this loss would be mitigated for (see Mitigation section below). Therefore, there would be no significant adverse effects to woodland habitat in Phase 1.



Additionally, about 21.83 acres of annual grassland would be temporarily affected. Due to the common nature of these grassland areas, these impacts would be less than significant due to its low habitat value and abundance in the vicinity. Total temporary impacts to agriculture are 5.55 acres. An additional 4.68 acres of agricultural land would be used as a staging area. The category “other” includes approximately 7.48 acres of temporary impacts to paved and graveled roads.

**Table 9. Summary of Vegetation Effects in Acres.**

Cover type	Affected Area	Phase				
		1	2	3	4	Total
Woodland	Permanent	1.98	2.38	1.54	0.71	6.61
	Not Affected	–	0.38	–	–	0.38
Annual Grassland	Temporary	21.83	32.01	39.66	11.86	105.36
Agriculture	Temporary	5.55	–	3.34	–	8.89
Other	Temporary	7.48	18.87	9.60	4.82	40.77
<b>Total</b>		<b>36.84</b>	<b>53.64</b>	<b>54.14</b>	<b>17.38</b>	<b>162.00</b>

*Phase 2.* Construction of the secant-pile walls, slurry walls, and jet grouting would permanently affect 2.38 acres of woodland habitat on the waterside and landside of the levee in this reach. This would not be considered a significant effect to woodland habitat due to the relatively small loss of trees in comparison to the available woodland habitat in the immediate area (approximately 35 acres). This loss would be mitigated for (see Mitigation section below). In addition, 32.01 acres of annual grassland and 18.87 acres of “other” would be temporarily affected and are not considered significant impacts to the project.

*Phase 3.* The removal of 1.54 acres of woodland is expected for the construction of a slurry wall along the eastern portion of the levee. The woodland habitat loss is small in comparison to available adjacent habitat (approximately 10 acres), and this loss would be compensated through mitigation (see Mitigation section below). Therefore, there would be no significant adverse effects to woodland habitat in this area.

Impacts to annual grassland (approximately 39.66 acres) would be temporary and are not considered significant. Agricultural land (approximately 3.34 acres) on the waterside of the levee would be temporarily impacted from construction activities. This land currently appears to be fallow and it is not expected to change at the time of construction. The category “other” (approximately 9.60 acres) would be temporarily impacted due to construction and hauling and is not considered significant to wildlife in this phase.

*Phase 4.* Less than one acre of woodland would be permanently affected by the construction of stability berms between at Binney Junction. This impact would not be

considered a significant effect to woodland habitat due to the small acreage affected relative to available habitat in the vicinity (approximately 50 acres), and this loss would be compensated through mitigation (see Mitigation section below). Annual grassland (approximately 11.86 acres) and “other” (approximately 4.82 acres) would be temporarily impacted from construction and staging and are not considered significant impacts in this phase.

### **Mitigation**

Mitigation for project-related effects on woodland vegetation due to the construction of Marysville Ring Levee improvements would take place at an existing Corps mitigation site along the Feather River and the end of Anderson Avenue. The site was established in 1992 by the Corps for a project that involved levee reconstruction along the Feather and Yuba Rivers. Project construction was subsequently reduced in size and less mitigation was needed. The established habitats on this site include riparian woodland, riparian scrub, emergent marsh and habitat for the Federally-listed valley elderberry longhorn beetle (VELB). This site has been monitored for success and establishment of the VELB habitat for 10 years.

The MRL project would use excess lands that exist at this site. The specific location within the site is currently being coordinated with FWS. A summary of the mitigation required for habitat loss is shown in Table 10. The mitigation acreage is a product of the HEP analysis conducted by USFWS and the Corps. The woodland habitat has been successfully established on the site and no further monitoring would be needed. Long-term maintenance would be accomplished by the non-Federal sponsor. This mitigation is expected to reduce the effects of vegetation to a less-than-significant level.

**Table 10. Summary of Mitigation in Acres.**

<b>Cover type</b>	<b>Mitigation</b>
Woodland	8.73
Annual Grassland	Temporary impacts/Reseeding
Agriculture	Temporary impacts/No Mitigation
Other	Temporary impacts/No Mitigation

All annual grassland areas disturbed during construction would be re-seeded with native annual grasses. Therefore, the temporary loss of annual grassland indicated in Table 9 would be less than significant. All effects to agricultural and other would be temporary and no mitigation would be done.

Avoidance and minimization measures in the form of BMPs would be implemented for the seasonal wetland features and irrigation ditches adjacent to the waterside levee in Phase 1. These may include barriers such as K-rails or other forms of fencing to indicate boundaries around these sites.

### 3.3.4 Special-Status Species

Special-status species are those plants and animals recognized by Federal, State, and/or other agencies or organizations as deserving special consideration because of their rarity or vulnerability to extinction due to habitat loss or population decline. This section discusses the special-status species that either occur or have the potential to occur in or near the project area and could be potentially impacted by the project.

#### Existing Conditions

##### Regulatory Setting

Certain special-status species and their habitats are protected by Federal, State, and/or local agency regulations. FESA provides legal protection for plant and animal species in danger of extinction. This act is administered by the USFWS and the National Marine Fisheries Service (NMFS). CESA parallels FESA and is administered by the CDFG. The plant and animal species protected under FESA and CESA are listed as endangered, threatened, or, in the case of plants, rare.

In addition to formal lists of endangered and threatened species, the Federal and State agencies also maintain lists of species of special concern based on factors such as limited distribution, declining population size, diminishing habitat acreage or value. Species of special concern are not afforded the same legal protection as listed species but may be added to official lists in the future. The two general categories of special interest species include species that are candidates for listing as threatened or endangered, and species that are not candidates for listing but have been unofficially identified as species of special interest by private conservation organizations or local government agencies.

Special-status species are those that meet any of the following criteria:

- Listed or candidate for listing under FESA.
- Listed or candidate for listing under CESA.
- Nesting bird species and active nests of birds listed under the Migratory Bird Treaty Act of 1916 (16 U.S.C. § 703-712) (MBTA).
- Species listed in the Bald and Golden Eagle Protection Act (16 U.S.C. § 668).
- Fully protected or protected species under the California Fish and Game Code.
- Species of concern that have the potential to occur in the project area due to suitable or marginal habitat existence for those species, as identified by USFWS; species of special concern listed by CDFG that have the potential to occur in the project area because suitable or marginal habitat may exist for those species.

- Plant species listed as Rare under the California Native Plant Protection Act (CDFG Code, Section 1900 *et seq.*).
- Plant species listed by the California Native Plant Society (CNPS) to be rare, threatened, or endangered in California. The purpose of the CNPS is to call attention to the status of a species that is experiencing decline but not afforded legal protections.
- Species protected by goals and policies of local plans such as the Yuba County General Plan.

### Special-Status Species Evaluation

Each species on the consolidated list of special-status species was evaluated for its potential to occur in the project area. Species that are not found in land cover-types present in the project area, or whose known range falls outside of the project area, were eliminated from further consideration. Special-status species include those that have the potential to occur or have been observed in the region, as determined by general biological surveys, the California Natural Diversity Data Base (CNDDDB), USFWS list of Federally-listed species, previous studies for the project area, and information about the species. The USFWS and CNDDDB lists are included in Appendix C. The CAR provided in Appendix D was also reviewed for special-status species. Table 11 lists the Federal and State listed special-status species that were identified as having the potential to occur in the study area or the immediate vicinity and could be impacted by construction activities.

Species not evaluated in detail below include California black rail, California red-legged frog, conservancy fairy shrimp, vernal pool fairy shrimp, and vernal pool tadpole shrimp. These species were identified in the CNDDDB report as occurring within the Yuba City USGS 7.5 minute quadrangle (Appendix C), but a records search did not identify them within or near the project area. Black rails inhabit saline and freshwater emergent wetlands within the San Francisco and Sacramento - San Joaquin Delta, which do not occur within the project area. California red-legged frog populations occur mainly in the foothills and coastal ranges of California. Therefore, it would be unlikely that red-legged frogs would occur within the project area. Conservancy fairy shrimp, vernal pool fairy shrimp, and vernal pool tadpole shrimp are associated with seasonal vernal pools. Vernal pools are not present within the project area. Therefore, these species are not expected to be affected by construction activities.

### Birds

*Bald Eagle.* Bald Eagle has been Federally delisted, however it is State-listed as endangered. Eagle nests are typically found in multi-storied stands with old-growth components. They are always found near bodies of water that support a sufficient prey base. Bald eagles build their nests 150 feet from the nearest water body on average. Often times they will build alternate nests in the same territory and vary use between them in

different years (USFWS 1986). Wintering habitat usually includes nearby productive forage areas, seclusion from human disturbance, and dense stands of timber for diurnal perching and nocturnal roosting (Paruk 1987).

**Table 11. Special-Status Species with the Potential to Occur in the Project Area.**

Common Name	Scientific Name	Status: Federal/State/Local
Bald Eagle	<i>Haliaeetus leucocephalus</i>	--/SE/--
California Black Rail	<i>Laterallus jamaicensis coturniculus</i>	--/SE/--
Swainson's Hawk	<i>Buteo swainsoni</i>	--/ST/--
White-tailed Kite	<i>Elanus leucurus</i>	FP/--/--
Western yellow-billed cuckoo	<i>Coccyzus americanus occidentalis</i>	--/SE/FCS
tri-colored blackbird	<i>Agelaius tricolor</i>	--/SSC/--
bank swallow	<i>Riparia riparia</i>	--/ST/--
giant garter snake	<i>Thamnophis gigas</i>	FT/ST/--
western pond turtle	<i>Actinemys marmorata</i>	--/SSC/--
California red-legged frog	<i>Rana draytonii</i>	FT/--/--
Valley elderberry longhorn beetle	<i>Desmocerus californicus dimorphus</i>	FT/--/--
Conservancy Fairy Shrimp	<i>Branchinecta conservation</i>	FE/--/--
Vernal Pool Fairy Shrimp	<i>Branchinecta lynchi</i>	FT/--/--
Vernal Pool Tadpole Shrimp	<i>Lepidurus packardii</i>	FE/--/--
green sturgeon	<i>Acipenser medirostris</i>	FT/--/--
delta smelt	<i>Hypomesus transpacificus</i>	FT/ST/--
Central Valley steelhead	<i>Oncorhynchus mykiss</i>	FT/--/--
Critical Habitat, Central Valley steelhead	--	X
Central Valley spring-run Chinook salmon	<i>Oncorhynchus tshawytscha</i>	FT/ST/--
Critical Habitat, Central Valley spring-run Chinook	--	X
Sacramento River winter-run Chinook salmon	<i>Oncorhynchus tshawytscha</i>	FE/--/--
Hartweg's golden sunburst	<i>Pseudobahia bahiifolia</i>	FE/SE/1B.1

**Listing Status:**

FE = Federally Endangered

FT = Federally Threatened

FP = Fully Protected

FCS = Federal Candidate Species

ST = State Endangered

ST = State Threatened

SSC = State Species of Special Concern

X = Critical Habitat

1B = Rare, threatened, or endangered in California and elsewhere

1B.1 = Seriously endangered in California (over 80% of occurrences threatened / high degree and immediacy of threat)

Historically, the bald eagle inhabited all of North America and used breeding grounds on most of the continent (USFWS 1986). The bald eagle is a permanent resident and uncommon winter migrant, restricted to breeding mainly in Butte, Lake, Lassen, Modoc, Plumas, Shasta, Siskiyou, and Trinity counties (CDFG 2009a). A CNDDDB records search did not identify any occurrences of bald eagle within the project vicinity, however, suitable habitat exists near the project area along the Feather and Yuba Rivers and adjacent rice fields.

*Swainson's Hawk.* The Swainson's hawk is State-listed as threatened. It is an uncommon breeding resident and migrant in the Central Valley, Klamath Basin, Northeastern Plateau, Lassen County, and the Mojave Desert. They nest primarily in riparian areas adjacent to suitable foraging habitat such as agricultural fields or pastures, and have been known to use isolated trees or roadside trees (CDFG 2009a). The Swainson's hawk nests in mature trees, preferably valley oak, cottonwood, willows, sycamores, and walnuts. Suitable foraging areas for Swainson's hawk include native grasslands or lightly grazed pastures, alfalfa and other hay crops, and certain grain and row croplands. Swainson's hawks primarily feed on voles; however, they will feed on a variety of prey including small mammals, birds, and insects. Potential nesting and foraging habitat exists in the riparian areas along the Yuba River (Phases 2 and 3) and in the annual grasslands and agriculture near Jack Slough (Phases 1 and 4).

The most current Swainson's hawk sighting near the project area was in July 2005 (CNPS 2009). This occurrence was along the west side of the Feather River approximately 1.5 miles northwest of the project area. A Swainson's hawk was observed foraging over the annual grassland adjacent to the project area in Phase 1, but no potential nests were observed in or adjacent to the project area.

*White-Tailed Kite.* The white-tailed kite is a fully protected state species. It is a common to uncommon, year-long resident in coastal and valley lowlands and is rarely found away from agricultural areas. The main prey of the white-tailed kite is voles and other small, diurnal mammals, but it occasionally preys on birds, insects, reptiles, and amphibians. White-tailed kite forages in undisturbed, open grasslands, meadows, farmlands, and emergent wetlands. Nests are made of loosely piled sticks and twigs and lined with grass, straw, or rootlets and placed near the top of a dense oak, willow, or other tree stand: usually 20 to 100 feet above ground. Nests are located near open foraging areas in lowland grasslands, agricultural areas, wetlands, oak-woodland and savannah habitats, and riparian areas associated with open areas. Suitable nesting and foraging habitat is found in all phases of the project area.

There were no reported occurrences of nesting white-tailed kite in CNDDDB for the Yuba City quad. However, the Corps and USFWS biologists observed three white-tailed kites utilizing riparian woodland habitat approximately 150 feet from the construction easement for Phase 1 on August 20, 2009. The white-tailed kite is expected to be a permanent resident in the project area and may nest or forage there during the nesting season.

*Western Yellow-Billed Cuckoo.* The western yellow-billed cuckoo is State-listed as an endangered species and is a candidate for Federal listing. This species requires large patches (40 acres or larger) of mixed old-growth riparian forests composed of willow and cottonwood trees with dense understory; however, yellow-billed cuckoos will occasionally occupy a variety of marginal habitats, particularly at the edges of their range. Other species such as alder (*Alnus glutinosa*) and box elder (*Acer negundo*) may be an important habitat element in some areas, including occupied sites along the Sacramento River (Laymon and Halterman 1998). Nests are primarily in willow trees; however, other species are occasionally used, including cottonwood and alder (Laymon 1980). While yellow-billed cuckoos nest primarily in willow trees, cottonwood trees are important as foraging habitat.

A CNDDDB records search identified one occurrence of the cuckoo in the southern portion of Marysville near the Yuba and Feather Rivers confluence in June 1976 (near Phase 2). Additionally, one sighting was recorded approximated one mile from Marysville along the Feather River in June 1986. However, statewide surveys conducted in 1999 and 2000 by the U.S. Geological Survey and USFWS documented no individuals nesting within the Feather River channel.

*Tri-Colored Blackbird.* The tri-colored blackbird is State designated as a species of special concern. The tri-colored blackbird inhabits open valleys and foothills and may be found in streamside forests, alfalfa and rice fields, marshes, and along reservoirs. This blackbird usually nests in marshes but may also nest in willow and blackberry thickets and on the ground in clumps of nettles. They forage in wet meadows, rice and alfalfa fields, and in rangelands. They commonly roost in trees or marshes. Whether they are roosting, foraging, or nesting, these birds are always found in large flocks. The tri-colored blackbird both nests and winters in interior valleys from southern Oregon (east of the Cascades) to northwest Baja California (Terres 1980). Once abundant in Yolo County, the tri-colored blackbird has been eliminated from the county and breeds only in a few scattered areas in California and Oregon.

A CNDDDB records search revealed that sightings of the tri-colored blackbird near the project area have not been recorded since 1935 and that the population may be extirpated. However, suitable foraging habitat exists in Phases 1 and 3 of the project area.

*Bank Swallow.* Bank swallow is State-listed as threatened. This species prefers open and partly open habitat, frequently near flowing water. Bank swallows forage over open riparian areas, but also over brushland, grassland, wetlands, water, and cropland. Individuals nest in steep sand, dirt, or gravel banks. They utilize holes dug in cliffs and river banks for cover and will also roost on logs, shoreline vegetation, and telephone wires. About 75% of the current breeding population in California occurs along banks of the Sacramento and Feather rivers in the northern Central Valley (Garrison 1999).

There were several sightings recorded on CNDDDB (Yuba City quad) for bank swallow along both banks of the Feather River between 1985 and 1988. The closest records are within 1.5 miles of Phase 4. Bank swallows may forage over the project area,

but field visits by Corps and USFWS biologists have not noted any suitable nesting habitat for the bank swallow in the project area.

*Swallows, Black Phoebes, and Other Migratory Birds.* Swallows, black phoebes, and other migratory birds commonly nest on the underside of bridges and other structures in the vicinity of streams and other watercourses. These species are protected from disturbance during the nesting season by the MBTA. Swallow and black phoebe nests were observed on the underside of the Highway 70/E Street bridge over the Yuba River, and under the 5<sup>th</sup> Street and Highway 20/Colusa Avenue bridges over the Feather River. Numerous swallows were observed flying around the bridges during biological surveys.

### Reptiles and Amphibians

*Giant Garter Snake.* The GGS is Federally- and State-listed as threatened. It is endemic to emergent wetlands in the Central Valley and is still presumed to occur in the rice production zones of Sutter, Butte, Colusa, and Glenn Counties (USFWS 1999). Habitat for the snake includes marshes, sloughs, ponds, small lakes, and low-gradient waterways, such as small streams, irrigation and drainage canals, and rice fields (58 FR 54053). The GGS requires adequate water with herbaceous, emergent vegetation for protective cover and foraging habitat. All three habitat components (i.e., cover and foraging habitat, basking areas, and protected hibernation sites) are needed (Hansen and Brode 1980). The snake is active from approximately May through October and hibernates during the remainder of the year.

A CNDDDB records search did not identify any occurrences of GGS in the project area, however, suitable habitat exists in Phases 1 and 3 of the project area, including rice fields, irrigation canals, and upland habitat. These habitats exist within 50 feet of the levee toe.

*Western Pond Turtle.* Western pond turtle is designated as a State species of special concern. The turtle is common to uncommon in suitable aquatic habitats throughout California, west of the Sierra-Cascade crest. The Western pond turtle inhabits permanent or nearly permanent waters with little or no current. The channel banks of inhabited waters usually have thick vegetation, but basking sites such as logs, rocks, or open banks must also be present (Zeiner et al. 1988). Western pond turtle habitat must include food sources such as aquatic plant material, beetles, aquatic invertebrates, as well as fish and frogs. Eggs are laid in nests along sandy banks of large slow-moving streams or in upland areas, including grasslands, woodlands, and savannas.

A CNDDDB records search did not identify any occurrences in the project area, however, suitable habitat exists along Jack Slough near Phase 1, and in slow-moving pools along the banks of the Feather and Yuba Rivers.



## Invertebrates

*Valley Elderberry Longhorn Beetle.* Elderberry shrubs are the host plant of the valley elderberry longhorn beetle (VELB), which is Federally-listed as threatened. Current information on the habitat of the beetle indicates that it is found only with its host plant, the blue elderberry. The beetles mate in May, and females lay eggs on living elderberry shrubs. Larvae bore through the stems of the shrubs to create an opening in the stem, within which they pupate. After metamorphosis, the beetle chews a circular exit hole, through which it emerges (Barr 1991). Adults can be found on elderberry foliage, flowers, or stems, or on associated plants. Adult VELB feed on foliage and are active from early March through early June. The VELB requires established elderberry plants one inch in basal stem diameter at ground level. The presence of exit holes in elderberry stems is evidence of previous beetle use.

Elderberry shrubs in the Central Valley are commonly associated with riparian habitat but also occur in oak woodlands and savannas and in disturbed areas. Elderberry shrub locations were mapped by USFWS on July 29 and August 20, 2009 in the project area. During the surveys, a total of 87 shrubs or shrub clusters were marked and recorded and stems counted per USFWS's "Conservation Guidelines for the Valley Elderberry Longhorn Beetle, July 1999". Their locations were identified using a global positioning system (GPS), and the size of the shrub or shrub cluster was recorded.

## Fish

*Green Sturgeon.* Green sturgeon is Federally-listed as threatened. Green sturgeon are the most marine of sturgeon species and come into rivers mainly to spawn. Their life stage in fresh water may last up to two years. Adults and juvenile sturgeon are benthic feeders but may also take small fish. Juveniles in the Delta estuary primarily feed on opossum shrimp and amphipods (Moyle 2002).

Incidental capture of larval green sturgeon in salmon out-migrant traps indicates that the lower Feather River may be a principal spawning area; green sturgeon may also spawn in the mainstem Sacramento River. Adults have been reported as far upstream as Red Bluff, and young have been recorded in a number of places downstream. Preferred spawning substrate is likely large cobble but can range from clean sand to bedrock. Eggs are broadcast and externally fertilized in relatively fast water and probably in depths greater than three meters. The importance of water quality is uncertain, but a small amount of silt is known to prevent the eggs from adhering to each other, thus increasing survival (Moyle 2002).

A CNDDDB records search did not identify any occurrences within the Feather or Yuba Rivers, however, suitable habitat may exist within portions of either river near Marysville.

*Delta Smelt.* Delta smelt is Federally and State-listed as threatened. Delta smelt is endemic to the upper Sacramento-San Joaquin estuary and is closely associated with

freshwater-saltwater mixing zones. Delta smelt spawning occurs in spring in river channels and tidally influenced backwater sloughs upstream of the mixing zone, primarily March through May. The Sacramento and San Joaquin rivers then transport the delta smelt larvae downstream to the mixing zone, normally located in the Suisun Bay. Young delta smelt then feed and grow in the mixing zone before starting their upstream spawning migration in late fall or early winter (Moyle et al. 1992).

Delta smelt feed on zooplankton, primarily copepods. The smelt typically lives only one year and has a relatively low fecundity. The smelt are preyed upon by larger fish, especially striped bass and largemouth bass which are invasive species in the Sacramento Delta (Moyle 2002).

A CNDDDB records search did not identify any occurrences of delta smelt within the Feather or Yuba Rivers. It is unlikely that the smelt would come up this far from their natal grounds, however, high flows may push them higher in the watershed and into the Feather and Yuba Rivers (Mulvey 2009).

*Central Valley Steelhead.* Central Valley steelhead is Federally listed as threatened. Historically, steelhead spawned and reared in most accessible upstream reaches of Central Valley rivers, including the Yuba, Feather, and Sacramento Rivers and their perennial tributaries. In the Central Valley, steelhead are now restricted to the upper Sacramento River downstream of Keswick Reservoir; the lower reaches of large tributaries downstream of impassable dams; small, perennial tributaries of the Sacramento River mainstem and large tributaries; and the Delta and San Francisco Bay system. Critical habitat for Central Valley steelhead has been designated in the Feather and Yuba Rivers (NMFS 2005).

Upstream migration in the lower Feather and Yuba Rivers occurs from August – March and peaks in October and February (CDFG 1991). Central Valley steelhead typically spawn from January through March, but spawning has been reported from late December through April. During spawning, the female digs a redd (gravel nest) in which she deposits her eggs, which are then fertilized by the male. Steelhead fry usually emerge from the gravel two to eight weeks after hatching (Barnhart 1986; Reynolds et al. 1993), between February and May, and move to shallow, protected areas along streambanks. Juvenile steelhead may spend 1 to 3 years in freshwater before emigrating to the ocean. During emigration, juvenile steelhead undergo smoltification before entering saline waters.

A CNDDDB records search did not identify any occurrences of Central Valley steelhead within the Feather or Yuba Rivers, however, suitable habitat for spawning and rearing is likely to exist.

*Central Valley Spring-Run Chinook Salmon.* Central Valley spring-run Chinook salmon is Federally and State-listed as threatened. Critical habitat for spring-run Chinook salmon includes the Sacramento River, American River, Feather River, Bear River, Yuba River, and Cache and Miner Soughs. Spring-run Chinook salmon historically occurred

from the upper tributaries of the Sacramento River to the upper tributaries of the San Joaquin River. The only streams in the Central Valley with remaining wild spring-run Chinook salmon populations are the Sacramento River and its tributaries, including the Yuba River (Corps 2009a). Critical habitat for Central Valley spring-run Chinook salmon has been designated in the Feather and Yuba Rivers (NMFS 2005).

Central Valley spring-run Chinook salmon enter the Sacramento River from late March to September, with peak abundances of immigrating adults in the Delta and lower Sacramento River occurring from April through June. Spring-run Chinook salmon spawn primarily upstream of the Red Bluff Diversion Dam and in the aforementioned tributaries. Spawning occurs from mid-August through early October. Juveniles typically emerge in November and December (Corps 2009b). On the Feather River, significant numbers of spring-run return to the Feather River Hatchery.

A CNDDDB records search identified that spring-run Chinook salmon have the potential to occupy the Feather and Yuba Rivers.

*Sacramento River Winter-Run Chinook Salmon.* Sacramento River winter-run Chinook salmon is Federally-listed as endangered. Adult winter-run Chinook salmon migrate through the Delta into the Sacramento River from November through July and spawn from mid-April through August. The primary spawning grounds in the Sacramento River are above the Red bluff Diversion Dam. Adult winter-run Chinook salmon do not enter the Feather River or its tributaries, but juveniles may periodically migrate up into these systems when rearing.

### Plants

*Hartweg's Golden Sunburst.* Hartweg's golden sunburst is Federally and State listed as endangered and is designated as a List 1B plant by the CNPS (62 FR 25:5542). Hartweg's golden sunburst occurs in grasslands and open blue oak woodlands of the southern Sacramento Valley and San Joaquin Valley of California. This species nearly always occurs on clayey soils on the north or northeast facing slope of mounds with grassland communities; the highest plant densities occur on upper slopes with minimal grass cover at altitudes between 50 to 460 feet. Hartweg's golden sunburst produces bright yellow flower heads in March or April.

The last documented occurrence of the Hartweg's golden sunburst within the study area was in 1990 on the north bank of the Yuba River at the junction of the Yuba and Feather Rivers, adjacent to Phase 2.

### **Environmental Effects**

#### Significance Criteria

Adverse effects on special status-species were considered significant if an alternative would result in any of the following:

- Direct or indirect reduction in growth, survival, or reproductive success of species listed or proposed for listing as threatened or endangered under the FESA or CESA.
- Direct mortality, long-term habitat loss, or lowered reproductive success of Federally or State-listed threatened or endangered animal or plant species or candidates for Federal listing.
- Direct or indirect reduction in the growth, survival, or reproductive success of substantial populations of Federal species of concern, State-listed endangered or threatened species, plant species listed by the CNPS, or species of special concern or regionally important commercial or game species.
- An adverse effect on a species' designated critical habitat.

#### Alternative 1 (No Action)

Under the no action alternative, levee improvements around the MRL would not be constructed by the Corps, therefore, there would be no effect on Federally-listed or Federal Candidate Species and State-listed or Species of Special Concern, and their habitats. The types of special-status species in or near the project area are expected to remain the same.

#### Alternative 2 (Proposed Action)

Construction of the MRL improvements would indirectly affect the giant garter snake and its habitat. The proposed action would directly affect habitat for the valley elderberry longhorn beetle. The project could also result in potential effects to any nesting raptors and other migratory birds in the project area, including Swainson's hawk, white-tailed kite, bridge nesting swallows, and black phoebes.

*Bald Eagle.* Construction of the MRL improvements could result in indirect effect to the bald eagle. Suitable foraging habitat for the eagle occurs along the Feather and Yuba Rivers and in agricultural lands and rice fields. These areas are likely used by the eagle during the winter migration. Project construction would temporarily affect the foraging habitat when it occurs near construction sites and staging areas. However, areas in temporary construction easements would likely return to their previous use after construction, and the effects to foraging habitat would be temporary. Permanent loss of foraging habitat is expected to be minor because most of the area converted to permanent easement would remain in annual grassland. Additionally, project construction would take place anytime between June and October when the possibility that eagles would be migrating and stopping at the project area would be small. Therefore, no significant adverse effects to the eagle would be expected.

*Swainson's Hawk.* Construction of the MRL improvements could potentially result in direct and indirect effects to Swainson's hawk. Swainson's hawk was reported nesting approximately 1.5 miles northwest of the project area along the Feather River in 2005. Construction of the project could potentially result in direct and/or indirect effects to Swainson's hawk if this species begins nesting adjacent to the project area prior to construction. Construction activities in the vicinity of a nest have the potential to result in forced fledging or nest abandonment by adult hawks.

The CDFG has determined that hawks greater than one-fourth of a mile away would not be adversely affected by construction disturbances. However, Swainson's hawks frequently change the location of their nest site from year to year. Therefore, specific mitigation/avoidance measures are discussed in the mitigation section below, and the project area would be surveyed by a qualified biologist prior to construction to locate specific nest sites and identify specific mitigation/avoidance measures for nests that could be adversely affected.

*White-Tailed Kite.* Construction of the MRL improvements could potentially result in direct and indirect effects to white-tailed kite. As discussed previously, three white-tailed kites were observed utilizing riparian woodland habitat approximately 150 feet from the construction easement for Phase 1. Construction of the project could potentially result in direct and/or indirect effects to the white-tailed kite if this species begins nesting in or adjacent to the project area prior to construction. Construction activities in the vicinity of a nest have the potential to result in forced fledging or nest abandonment by adult kites. Therefore, the white-tailed hawk would be adversely affected by construction activities. However, with appropriate avoidance measures, project construction is not expected to adversely affect the white-tailed kite or its habitat. The project area would be surveyed by a qualified biologist prior to construction to locate specific nest sites and identify specific mitigation/avoidance measures for nests that could be adversely affected.

*Western Yellow-Billed Cuckoo.* Construction of the MRL improvements is not likely to result in direct and indirect effects to Western yellow-billed cuckoo. This species has not been observed in the study area since 1986. Due to limited sightings of the cuckoo and lack of expansive stands of mixed old-growth riparian forest in the project area, no significant adverse effects to Western yellow-billed cuckoo are expected.

*Tri-Colored Blackbird.* Construction of the MRL improvements is not likely to result in direct and indirect effects to tri-colored blackbird. Although suitable foraging habitat exists in Phases 1 and 3, and suitable nesting habitat exists within Phases 1 and 2, Construction activities are not expected to adversely affect this habitat. Some agricultural lands near construction sites and staging areas would be temporarily affected due to project construction activities but would return to their previous use after construction. Permanent loss of foraging habitat is expected to be minor because most of the area converted to permanent easement would remain as annual grassland. Therefore, no significant adverse effects to the tri-colored blackbird are expected.

*Bank Swallow.* Construction of the MRL improvements is not likely to result in direct and indirect effects to bank swallow. Field visits by Corps and USFWS biologists have not noted any suitable nesting habitat for the bank swallow in the project area. Therefore no adverse impacts to nesting habitat for the bank swallow are expected. If suitable habitat for bank swallows is found during future surveys, appropriate coordination and avoidance measures will be undertaken. Effects to bank swallows and their nesting habitat could occur if construction activities were specifically related to bank protection projects (CDFG 1992). For this proposed project, construction activities would occur on the levees and staging areas which are set back from the banks of the rivers. Therefore, no significant adverse effects to bank swallows or their habitat are expected.

*Swallows, Black Phoebes, and Other Migratory Birds.* Construction of the MRL improvements could potentially result in direct and indirect effects to swallows, black phoebes, and other migratory birds. Swallow nests were observed on the undersides of Highway 70/E Street bridge over the Yuba River, and under the 5<sup>th</sup> Street and Highway 20/Colusa Ave. bridges over the Feather River. Construction activities in the vicinity of a nest have the potential to result in forced fledging or nest abandonment by these species during the breeding season. However, with appropriate avoidance measures, project construction is not expected to adversely affect these species or its habitat.

*Giant Garter Snake.* Construction of the MRL improvements in Phases 1 and 3 could potentially result in indirect effects to the GGS upland habitat only. Suitable GGS habitat exists in the rice fields adjacent to both Phases and use the irrigation ditches and canals as a means to disperse through the project area. In addition, the banks of the rice fields, adjacent roads, and the levee provide basking habitat and refugia for the GGS.

Indirect effects of the project could potentially include physical vibration and an increase in site disturbance during operation of equipment and trucks during construction activities. If construction takes place during the active season for GGS, these site disturbances could cause snakes to leave their burrows, exposing them to increased chances of predation or other physical harm. With appropriate avoidance measures, project construction is not expected to adversely affect the GGS or its habitat (see mitigation below for specific avoidance measures).

Table 12 summarizes impacts to the GGS habitat as a result of the proposed project.

**Table 12. Impacts to Giant Garter Snake Habitat.**

<b>Project Impact Area</b>	<b>Habitat Type</b>	<b>Area of Impact (acres) / Impact Type</b>
Phases 1 & 3	Rice field	1.05 / Temporary
	Drainage ditches / irrigation canals	-- / Not affected
	Upland	33.70 / Temporary
<b>Total temporary Impacts to giant garter snake upland habitat</b>		<b>33.70</b>

*Western Pond Turtle.* Construction of the MRL improvements would not likely result in direct and/or indirect affects to the western pond turtle. Project construction would take place on the waterside of the levee, but equipment and materials would be limited to the temporary and permanent easements which would avoid these habitats. Additionally, a SWPPPs plan and BMPs would be implemented to minimize effects on water quality. Suitable habitat for the turtle exists along Jack Slough, the levee is far enough from the slough that the levee and staging areas would not be considered upland basking habitat. Therefore, no adverse effects to the western pond turtle or its habitat are expected.

*Valley Elderberry Longhorn Beetle.* Construction of the MRL improvements would result in direct and indirect affects to VELB. Eighty-seven shrubs were surveyed, and it was determined that 28 shrubs with stems greater than one inch would be directly impacted by construction in Phases 2 and 3. None of these shrubs were recorded as having exit holes. These shrubs would be transplanted before construction begins.

*Green Sturgeon, Delta Smelt, Central Valley Steelhead, Central Valley Spring-Run Chinook Salmon, and Sacramento River Winter-Run Chinook Salmon.* Construction of the MRL improvements is not likely to result in direct and/or indirect effects to green sturgeon, delta smelt, Central Valley steelhead, Central Valley spring-run Chinook salmon, and Sacramento River winter-run Chinook salmon, or the associated critical habitat for the above listed species. Project construction activities would take place from the waterside of the levee, however, instream water work would not occur in any phase of the project. Activities within the construction easements would not disturb streamside vegetation. BMPs would be implemented to avoid debris, soils, or fuel spills; therefore no adverse effects to fish and its habitat are expected.

*Hartweg's Golden Sunburst.* Construction of the MRL improvements is not likely to result in direct and/or indirect impacts to Hartweg's golden sunburst. With only one occurrence documented in 1990 near the project area, this population is believed to be extirpated and is not likely to occur in the project area because of past and present disturbances from agriculture and levee maintenance practices (CDFG 2009b). Therefore, no significant adverse effects to the Hartweg's golden sunburst are expected.

## Mitigation

Construction of the MRL improvements would have an effect on habitat for the VELB and GGS. Additionally, there is the potential for effects to special-status raptor species. Consultation would be initiated with USFWS for the valley elderberry longhorn beetle and giant garter snake. A Biological Opinion is expected from USFWS prior to the final EA. Potential mitigation measures would be coordinated with USFWS and CDFG, as appropriate. Surveys and avoidance measures are proposed for Swainson's hawk, and white-tailed kite. Avoidance measures have been incorporated into the project description to avoid direct effects to the, giant garter snake, while upland habitat would be dewatered prior to construction.

### Swainson's Hawk, White-Tailed Kite, and Other Raptors

Construction would occur between June and October for all phases (see section 2.4.2 for construction windows per phase). Where suitable nesting habitat occurs, preconstruction surveys would be conducted within 0.5 miles of the project area for Swainson's hawk, and within 1,000 feet of the project area for tree nesting raptors, including white-tailed kite and other raptors.

Surveys would conform to the Swainson's Hawk Technical Advisory Committee Guidelines (CDFG 2000). If nesting raptors are recorded within their respective buffers, CDFG would be consulted regarding suitable measures to avoid affecting breeding. Mitigation measures would include but are not limited to the following:

- Maintaining an appropriately-sized buffer around each active raptor nest determined in consultation with CDFG; no construction activities would be allowed within this buffer except as allowed through consultation with CDFG.
- Depending on conditions specific to each nest, and the relative location and rate of construction activities, it may be feasible for construction to occur as planned within the buffer without impacting breeding effort. In this case, as determined by consultation with CDFG, the nest(s) would be monitored by a qualified biologist during construction within the buffer. If the monitoring biologist determines that construction would impact the nest, the biologist would immediately contact the appropriate Corps representative and CDFG. Construction activities within the buffer would be stopped until either the nest is no longer active or the project receives approval to continue by CDFG.

The proposed mitigation measures would reduce the effects on the above-listed special-status raptors to less than significant.



### Swallows, Black Phoebe, and Other Migratory Birds

If construction is scheduled to occur during the typical nesting season for these birds, March 1 through September 1, a preconstruction survey would need to be conducted within two weeks prior to construction for nesting birds under the project bridges and in other suitable habitats. If no nests are detected, no further mitigation would be necessary. If active nests are detected, CDFG would need to be contacted to determine appropriate mitigation measures to prevent impacts to nesting birds.

### Giant Garter Snake

With the MRL project, there would be no permanent impacts that would result in the loss of habitat or permanently remove essential habitat components for the giant garter snake. All potential effects to the giant garter snake would take place during one construction season and would be considered temporary.

Potential direct effects to the giant garter snake during construction would be avoided by the placement of k-rails along the Phase I reach that has suitable GGS habitat. Additionally, in the Phase 1 reach, 1.05 acres of a rice field adjacent to the levee would not be flooded in the spring prior to construction. This would further avoid the potential for direct impacts on the garter snakes in this area. The rice field would be returned to rice production after construction is complete.

There is the potential for temporary effects to upland habitat component of the snake. In the Phase 1 reach, there would be truck traffic on the haul road within 200 feet of potential giant garter snake habitat. This activity would occur for one construction season and would likely affect 33.70 acres of upland habitat. All affected upland habitat would be returned to pre-project conditions after construction is completed. Consultation would be initiated with USFWS and the following measures would be implemented, as applicable, to further avoid any adverse effects to the snake or its habitat.

- Construction activity would be confined within or near potential habitat to the period between May 1 and October 1.
- Prior to construction activities, a qualified biologist would instruct all construction personnel in worker awareness training to recognize garter snake and its habitat.
- A giant garter snake survey would be conducted 24 hours prior to construction in potential habitat. A Service approved biologist should be onsite during any clearing or grubbing of wetland vegetation. Clearing should be confined to the minimal area necessary to facilitate construction activities. The snake survey should be repeated if a lapse in construction activity of two weeks or greater occurs.

- Nearby habitat designated as environmentally sensitive to the snake would be flagged and avoided by all construction personnel.
- Movement of heavy equipment to and from the project site or borrow/disposal site would be confined to existing roadways, where possible, to minimize habitat disturbance. K-rails would be installed on the waterside of the levee near the GGS aquatic habitats. Equipment would stay at least 30 feet from the banks of GGS aquatic habitat when possible.
- Temporary drainage of a small rice field prior to construction would occur adjacent to the levee toe in Phase 1. This would allow for any snakes to move and find adequate cover. Any dewatered habitat should remain dry for at least 15 consecutive days after April 15 and prior to excavating or filling of the dewatered habitat.
- If a GGS is encountered during construction, activities would cease until either the snake moved out of harms way on its own, or capture and relocation have been completed by the USFWS-approved biologist. Any incidental take would be reported to the USFWS immediately by telephone at (916) 414-6600.

With the implementation of the above mitigation measures, any potential effects to GGS would be reduced to less than significant.

#### Valley Elderberry Longhorn Beetle

Construction of the MRL improvements would affect 28 elderberry shrubs. Consultation has been initiated with USFWS and compensation would be implemented according to USFWS's "Conservation Guidelines for the Valley Elderberry Longhorn Beetle, July 1999". Compensation according to the guidelines would include transplanting 28 elderberry shrubs that would be directly impacted by construction activities in Phase II and establishing additional 303 elderberry seedlings and 303 associated natives on 2.5 acres. This compensation would take place on excess lands at an existing Corps mitigation site along the Feather River and the end of Anderson Avenue. The site was established in 1992 by the Corps for a project that involved levee reconstruction along the Feather and Yuba Rivers. Project construction was subsequently reduced in size and less compensation was needed. The established habitats on this site include riparian woodland, riparian scrub, emergent marsh and habitat for the Federally-listed VELB. This site has been monitored for success and establishment of the VELB habitat for 10 years.

The MRL project would use excess lands that exist at this site. The specific location within the site is currently being coordinated with FWS. The affected elderberry shrubs would be transplanted to the site and watered for 3 years. The VELB habitat has been successfully established on the site and no further monitoring would be needed. Long-term maintenance would be accomplished by the non-Federal sponsor. This mitigation is expected to reduce the effects to a less-than-significant level.

In addition to the above proposed compensation, the following measures taken from the USFWS Conservation Guidelines, would be incorporated into the project to minimize further effects to the VELB:

- A minimum setback of 100 feet from the dripline of all elderberry shrubs would be established, if possible. If the 100-foot minimum buffer zone is not possible, the next maximum distance allowable would be established. This area would be fenced, flagged, and maintained during construction. A biological monitor would provide instruction on establishing the buffer zones for the shrubs.
- Environmental awareness training would be conducted for all construction representatives and contractor personnel before they begin work. The training would include status information, the need to avoid adversely affecting the elderberry shrub, avoidance areas and measures taken by the workers during construction, and contact information.
- Dust suppression measures would be used.
- Signs would be posted every 50' along the edge of the avoidance area with the following information:

“This area is the habitat of the valley elderberry longhorn beetle, a threatened species, and must not be disturbed. This species is protected by the Endangered Species Act of 1973, as amended. Violators are subject to prosecution, fines, and imprisonment.”

With the implementation of the listed conservation measures, and the proposed mitigation, any effects to VELB would be reduced to less than significant.

### **3.3.5 Agriculture and Prime and Unique Farmlands**

#### **Existing Conditions**

Agriculture is the most extensive land use in Yuba County and the most significant component of the county's economy. Approximately 68 percent of the county is used for agriculture, croplands, and grazing.

The designation of Prime Farmland grew out of a program by the Natural Resources Conservation Service (NRCS) to map the Nation's Important Farmlands. In 1980, the California Department of Conservation (CDC) initiated the Farmland Mapping Program to supplement the NRCS program. The continuing conversion of agricultural lands led to the passage of the Farmland Protection Policy Act in 1981, which was amended in 1994. The act expressed the need for all Federal agencies to recognize the effect of their actions and programs on the Nation's farmlands.

The CDC divides farmlands into the following five categories based on their suitability for agriculture:

- **Prime Farmland** – Prime Farmland has the best combination of physical and chemical features able to sustain long-term agricultural production. This land has the soil quality, growing season, and moisture supply needed to produce sustained high yields. Land must have been used for irrigated agricultural production at some time during the four-year period prior to the CDC mapping date.
- **Farmland of Statewide Importance** – Farmland of Statewide Importance is similar to Prime Farmland, but with minor shortcomings, such as greater slopes or less ability to store soil moisture. Land must have been used for irrigated agricultural production at some time during the four-year period prior to the CDC mapping date.
- **Unique Farmland** – Unique Farmland consists of lesser quality soils used for the production of the State’s leading agricultural crops. This land is usually irrigated, but may include non-irrigated orchards or vineyards as found in some climatic zones. Land must have been cropped at some time during the four-year period prior to the CDC mapping date.
- **Farmland of Local Importance** – Farmland of Local Importance is land that either is currently producing crops or has the capability of production, but does not meet the criteria of the categories above.
- **Grazing Land** – Grazing Land is land on which the vegetation is suited to the grazing of livestock (CDC 2007).

The land contained within the MRL is primarily urban residential and commercial zones with little-to-no agricultural land use. The land along the exterior of the Ring Levee includes natural habitats to the west and south, and agricultural lands to the north and east.

*Phase 1.* Phase 1 includes construction on the northern and western portions of the levee. The land along the western portion of Phase 1 consists primarily of grasslands and other natural habitat. The land to the north of Phase 1 is primarily Unique Farmlands and Grazing Land. The Unique Farmlands in this area include rice fields, vineyards, and orchards.

*Phase 2.* Phase 2 includes construction on the southern portions of the MRL. The land in this area is primarily recreational parkland, and natural habitats. Rice fields are located near the project area to the south of Phase 2. There is no Prime or Unique Farmland located in this portion of the project area.

*Phase 3.* Phase 3 is located primarily on the eastern edge of the MRL. The land in this area is primarily natural habitat areas, however, there is a small field located to the southern end of the Phase 3 project area. This field is currently in fallow, but it probably contained an orchard in previous years. This field is delineated as Unique Farmland.

*Phase 4.* Phase 4 is located on the western side of the Ring Levee at Binney Junction. This area is primarily operated by the railroads, and does not contain any agricultural land. There is no Prime or Unique Farmland delineated in this portion of the project area.

## **Environmental Effects**

### Basis of Significance

An alternative would be considered to have a significant effect on agriculture or prime and unique farmlands if it would result in the permanent conversion of existing prime or unique farmland to an alternative form of land use.

### Alternative 1 (No Action)

Under the no action alternative, the Corps would not participate in constructing the MRL improvements. Agriculture and prime or unique farmland designations within the project area would not change. The soil types would not be altered, therefore, their classifications would remain the same.

### Alternative 2 (Proposed Action)

There would be no permanent loss of any Prime or Unique Farmlands resulting from construction of the MRL improvements. There would be some temporary, short-term effects to Prime and Unique Farmlands and local agriculture.

*Phase 1.* There is a total of approximately 5.55 acres of affected agricultural land as a result of construction of Phase 1 of the project. There is a parcel of approximately 4.68 acres of agricultural land that has been proposed for a staging area for Phase 1 construction. This land appears to have been used for crops in the past, however, it currently appears to be in a state of disuse. This parcel of land is delineated by the CDC as Grazing Land. This land would be temporarily disturbed for the duration of Phase 1 construction by staging of vehicles, equipment, and materials.

There is a 1.05-acre rice field adjacent to the Phase 1 project area that would also be affected by project construction. This rice field is delineated as Unique Farmland by the CDC. The effects to the rice field would consist of the field remaining unplanted for the duration of one construction season, while the adjacent levee is under construction.

*Phase 2.* The rice fields near the Phase 2 project area are far enough removed from the levee that there would be no effects to them as a result of construction.

*Phase 3.* The 3.34 acres of fallow Unique Farmland would be temporarily affected by Phase 3 construction. This farmland is within the necessary working space for the slurry wall construction. As a result, this land would not be able to be planted during the period of Phase 3 construction. However, since this land has not been farmed in recent years, it is anticipated that this would not be a significant effect to agriculture or Unique Farmland.

There is a dirt agricultural road that would be used as a haul route during Phase 3 for the slurry wall construction at the northern edge of the levee. This road runs between rice and crop fields to the north of the ring levee. There is the potential of impacts to the surrounding fields from fugitive dust, caused by vehicle transport on the dirt road.

*Phase 4.* Phase 4 construction would have no effect on agriculture or Prime and Unique Farmlands.

### **Mitigation**

*Phase 1.* All use of privately owned farmland in the Phase 1 project area would need to be negotiated with the landowners prior to the start of construction to determine the feasibility of using the proposed staging area and requesting the dewatering of the rice field for the season. The effects to these lands would be temporary for the duration of the construction season, and landowners would be able to return to their normal agricultural operations following completion of Phase 1 construction. Since there would be no permanent loss of farmland, no further mitigation would be required outside of the compensation to the landowners for the loss of their seasonal profits.

*Phase 2.* There would be no effect to any agricultural areas or Prime and Unique Farmland in this portion of the project area and no mitigation would be required.

*Phase 3.* All use of privately owned farmland in the Phase 3 project area would need to be negotiated with the landowners prior to the start of construction. The effects to these lands would be temporary for the duration of the construction season, and landowners would be able to return to their normal agricultural operations following completion of Phase 3 construction. Since there would be no permanent loss of farmland, no further mitigation would be required outside of the compensation to the landowners for the loss of their seasonal profits.

The contractor would also prepare a fugitive dust control plan and submit it to the FRAQMD for review before initiating construction activities. Mitigation measures would include speed limits for the haul routes, watering down the road, and covering material in the haul trucks, among other mitigation measures, in order to reduce fugitive dust effects. A complete list of these mitigation measures can be found in Section 3.3.2 Air Quality, Mitigation and/or Section 3.3.6 Traffic and Circulation, Mitigation.

*Phase 4.* There would be no effect to any agricultural areas or Prime and Unique Farmland in this portion of the project area and no mitigation would be required.

### 3.3.6 Traffic and Circulation

The following section describes the corridor routes and functions, traffic volumes, traffic levels of service, public transportation, bicycle routes, rail service, and traffic safety that may be affected by the proposed project.

#### Existing Conditions

The most common way to describe roadway traffic volumes is through the “Level-of-Service” concept. Level of Service (LOS) is a general measure of traffic conditions, whereby a letter grade, from A (the best) to F (the worst), is assigned. These grades represent the perceptions of drivers, and are an indication of the comfort and convenience associated with driving, as well as speed, travel time, traffic interruptions, and freedom to maneuver. Although qualitative, this method of analysis provides a relative measure of traffic volumes in relation to roadway/intersection capacity (Yuba County 2009). The **LOS** grades are generally defined as follows:

- **LOS A** represents free-flow travel with an excellent level of comfort and convenience and freedom to maneuver.
- **LOS B** has stable operating conditions, but the presence of other road users causes a noticeable, though slight, reduction in comfort, convenience, and maneuvering freedom.
- **LOS C** has stable operating conditions, but the operation of individual users is substantially affected by the interaction with others in the traffic stream.
- **LOS D** represents high-density, but stable flow. Users experience severe restriction in speed and freedom to maneuver, with poor levels of comfort and convenience.
- **LOS E** represents operating conditions at or near capacity. Speeds are reduced to a low but relatively uniform value. Freedom to maneuver is difficult with users experiencing frustration and poor comfort and convenience. Unstable operation is frequent, and minor disturbances in traffic flow can cause breakdown conditions.
- **LOS F** is used to define forced or breakdown conditions. This condition exists wherever the volume of traffic exceeds the capacity of the roadway. Long queues can form behind these bottleneck points with queued traffic traveling in a stop-and-go fashion.

The LOS rankings listed above are determined for individual roadways based on a vehicle’s average delay, measured in seconds, at individual intersections. The LOS rankings by average delay are defined in Table 13 below.

## Roadways

There are four types of roads throughout the City of Marysville: highways, principal arterials, collector streets, and local streets. There is one freeway immediately adjacent to Marysville but none within the city limits.. There are two state highways that drive through and intersect in the City of Marysville:

- State Highway 20 runs east and west connecting Marysville with Yuba City in the west via the Feather River Bridge. The LOS on Highway 20 is “F” when it enters the city of Marysville in the west, and LOS “E” both throughout the city and leaving it in the east. If no improvements occur on Highway 20, it is expected to be LOS “F” throughout the entire City by 2027 (Caltrans 2009a).
- State Highway 70 runs north to south connecting Marysville with Oroville in the north and Olivehurst in the south via the E Street Bridge. The LOS on Highway 70 is “F” throughout the City of Marysville and LOS “E” north and south of the City (Caltrans 2009b).

**Table 13. Intersection Level of Service Definitions**

LOS	Average Control Delay (seconds/vehicle)	
	Signalized Intersections	Unsignalized Intersections
A	≤ 10.0	≤10.0
B	10.1 – 20.0	10.1 – 15.0
C	20.1 – 35.0	15.1 – 25.0
D	35.1 – 55.0	25.1 – 35.0
E	55.1 – 80.0	35.1 – 50.0
F	> 80.0	> 50.0

Source: Transportation Research Board, 2000

Principal arteries are intended to carry large volumes of through-traffic efficiently and as a secondary function, to provide access. Highway 20, Highway 70, and Fifth Street are all principal arteries.

Collector streets carry traffic from neighborhood residential streets to arterials but are not designed to carry large volumes of through-traffic. Streets identified as collector streets include 22<sup>nd</sup> Street, Hall Street, Covillaud Street, Ramirez Street, East 10<sup>th</sup> Street, 14<sup>th</sup> Street, and H Street.

Local streets provide access to property but are not designed for high volume through-traffic. All streets within the City of Marysville that are not mentioned above are considered local streets.

There are four bridges that offer vehicular access in and out of Marysville. Simpson Lane and Highway 70 overcrossing the Yuba River, and 5<sup>th</sup> Street and Highway 20 provide access over the Feather River. Two railroad track bridges also cross over the



Yuba River. There is a paved roadway on top of the entire ring levee. This road is primarily used for maintenance vehicles, pedestrians and bicyclists. On the eastern portion of the levee, from Simpson Lane/ Ramirez Street to Highway 20, there is public access for residences that live on the waterside toe of the levee. There are six roads and two highways that intersect with the levee crown:

- 14<sup>th</sup> Street
- Bizz Johnson Drive
- 2<sup>nd</sup> Street
- Sampson
- Ramirez/Simpson Lane
- Jack Slough Road
- Highway 20 (east)
- Highway 70 (north)

#### Public Transportation

Public Transportation bus services in Marysville are serviced by Yuba-Sutter Transit, which offers both fixed-route and demand-responsive services to city residents through local, commuter and rural bus routes. Bus routes that pass through Marysville include: Sacramento Commuter and Midday Express, Marysville Loop, Yuba City to Yuba College, Foothill, Live Oak, and Wheatland. Commercial bus services are offered by Greyhound and by Amtrak, which provide connecting services to Chico and Sacramento, with statewide and national connections. The Amtrak stop is at the Yuba County Government Center off of 9<sup>th</sup> Street. There is one Park-and-Ride facility located in Marysville at the Yuba County Government Center.

There are several rideshare or vanpool opportunities available between Marysville to Sacramento during the weekly commute (California Energy Commission 2006). There are several taxi cab companies that offer services in and around the Marysville.

#### Bicycles and Pedestrians

The City of Marysville has three types of bikeway classes:

- Class I Bikeway (bike path) provides a completely separated right-of-way for the exclusive use of bicycles and pedestrians with cross-flow minimized.
- Class II Bikeway (bike lane) provides a striped lane for one-way bike travel on a street highway. These lanes are for the exclusive or semi-exclusive use of bicycles with through travel by motor vehicles or pedestrians prohibited.
- Class III Bikeway (bike route) provides for shared use with pedestrian or motor vehicle traffic. Class III routes provide a right-of-way designated by signs or permanent markings and shared with pedestrians or motorists.

There is a Class I bike path on top of the levee that connects to several streets throughout the City of Marysville. There is a Class I bike path adjacent to Bizz Johnson Drive in Riverfront Park. There are Class III bike routes throughout the City that connect downtown with residential neighborhoods.

### Railroad Service

Marysville is served by two freight railroads that are owned and operated by Union Pacific Railroad. Transported commodities include chemicals, coal, food and food products, truck trailers and containers, forest products, grain and grain products, metals and minerals, and automobiles and parts. There are passenger trains, serviced by Amtrak, that run trains on the railroad lines within the city. The railroad crosses the MRL in five locations and runs parallel to the levee for approximately two miles. (Plate 3)

### **Environmental Effects**

#### Significance Criteria

Adverse effects on traffic are considered significant if an alternative would result in any of the following:

- Substantially increase traffic in relation to existing traffic load and capacity of the roadway system.
- Substantially disrupt the flow and/or travel time of traffic.
- Expose people to significant public safety hazards resulting from construction activities on or near the public road system.
- Reduce supply of parking spaces sufficiently to increase demand above supply.

#### Alternative 1 (No Action)

Under the no-action alternative, the Corps would not participate in constructing the MRL improvements. The existing freeway/roadway network, public transportation, bicycle and pedestrian facilities, types of traffic, and circulation patterns would be expected to remain the same. However, traffic volumes are expected to increase as projected in the Highway 20 and Highway 70 Transportation Corridor Concept Reports (Caltrans 2009a; Caltrans 2009b).

#### Alternative 2 (Proposed Action)

Construction of the Proposed Action would have short-term effects on the traffic and circulation in the project area. Construction activities could affect the types, volumes, and movement of traffic, public safety, and parking availability in and near the project area.

Highway 20, Highway 70, and the crown of the levee would be the primary haul and access routes throughout the duration of the project. All other roads used by the project are dependent on the phase of construction. The construction hauling would increase traffic, which could decrease the LOS on both highways from LOS E to LOS F. The increased construction traffic could also slow down public transportation routes and schedules throughout Marysville. This traffic increase would be a short-term impact to the roadways and when completed roadway LOS and bus schedules would return to pre-construction conditions.

The crown of the levee is used for maintenance activities, bicycle riding, jogging, walking, and vehicle traffic. During construction, the crown of the levee would be temporarily closed to all pedestrians and bicyclists in the construction location. Recreation reroutes are discussed in Section 3.3.7 Recreation and shown on Plate 7. This effect would be temporary and unavoidable. After construction, the road would be returned to its present condition.

*Phase 1.* Construction of Phase 1 would have temporary impacts on Jack Slough Road, Sampson Street, and Triplet Way for access onto the levee. An estimated 25 to 30 workers would be onsite each day during construction. These workers would access the area via regional and local roadways to access the staging area. Based on the trips per day and durations, construction of the proposed action would increase the volume by approximately 21 to 39 roundtrip truck trips per day. This increase in average daily trips (ADT) would represent a minimal increase in vehicle traffic in the regional transportation network. Because this small increase is not expected to affect the current LOS on Highway 70 or Highway 20, this increase in regional traffic would not be considered significant.

The staging areas being used for this phase would provide parking for construction workers. No construction related vehicles would be parked along regional roadways or nearby residential areas. As a result, there would be no effects on parking supply or availability. Access to the main staging area during the closure of Jack Slough Road would be: (1) Highway 70, north of Marysville, to Woodruff Lane going east to Jack Slough Road going south, (2) Highway 20, north of Marysville, to Woodruff Lane going west to Jack Slough Road going south, or (3) Highway 20, north of Marysville, to levee crown going west to agriculture road identified to Jack Slough Road.

There are four potential haul routes proposed for all material and equipment transportation: (1) Highway 70 to 24<sup>th</sup> Street to Triplett Way to the levee crown, (2) Jack Slough Road to the levee crown, (3) Highway 20 to the levee crown, and (4) the agriculture access road north of the Ring Levee, to Jack Slough Road to the levee crown (see above paragraph). The haul routes are depicted on Plate 4.

Construction of the proposed action would require Jack Slough Road to be closed for 14 days and require the private driveway that meets the north end of Sampson Street to be closed for the duration of Phase 1. Both roads would be temporarily rerouted to

nearby roads and highways. This could disrupt the traffic flow on these roads and possibly pose a safety hazard to other motorists, pedestrians, and bicyclists on and along these roadways, particularly when local schools are in session.

*Phase 2.* Construction of Phase 2 would have temporary impacts on A Street, 2<sup>nd</sup> street, Levee Road, Bizz Johnson Drive, and 14<sup>th</sup> Street for access onto the levee. An estimated 30 to 50 workers would be onsite each day during construction. These workers would access the area via regional and local roadways, and park their vehicles at one of the staging areas identified. Based on the trips per day and durations, construction of Phase 2 would increase the volume by approximately 42 roundtrip truck trips per day. This increase in ADT would represent a minimal increase in vehicle traffic in the regional transportation network. In addition, this small increase would not be expected to affect the current LOS on Highways 70 or 20. Therefore, this increase in regional traffic would not be considered significant.

The staging areas would primarily be accessed from Bizz Johnson Drive. The staging areas would provide parking for construction workers and delivery of supplies. No construction-related vehicles would be parked along regional roadways or nearby residential areas. As a result, there would be no effects on parking supply or availability. Access to staging areas during the closure of Bizz Johnson Drive would be: (1) Highway 70/B Street to 14<sup>th</sup> Street to Bizz Johnson Drive.

The haul route proposed for all material and equipment transportation would be Highway 20 to 3<sup>rd</sup> Street to F Street to Bizz Johnson Drive to the waterside toe or the levee crown. The haul route is depicted on Plate 4.

Construction of the proposed action would require Bizz Johnson Drive to be temporarily closed at the south entrance and a temporary road shift near the 5<sup>th</sup> Street Bridge, which would require the Class I bikeway adjacent to the road shift, to be closed off for the duration of construction. The pedestrian route to and on the 5<sup>th</sup> Street Bridge between Marysville and Yuba City would stay open during construction. However, the pedestrian access point from Riverfront Park to the 5<sup>th</sup> Street Bridge would be closed to the public for the duration of construction. South access to Riverfront Park would be temporarily rerouted to the 14<sup>th</sup> Street entrance and bicycle traffic would be rerouted to roads within the City. This could disrupt the traffic flow on these local roadways and possibly pose a safety hazard to other motorists, pedestrians, and bicyclists on and along these roadways, particularly when local schools are in session.

*Phase 3.* Phase 3 construction would have temporary impacts on Highway 20/Browns Valley Road, Simpson Lane/Ramirez Street, and Levee Road for access onto the levee. An estimated 20 to 30 workers would be onsite each day during construction. These workers would access the area via regional and local roadways and park their vehicles at one of the staging areas. Based on the trips per day and durations, construction of Phase 3 would increase the volume by approximately 33 roundtrip truck trips per day. This increase in ADT would represent a minimal increase in vehicle traffic in the regional transportation network. In addition, this small increase would not be expected to affect

the current LOS on Highways 70 or 20. Therefore, this increase in regional traffic would not be considered significant.

There are several staging areas located on the waterside toe of the levee that do not directly impact any roadways. The staging areas would be accessed via the levee crown and/or the waterside toe. The staging areas would provide parking for construction workers and delivery of supplies. No construction-related vehicles would be parked along nearby residential areas. As a result, there would be no effects on parking supply or availability.

There are three potential haul routes proposed: (1) Ramirez Street/Simpson Lane to Levee Road (crown of levee) for the southern slurry wall, (2) Highway 20 to Levee Road for the northern slurry wall, and (3) Levee Road between slurry wall construction sites and staging. The waterside toe of the levee would be used for access for duration of the entire phase. Construction of temporary access ramps may be necessary for equipment access from the landside slope to the crown of the levee. The haul routes are depicted on Plate 4.

Construction of the proposed action would require a localized lane shift of Highway 20 on the landside toe of 12 to 40 feet for the equipment working area and rerouting Highway 20 at its intersection with Levee Road or closing one lane at a time for approximately 7 to 14 working days, depending on the method of construction. This would be accomplished by constructing a temporary access ramp to connect with N. Levee Road and bypass the intersection of the levee crown and Highway 20. This could disrupt the traffic flow on these local roadways and possibly pose a safety hazard to other motorists, pedestrians, and bicyclist on and along these roadways.

*Phase 4.* Construction of Phase 4 would have temporary impacts on Ellis Lake Drive and the Binney Junction railroad tracks for access onto the levee and staging. Coordination between the Corps and Union Pacific Railroad would need to occur to gain access to the entire site. A temporary access ramp for equipment and workers would need to be installed to facilitate access over the railroad tracks. This could disrupt the traffic flow on Ellis Lake Drive and railway flow on the tracks and possibly pose a safety hazard to other motorists, pedestrians, and bicyclists on and along this roadway, particularly when local schools are in session.

An estimated 10 to 20 workers would be onsite each day during construction. These workers would access the area via regional and local roadways, and park their vehicles at the staging area. Based on the trips per day and durations, construction of the proposed action would increase the volume by approximately 15 roundtrip truck trips per day. This increase in ADT would represent a minimal increase in vehicle traffic in the regional transportation network. In addition, this small increase would not be expected to affect the current LOS on Highways 70 or 20. Therefore, this increase in regional traffic would not be considered significant

The staging areas would provide parking for construction workers and delivery of supplies. No construction related vehicles would be parked along regional roadways or nearby residential areas. As a result, there would be no effects on parking supply or availability. Access to staging areas and the haul route would be: (1) Highway 70/B Street to 14<sup>th</sup> Street to Ellis Lake Drive, and (2) Highway 70 to the crown of the levee in the north, near the Catholic Cemetery. The haul routes are depicted on Plate 4.

### **Mitigation**

The mitigation presented below is consistent with previous mitigation that has been developed and approved for the 1998 EIS/EIR. The contractor would coordinate all road closures and mitigation with the City of Marysville, CalTrans and other responsible agencies. The following measures would be implemented to reduce the adverse affects on traffic and circulation:

- Construction zones along residential roadways would be posted to notify approaching motorists of trucks entering and exiting roadside construction sites and to reduce speeds through the construction zone.
- Before and during construction, signs would be placed at construction areas to notify users of ongoing construction and limits of use.
- Before and during construction, electronic signs would be posted for rerouted routes for motorists and bicyclist.
- Access would be provided for emergency vehicles at all times.
- All speed limits, traffic laws, and transportation regulations would be obeyed during construction.
- If there are trucks or equipment needing time to maneuver in residential areas or into or out of construction sites, flaggers would be stationed to slow or stop approaching vehicles to avoid conflicts with construction vehicles or equipment.
- On-street parking for construction workers would be prohibited.
- Off-street parking would be identified and provided to the construction workers and their vehicles and trucks. If possible, parking would be close enough to walk to the site.

Although there would be an increase in traffic in the project area during construction, this increase would be short-term and would be reduced to a less-than-significant level with implementation of these measures.

### 3.3.7 Recreation

#### Existing Conditions

The city of Marysville has approximately 266 acres of neighborhood and community parks and recreation facilities that are accessible to the public (Plate 6; City of Marysville 2009). Parks are classified into three categories:

- **Community Parks** - large parks that are designed for organized activities, sports, and large group functions, such as meetings and picnics. They are well equipped to deal with both local groups and other regional groups that draw people from outside of Marysville, such as the Yuba Sutter Youth Soccer League.
- **Neighborhood Parks** - cater to the residents of those neighborhoods and provide an area for outdoor activities. Most of these parks have play equipment for children; large, open play areas; and benches or picnic tables.
- **Passive Parks** - green spaces that are simply small landscaped parcels of city-owned property.

There are four community parks within Marysville. Ellis Lake, East Lake, and Bryant Field are inside the ring levee, and the Riverfront Park Complex lies outside the ring levee, adjacent to the Feather River. Riverfront Park is approximately 193 acres and includes a golf driving range, an OHV motocross course, soccer fields used by the Yuba Sutter Youth Soccer League, a nature area, a pavilion, picnic areas, a boat ramp, softball fields, bike paths, and swimming and beach facilities.

There are eight neighborhood parks within Marysville: Gavin Park, Miner Park, Motor Park, Stephen J. Field (Circle) Park, Triplett Park, Veterans Park, Yuba Park, and Basin Park. All parks are within the ring levee and offer benches and picnic areas.

There are three passive parks: 3<sup>rd</sup> and D Streets Mini-Park located in historic downtown Marysville; Plaza Park, located near the Bok Kai Temple; and Washington Square, located at 10<sup>th</sup> and E streets.

Within the city limits, including the levee crown, there are approximately sixteen miles of commuter and recreational bikeways. The primary function of the levee crown is for maintenance vehicles but due to its proximity to residences, pedestrians, bicyclists and equestrians use the crown of the levee for recreational purposes. There are approximately ten access points onto the levee crown from neighborhoods and surrounding parks and over seven miles of paved road for jogging, walking, and bicycling (See Plate 7). The seven access points onto the levee are:

- Highway 20 and Levee Road
- Cheim Blvd and Olson Court (stairwell)
- East 26<sup>th</sup> Street at Jack Slough Road and the levee crown
- Sampson Lane and the levee crown
- 24<sup>th</sup> Street and old railroad grade (stairwell)
- 14<sup>th</sup> Street at Bizz Johnson Drive and the levee crown
- 5<sup>th</sup> Street Bridge and Bizz Johnson Drive
- Bizz Johnson Drive at sewer treatment plant and the levee crown
- D Street at the Bok Kai Temple (stairwell)
- 2<sup>nd</sup> Street and the levee crown
- Simpson Lane at Ramirez Street and Levee Road

In addition to parks and other recreation facilities, recreation in Marysville includes annual events. The annual events can be weekend or week-long events that occur once a year. Some of the annual events in Marysville include:

- Bok Kai Festival (March)
- Marysville Stampede in Riverfront Park (May)
- Juneteenth Celebration in Yuba Park (June)
- Antique Street Fair in Historic Downtown (June)
- Marysville Peach Festival in Historic Downtown Marysville (July)
- Youth Fishing Derby at Ellis Lake (September)
- Chinese Moon Festival in the Historic China Town (September)
- Yuba-Sutter Veterans Day Parade in downtown (November)
- Marysville Christmas Parade in Downtown (December) (Yuba-Sutter Tourism 2009)

## **Environmental Effects**

### Significance Criteria

Effects on recreational resources are considered significant if construction would result in any of the following:

- Eliminate or severely restrict access to recreational facilities and resources.
- Result in substantial long-term disruption of use of an existing recreation facility.
- Substantially diminish the quality of the recreation experience.

### Alternative 1 (No Action)

Under the no-action alternative, the Corps would not participate in constructing the MRL improvements. The parks, bikeways, and levee roads would remain open, and there would be no changes to the project area.

### Alternative 2 (Proposed Action)



*Phase 1.* Construction of the levee in Phase 1 would have short-term effects on recreational use on the levee crown. The road on the top of the levee would be closed to public use during the construction period, which would occur between August and October 2010 and resume in July or August 2011. An alternate route through the adjacent neighborhoods would be identified. When the construction is completed the paved road on top of the levee crown would be restored to its preconstruction condition.

The following pedestrian access points would be fenced off and closed during construction:

- East 26<sup>th</sup> Street at Jack Slough Road and the levee crown
- 24<sup>th</sup> Street and old railroad grade (stairwell)
- Sampson Lane and the levee crown

There would be three staging areas for Phase 1 construction, approximately two acres of which would be adjacent to the Marysville High School sports fields. This staging area would be used primarily for parking and would not have any direct effects on the sports fields. There are no community, residential, or passive parks in the construction area, therefore there would not be any effects to public parks.

*Phase 2.* Construction of the levee in Phase 2 would have short-term effects on recreational use on the levee crown. The road on the top of the levee would be closed to public use during the construction period, which would occur between June and October 2012. An alternate route through the adjacent neighborhoods would be identified. When the construction is completed the paved road on top of the levee crown would be restored to its preconstruction condition.

The following pedestrian access points would be fenced off and closed during construction:

- 14<sup>th</sup> Street at Bizz Johnson Drive and the levee crown
- 5<sup>th</sup> Street Bridge and Bizz Johnson Drive
- Bizz Johnson Drive at sewer treatment plant and the levee crown
- D Street at the Bok Kai Temple (stairwell)
- 2<sup>nd</sup> Street and the levee crown
- Simpson Lane at Ramirez Street and Levee Road

There would be two staging areas in Phase 2 construction, approximately ten acres of which would be in Riverfront Park. The staging areas would be used for parking, deliveries, and storage of equipment, materials, and topsoil. All staging areas would be closed off to the public during the construction period and would be restored to their previous use after levee improvements are constructed. The staging areas affected would include:

- Two softball fields
- BMX track
- Lion's Grove day use area
- Parking lot for the boat ramp
- Bike and pedestrian pathway along Bizz Johnson Drive (approx. 0.5 miles)
- Southern entrance/exit into Riverfront Park

Use of these staging areas would have short-term effects on some of the recreational use in Riverfront Park during the duration of construction activities, from approximately June 2012 to October 2012. All of the areas mentioned above would be closed off during construction except for the parking area for the boat ramp. Only half of the parking lot and one entrance/exit would be used for construction purposes, leaving the other half of the parking lot and an entrance/exit to be accessed by the public. Construction vehicles would be present in the staging areas and Bizz Johnson Drive would be used as an access and haul route resulting in increased traffic along the entry routes used by recreationalists. For alternate bike and pedestrian routes see Plate 7.

*Phase 3.* Construction of the levee in Phase 3 would have short-term effects on recreational use on the levee crown. The road on the top of the levee would be closed to public use during the construction period, which would occur between June and October 2013. An alternate route through the adjacent neighborhoods would be identified. When the construction is completed the paved road on top of the levee crown would be restored to its preconstruction condition.

The following pedestrian access points would be fenced off and closed during construction:

- Simpson Lane at Ramirez Street and Levee Road
- East 26<sup>th</sup> Street at Jack Slough Road and the levee crown
- Cheim Blvd and Olson Court (stairwell)

There would be two staging areas for Phase 3 construction on the waterside toe of the levee. The staging and construction areas are not adjacent to any community, residential, or passive parks, therefore there wouldn't be any affects to public parks in Phase 3. The southern end of Phase 3, at Simpson Lane and Levee Road, construction would occur approximately four hundred feet from Yuba Park. This could have short-term impacts on the Juneteenth celebration due to traffic and noise from construction and construction vehicles

*Phase 4.* A stability berm would be constructed on the landside toe of the levee. The staging and access areas would be on the landside toe of the levee, therefore the levee road and recreation areas would not be directly impacted. The levee crown in the Phase 4 area may be closed off to pedestrians and bicyclists for a few days during construction due to safety concerns and would have short-term effects on recreational use on the levee crown. The construction and staging areas would not have any effects on

community, residential, or passive parks in the construction area, therefore there would not be any effects to public parks.

### **Mitigation**

The following measures would be implemented to reduce the short term effects on recreation:

- Prior to construction, public outreach would be conducted through mailings, posting signs, coordination with interested groups, and meetings to provide information regarding changes to recreation use and access.
- Prior to construction, coordination with local bike groups and alternative bike routes (Plate 7) would be established.
- Before and during construction, warning and restriction signs would be placed at construction areas and levee access points to notify users of ongoing construction and limits of use.
- Before and during construction, electronic signs would be posted for alternative routes for pedestrians, bicyclists and vehicles (Plate 7).
- If there are trucks or equipment needing time to maneuver or access construction areas, flaggers would be stationed to slow or stop approaching vehicles, bicyclists, and pedestrians to avoid conflicts with construction vehicles or equipments and to maintain public safety.

Although there would be short-term disruptions to recreation in the project area during construction, the disruptions would be reduced to a less-than-significant level with implementation of the mitigation measures.

### **3.3.8 Noise**

This section evaluates the effects of the proposed alternatives on the noise level in the project area. The effects of vibration on buildings are also considered.

#### **Existing Conditions**

Sound is energy that is transmitted through the air as the result of a disturbance or vibration, which may evoke an auditory sensation. Noise is generally defined as sound that is loud, unpleasant, unexpected, or disagreeable.

Sound is characterized by various parameters that include the rate of oscillation of sound waves (frequency, or pitch), the speed of propagation, and the pressure level or energy content (amplitude). In particular, the sound pressure level is the most common descriptor used to characterize the loudness of an ambient sound level. Because of the

ability of the human ear to detect a wide range of sound-pressure fluctuations, sound-pressure levels are expressed in logarithmic units called decibels (dB). Since the human ear is not equally sensitive to sound at all frequencies, a special frequency-dependent rating scale has been devised to relate noise to human sensitivity. The A-weighted decibel scale (dBA) provides this compensation by discriminating against frequencies in a manner approximating the sensitivity of the human ear.

Typical sounds range from 40 dBA (very quiet) to 100 dBA (very loud). Conversation is roughly 60 dBA at three to five feet. As background noise levels exceed 60 dBA, speech intelligibility becomes increasingly difficult. Noise becomes physically discomforting at 110 dBA. In general, human sound perception is such that a change in sound level of 3 dB is just noticeable, a change of 5 dB is clearly noticeable, and a change of 10 dB is perceived as doubling or halving the sound level.

Several rating scales have been developed to analyze the adverse effect of community noise on people. Development of these scales has considered that the potential effect of noise on people largely depends on the total acoustical energy content of the noise, as well as the time of day when the noise occurs. The selection of a proper noise descriptor for a specific source depends on the spatial and temporal distribution, duration, and fluctuation of the noise. The noise descriptors most often used to describe traffic, community, and environmental noise are defined below (Caltrans 2008):

- **$L_{eq}$** : the equivalent energy noise level, is the average acoustic energy content of noise during the time it lasts. Thus, the  $L_{eq}$  of a time-varying noise and that of a steady noise are the same if they deliver the same acoustic energy to the ear during exposure, no matter what time of the day of night they occur.
- **$L_{dn}$** : the day-night average noise level, is a 24-hour average  $L_{eq}$ , with a 10-dBA "penalty" added to noise during the hours of 10:00 p.m. to 7:00 a.m. to account for the greater noise sensitivity of people at night.
- **$L_{max}$** : the maximum instantaneous noise level during a specific period of time. The  $L_{max}$  may also be referred to as the "peak (noise) level."
- **CNEL** (community noise equivalent level): A noise level similar to the  $L_{dn}$  described above, but with an additional 4.77-dBA "penalty" for the noise-sensitive hours between 7 p.m. and 10 p.m., which are typically reserved for relaxation, conversation, reading, and television. When the same 24-hour noise data are used, the CNEL value is typically about 0.5 dBA higher than the  $L_{dn}$  value.

### Regulatory Setting

Local regulation of noise involves implementation of general plan policies and noise ordinance standards. Local general plans identify general principles intended to guide and influence development plans. Local noise ordinances typically set forth

standards related to construction activities, nuisance-type noise sources, and industrial property-line noise levels. Noise in the project area is regulated by the Yuba County General Plan Noise Element and Yuba County noise ordinance (Yuba County 2008).

The existing Yuba County General Plan Noise Element was adopted in 1980 and contains objectives for acceptable noise exposure for several land use designations. The recommended noise level criteria are summarized in Table 14. These designations are established for land use planning purposes and are intended to apply to long-term exposure to noise.

Yuba County has adopted a noise ordinance, codified as Chapter 8.20 of the Yuba County Ordinance Code, to protect the citizens of Yuba County from unnecessary, excessive, and annoying noise and vibration and maintain quiet in areas that exhibit low noise levels. The maximum permissible noise levels for different land uses are shown in Table 15 below. The noise ordinance also states that where the ambient noise level is less than designated in this listing, the governing permissible noise level is the respective maximum noise level shown. Furthermore, the noise ordinance also states that it is unlawful for construction or repair work that causes discomfort or annoyance to occur within a residential zone between the hours of 10:00 p.m. and 7:00 a.m. without a permit.

**Table 14. Recommended Ambient Allowable Noise Level Objectives.**

Land Use	7 a.m. to 10 p.m. (dBA)	10 p.m. to 7 a.m. (dBA)
Low Density Residential	50	50
Multi-Family Residential	55	50
Schools	45	45
Retail/Commercial	60	55
Passive Recreation Areas	45	45
Active Recreation Areas	70	70
Hospitals/Mental Facilities	45	40
Agriculture	50	50
Neighborhood Commercial	55	55
Professional Office	55	55
Light Manufacturing	70	65
Heavy Manufacturing	75	70

Source: Yuba County General Plan Update 2008

**Table 15. Yuba County Noise Regulations.**

<b>Zone</b>	<b>Time Period</b>	<b>Ambient Level</b>	<b>Maximum Permissible Noise Levels (dBA)</b>
Single-family residential	10 p.m. to 7 a.m.	45	55
	7 p.m. to 10 p.m.	50	60
	7 a.m. to 7 p.m.	55	65
Multi-family residential	10 p.m. to 7 a.m.	50	60
	7 a.m. to 10 p.m.	55	65
Commercial-BP	10 p.m. to 7 a.m.	55	65
Commercial	7 a.m. to 10 p.m.	60	70
M1 (General industrial)	Any time	65	75
M2 (Extractive industrial)	Any time	70	80

Source: Yuba County 2008

Vibration

Construction equipment can create seismic waves that radiate along the surface of the earth and downward into the earth. Surface waves can be felt as ground vibration. Ground vibration can result in effects ranging from annoyance to people to damage of structures. Varying geology and distance result in different vibration levels containing different frequencies and displacements. In all cases, vibration amplitudes decrease with increasing distance from the vibration source.

Potential annoyance and physical damage to buildings from vibration are the primary issues associated with groundborne vibration. Table 16 shows the human response to continuous vibration (Whiffen 1971). Table 17 shows damage potential thresholds for vibration generated by construction activities (AASHTO 1990).

**Table 16. Human Response to Continuous Vibration From Traffic.**

<b>PPV (in/sec)</b>	<b>Human Response</b>
0.4 – 0.6	Unpleasant
0.2	Annoying
0.1	Begins to annoy
0.08	Readily perceptible
0.006 – 0.019	Threshold of perception

PPV = Peak Particle Velocity

Source: Whiffen 1971

**Table 17. Maximum Vibration Levels for Preventing Damage.**

Type of Situation	Limiting Velocity (in/sec)
Historic sites or other critical locations	0.1
Residential buildings with plastered walls	0.2 – 0.3
Residential buildings in good repair with gypsum board walls	0.4 – 0.5
Engineered structures without plaster	1 – 1.5

Source: AASHTO 1990

### Existing Noise Conditions

Most of Yuba County is rural in nature. Areas of the county that are not urbanized are relatively quiet. Areas of the county that are more urbanized are subjected to higher noise levels due to roadway traffic, industrial activities, and other human activities. Within the county, major sources of noise include roadway traffic on state routes, major arterials, and other roadways; railroad noise; aircraft operations at Beale Air Force Base and Yuba and Sutter County Airports; and fixed noise sources from industrial, commercial, mining, and farming activities. People who live or work within the influence of these facilities may experience noise levels which could be considered annoying. Table 18 summarizes typical ambient noise levels based on population density.

**Table 18. Population Density and Associated Ambient Noise Levels.**

	dBA, L <sub>dn</sub>
<b>Rural</b>	40–50
<b>Suburban</b>	
Quiet suburban residential or small town	45–50
Normal suburban residential	50–55
<b>Urban</b>	
Normal urban residential	60
Noisy urban residential	65
Very noisy urban residential	70
<b>Downtown, major metropolis</b>	75–80
<b>Under flight path at major airport, 0.5 to 1 mile from runway</b>	78–85
<b>Adjoining freeway or near a major airport</b>	80–90

Sources: Cowan 1984; Hoover and Keith 1996.

Vehicle traffic is the primary noise source in Marysville. Traffic on the roadways includes agricultural equipment; truck traffic from food processing plants, industrial sites, and logging; recreational vehicles; and rural vehicle traffic, including commuters traveling to places of employment in the Sacramento region. Additional sources of noise in the project area include pets, boats, agricultural operations, and occasional train pass-bys and/or aircraft flights overhead.

Noise-sensitive land uses include residences, motels and hotels, schools, libraries, churches, hospitals, nursing homes, and other similar uses where noise can adversely affect use of the land. Noise-sensitive land uses and receptors in the project area are primarily residential uses, generally 50 to 100 feet from the project area. However, in some cases, residences are as close as 15 feet from potential project construction activities. Residential uses also occur along the haul routes. See Section 2.3.2 for haul route information

## **Environmental Effects**

### Significance Criteria

Adverse effects of noise are considered significant if an alternative would result in any of the following:

- Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.
- Substantial short-term or periodic increase in ambient noise levels in the project vicinity above existing levels without the project.
- Substantial long-term increase in ambient noise levels in the project vicinity above levels without the project.
- Vibration exceeding 0.2 in/sec within 75 feet of existing buildings.

### Alternative 1 (No Action)

Under the no action alternative, the Corps would not construct the MRL improvements. The types of noise sources and sensitive receptors would be the same as described for the existing conditions.

### Alternative 2 (Proposed Action)

Construction activity noise levels within the project area would fluctuate depending on the particular type, number, and duration of uses of various pieces of construction equipment. Construction-related material haul trips would raise ambient noise levels along haul routes, depending on the number of haul trips made and types of vehicles used. In addition, certain types of construction equipment generate impulsive noises (such as pile driving). Table 19 shows typical noise levels during different construction stages. Table 20 shows typical noise levels produced by various types of construction equipment.



**Table 19. Typical Construction Noise Levels.**

<b>Construction Phase</b>	<b>Noise Level (dBA, Leq)<sup>1</sup></b>
Ground Clearing	84
Excavation	89
Foundations	78
Erection	85
Finishing	89

<sup>1</sup>Average noise levels correspond to a distance of 50 feet from the noisiest piece of equipment associated with a given phase of construction and 200 feet from the rest of the equipment associated with that phase. Source: USEPA, 1971

Based on their distance from the project site, sensitive receptors in the project area are anticipated to experience noise levels similar to those described in Tables 19 and 20. Construction noise at these levels would be substantially greater than existing noise levels at nearby sensitive receptor location. Construction activities associated with the project would be temporary in nature and related noise impacts would be short-term. However, since construction activities could substantially increase ambient noise levels at noise-sensitive locations, especially if they occurred during nighttime hours, noise from construction would be potentially significant without mitigation.

**Table 20. Typical Noise Levels from Construction Equipment.**

<b>Construction Equipment</b>	<b>Noise Level (dBA, Leq at 50 feet)</b>
Dump Truck	88
Air Compressor	81
Concrete Mixer (Truck)	85
Grader	85
Scraper	89
Jack Hammer	88
Bulldozer	85
Paver	89
Generator	81
Pile Driver (impact)	101
Backhoe	80

Source: Cowan 1984, Federal Transit Administration 1995

Construction activities associated with all phases of the project would result in short-term increases in ambient noise. Sensitive receptors that could be affected by this increase include residents, wildlife, recreationists, local businesses, and students. Construction of the project would occur between the hours of 7 a.m. to 7 p.m., up to seven days a week. The noise associated with the construction activities would typically fall within Yuba County's construction exemption for noise, limited to the hours described above (Yuba County Ordinance Code, §8.20.310). During that time, residents, businesses, and people using the park facilities would be exposed to increases in noise. Because construction would be short-term and construction activities would be limited to the hours of 7 a.m. to 7 p.m., noise is not likely to be a significant effect.

Construction activities associated with the project may result in some minor amount of ground vibration. Vibration from construction activity is typically below the threshold perception when the activity is more than about 50 feet from the receptor. The closest residents in all four phases of the project are within 50 feet of construction activities. Noise from vibrations due to these activities would be short term and would end when construction is complete; therefore no significant long-term effects to residences, wildlife, recreationists, or students near the project area are expected.

There is a potential that vibrations associated with construction activities could cause damage to structures and/or personal property, adjacent to the project area. However, the slurry wall system would be used where buildings are located furthest from the levee operation or are less susceptible to vibration. This project would use the slurry wall system in the newer developed residential areas. The Corps has used this system in areas where homes are within twenty feet of the levee toe and no structural problems from construction-related vibrations were reported (Corps 2009c).

In locations where secant-pile walls are proposed for construction, structural impacts from vibrations are not anticipated. This structural wall system is preferred where tunnels and unknown objects within the levee from past construction may reside. An incidental benefit of this wall system is that the construction method reduces vibration, which could otherwise damage historical buildings in the area, such as the Bok Kai Temple (Corps 2009c). Therefore, no significant effects to structures near construction activities are expected.

*Phase 1.* Phase 1 construction and staging areas are adjacent to Marysville High School, which is considered a sensitive receptor. Construction is expected to start in the summer months (July or August) and continue into the school year (construction ending in October). Construction would be coordinated with the Marysville Joint Unified School District and with the school in order to determine the extent of the effect that construction noise would have on the school.

*Phase 2.* Phase 2 construction and staging areas are adjacent to a residential neighborhood, local businesses, and Riverfront Regional Park. There would be short term increases in noise to these receptors during the construction period. The Bok Kai Temple is located at the landside toe of the levee in Phase 2. Additional information on vibration effects to the Bok Kai Temple can be found in Section 3.3.9, Cultural Resources.

*Phase 3.* Phase 3 contains no additional sensitive receptors aside from the residents, recreationists, wildlife, businesses, and students discussed above. Therefore, there would likely be short term increases in noise to these receptors.

*Phase 4.* Phase 4 construction areas are adjacent to North Marysville Continuation High School and Marysville Youth and Civic Center, which are considered sensitive receptors. Construction is expected to start in the summer months (June to August) and continue into the school year (construction ending in October). Construction

would be coordinated with the Marysville Joint Unified School District, the school, and the Youth and Civic Center in order to determine the extent of the effect that construction noise would have on the school and Center.

### **Mitigation**

The following mitigation measures would be implemented to reduce the adverse effects on noise as much as possible:

- Construction activities would be limited to the hours of 7:00 a.m. and 7:00 p.m., up to seven days a week in accordance with the Yuba County Noise Ordinance exemptions for construction (Yuba County Ordinance Code, §8.20.310).
- Construction equipment noise would be minimized during project construction by muffling and shielding intakes and exhaust on construction equipment (per the manufacturers' specifications) and by shrouding or shielding impact tools.
- All equipment, haul trucks, and worker vehicles would be turned off when not in use for more than 30 minutes.
- Prior to construction of each Phase, the city or county would provide written notification to potentially affected residents, workers, and the general public identifying the type, duration, and frequency of construction activities. Notification materials would also identify a mechanism for residents to register complaints with the city or county if construction noise levels are overly intrusive or construction occurs outside the required hours. The city or county would take corrective action.
- Use of noise-reduction devices on construction equipment would reduce noise by an average of 5 to 10 dBA at 50 feet as shown in Table 20.

To help reduce any vibration-related impacts to structures and sensitive receptors, the following BMPs would be used:

- Conduct pre-construction surveys for potential buildings and structures that could be affected by vibrations.
- Reduce vehicle and truck speeds to 10 miles per hour.

With the implementation of the above listed mitigation measures, any potential effects from noise and vibration would be reduced to less than significant.

### 3.3.9 Cultural Resources

The term cultural resources is broadly defined as the buildings, structures, objects, sites, districts, and archeological resources associated with historic or prehistoric human activity. These cultural resources are listed in, or eligible for listing in, the National Register of Historic Places (NRHP) and are referred to as “historic properties” when they have been determined eligible for listing or are listed in the NRHP. Such properties may be significant for their historic, architectural, scientific, or other cultural values and may be of national, state, or local significance.

Cultural resources are representative of broad patterns, themes, events and people in prehistory and history. For the purposes of this project, prehistory includes the Native groups that inhabited the project area before contact with the Spanish and later Europeans and white explorers; history includes the broader scope of exploration of northern California and the people and events that brought settlement to the Marysville area.

#### Prehistory

Centuries before modern influences invaded the area around the Yuba and Feather Rivers the Valley Nisenan inhabited the area. The Nisenan were the dominant Native American group between modern Sacramento and Marysville. The Nisenan have ethnographic origins in the Maidu people and their homeland in the northern Sierra Nevada.

The Nisenan were a southern linguistic group of the Maidu people, sometimes referred to as the “Southern Maidu.” The name “Nisenan” was a self-designation by the native groups occupying the Yuba and American River drainages (Wilson and Towne 1978). Along with the Maidu and Konkow, the Nisenan formed a subgroup of the California Penutian linguistic family. The Nisenan covered a significant portion of the Central Valley and reached into the Sierra Nevada.

The Nisenan often inhabited areas near rivers; some major areas of significance included sites on the American, Sacramento, Bear, Feather, and Yuba Rivers. The basic political unit was a village community or tribelet with one primary village and a few satellite villages under one head authority. The Nisenan mostly settled in permanent or winter settlements and followed a yearly gathering cycle that led them away from the lowlands and into the hill country each summer. During the annual gathering cycle, the Nisenan harvested acorns, nutmeg, pine nuts, buckeyes, and sunflower seeds and often stored these for long periods. Other vegetation such as greens, tule and cattail roots, brodiaea bulbs, manzanita berries, blackberries, and California grapes was harvested and eaten as they ripened. All valley groups, including the Nisenan, fished trout, perch, chub, sucker, hardhead, eel, sturgeon, and Chinook salmon. Fishing methods included hook, net, harpoon, trap, weir, and poison (Moratto 1984).

## History

Early Spanish contact occurred at the southern end of Nisenan territory as the Spanish, notably José Canizares in 1776, explored Miwok land. Although there is no record of the Nisenan removal to the Spanish missions, by the late 1820's, white settlement began to encroach on Nisenan land as American and Hudson's Bay Company trappers began to trap beaver in the Nisenan territory under peaceful occupation. In 1833, a disease, believed to be malaria, swept through the Sacramento Valley and decimated the valley Nisenan. An estimated 75 percent of the native population was killed; as a result, there were very few Nisenan left in the valley to face the settlers and gold miners who came soon after the epidemic.

By January 1850, the discovery of gold in Coloma in 1848 encouraged development in the area, and a town was laid. Mary Murphy Covillaud, wife of Charles Covillaud and Donner party survivor, received the honor of having the new town of Marysville named for her (Hoover, et al. 1990). With the discovery of gold in the Nisenan territory, the remaining natives were killed; their villages were destroyed; and they were persecuted. White settlers and miners called the Nisenan "diggers" and quickly destroyed them as a viable culture (Wilson and Towne 1978).

The location of Marysville made it an ideal center of trade for the northern mines. As the head of navigation on the Feather River, Marysville had the superior location along the river because the distance to the north and east mines was not great. Riverboat cargoes could be readily transported via pack-mule to gold fields farther afield, and as a result, the city of Marysville experienced amazing growth due to its position along the Yuba and Feather Rivers (Hoover, et al. 1990).

Marysville history is intertwined with the history of the Gold Rush. Due to the promise of massive fortune, thousands of people flooded the area starting in 1849. The Chinese came to Marysville at the same time, and their influence in the city's development is still visible in the old town area of Marysville and the Bok Kai Temple at the lower end of D Street. To the Chinese, Marysville was known as Sam Fou, or "the third city," due to its large population, only exceeded by the populations of San Francisco and Sacramento (California Office of Historic Preservation 2002). The earlier Chinese settlers of Marysville emigrated from the Canton Province of the Kwang Tung state of China (Marysville Chinese Community 2002).

As the Chinese came to the Marysville area, they brought along their myths, idols, customs, and religion. In 1854, the Chinese of Marysville erected the Bok Kai Mui Temple to house their gods and worship. After the original temple was destroyed, a new location of worship, the Bok Kai Temple, was built in 1880 about two blocks from the original structure. Since 1974, the Bok Kai Temple has been the focus of a continual restoration project supported by the entire Marysville community (Marysville Chinese Community 2002).

After the mining activities in the Marysville area diminished, the building of the Central Pacific Railroad quickly took over as a major source of Chinese employment. Eventually, both the Southern Pacific and Northern Pacific Railroads ran through the city as supply routes. Before construction of the Central Pacific Railroad began, engineer Theodore Judah suggested that Marysville was an ideal town to connect to the direct Central Pacific line. Although he was overruled, the railroad did eventually connect with Marysville, which further shortened the length of time supplies took to reach the city and therefore increased business (Shouter 2000).

### **Existing Conditions**

The history of the city of Marysville shares many common themes with other northern California towns established during the Gold Rush. Native Americans, the railroad, mining, and the Chinese all had considerable influence in Marysville's history. As a result, the majority of the known resources within the project area are related to these historic themes. For the purposes of this project the archeological area of potential effects (APE) includes an area more expansive than the project area. There are several known historic resources that are partially within the project area and expand to areas outside the project area. Although those portions of the historic resources are not within the project area they must be inventoried and evaluated as being potentially affected by the proposed project.

#### Existing Prehistoric and Historic Sites

Within the APE there are no known existing prehistoric sites. Since the city of Marysville was established in 1850 there has been extensive development in the city and surrounding areas, including the construction of the levees and areas along the river banks.

Within the APE there are four known historic sites. One additional site, Binney Junction, could not be inventoried and evaluated due to issues obtaining rights of entry to the property. Binney Junction will be inventoried and evaluated in advance of construction efforts for Phase 4. Three other potential historic sites (the 5<sup>th</sup> Street Bridge, American Bridge Company Railroad Trestle, and Southern Pacific Railroad Grade) were determined to be outside the APE and would not be affected by the proposed project. The known historic sites within the APE include the Bok Kai Temple, the Marysville Ring Levee, the Western Pacific Railroad Spur, and the Yuba River Sand Company Plant. A short description of each historic site is below.

*Bok Kai Temple.* The Bok Kai Temple is located in Marysville's Chinatown was built in 1880. Located on D Street immediately adjacent to the landside levee slope and toe, the temple is also the focal point of the Bomb Day festival, which is held every year on the second day of the second month of the Chinese lunar year. The Bok Kai Temple is listed as a California Registered Historical Landmark and a State Point of Historic Interest. In addition, it is included in the California Inventory of Historic Resources, is listed in the NRHP and in 2001 the National Trust for Historic Preservation listed the

Bok Kai Temple as one of America's 11 Most Endangered Historic Places. The temple was nominated to the NRHP in 1974 for consideration as a site of significance due to its architectural and religious aspects. The Bok Kai Temple is the only temple in the United States that honors Bok Eye, the Chinese Water God, and is unique for its interior wall paintings and murals, gilded alters, painted statuary, and elaborately embroidered ceremonial banners and lanterns.

The Bok Kai Temple is not within the direct project area of construction, but due to the close proximity of construction and the sensitivity of the historic resource, the temple is considered within the archaeological APE. At this location a secant pile wall would be constructed. A series of 3- to 4-foot diameter holes would be drilled into the earth by a drill rig. These holes may be cased with a steel pipe which can be vibrated or oscillated into the ground at the perimeter of the holes. The boreholes are backfilled with Portland cement concrete using a concrete pump truck. Steel reinforcing may be added to provide additional strength. Due to the close proximity of the temple and the sensitivity of the structure and artwork the temple has undergone specific investigation to determine its ability to withstand vibration and construction effects.

*Marysville Ring Levee.* After the floods of 1875 the MRL was modified from its original 1868 construction to generally the same location and design as is seen today. There have been substantial additions and modifications such as earth fill (1907, 1942 and 1956), dredge tailings (1908), and various raises and reshaping in the 134 years since the levee construction. The levee surrounds the city of Marysville in its entirety and is a standard trapezoidal shaped earthen levee. In some places railroad tracks, berms, roads and other utilities cross or run parallel to the levee. The MRL would undergo a number of different construction methods, including jet grouting, construction of slurry walls, installation of secant pile walls, and construction of berms. Except for the Phase 4 construction where seepage/stability berms would be constructed, upon completion of construction it would not be outwardly visible that construction has occurred at the location. Additionally, the MRL has undergone countless physical modifications in its 134 year history in order to keep the system viable as flood protection for the city and as a result any NRHP eligibility of the levee would not be related to its visual integrity. Due to its significance as a flood protection feature for Marysville and because it has played an important role in the city's history the Marysville Ring Levee has been found eligible for listing in the NRHP.

*Marysville Sand Company Plant.* The remains of the Marysville Sand Company Plant are located on the waterside of the southern portion of the MRL, near 1<sup>st</sup> Street and between B and C Streets in downtown Historic Marysville. The Marysville Sand Company is located on a wide portion of the berm between the ring levee and the Yuba River. The Marysville Sand Company originally began to dredge and process sand from this location in 1915. There were prior sand and gravel dredging operations at this location in the 1880s and 1890s when the Western Pacific Railroad drove much of the sand and gravel business. Sand was dredged from the Yuba River located south of the site location, processed through various methods such as fire kilns to dry it, or directly loaded onto railroad cars from the Western Pacific and Southern Pacific railway lines

located very nearby. The sand was generally used by the railroad companies to help cool the friction that occurred on the railway tracks and as engine sand for steam engines. Sand processing continued at this location well into the 1960s and 1970s and was abandoned some time in the last 30 years (Lamon 2009).

Since abandonment, most of the features that typified a sand processing plant have been removed and very little remains to indicate the original use of the site. In the last decade the concrete walls and foundations have been heavily vandalized and the area has been used for dumping and other illegal activities. At this location the area would be used for staging of equipment and materials and the remaining features of the sand plant would be removed. The Marysville Sand Company Plant has been found not eligible for listing in the NRHP. Although sand processing was an important contributor to the railroad industry in this area it is not a unique activity since several other sand and gravel plants operated nearby. Additionally, most of the original features of the plant have been removed and the integrity of the plant has been heavily compromised.

*Western Pacific Railroad Spur.* As a spur of the Western Pacific Railroad, this length of the railroad was an offshoot of the overall Western Pacific Railroad that operates towards and through Marysville. The Western Pacific Railroad is and continues to be one of the major transportation routes in northern California and has been in operation since the latter half of the 19<sup>th</sup> century. The spur consists of the alignment and built up grade, but is missing all associated tracks and railroad ties. The spur follows a parallel alignment with the levee except at the northern end where the levee bisects the spur line. The spur continues in a northeastern direction past the levee, originally leading to a slaughterhouse and the town of Oroville. At this location the spur would be covered with fill material and a ramp would be constructed to allow access to the levee. Upon completion of the project the fill and ramp would be removed and it would not be outwardly visible that construction has occurred at the location. Although portions of the overall Western Pacific Railroad have been determined to be eligible for inclusion into the NRHP, this spur segment is not eligible individually or as a contributing factor to the overall railroad system.

## **Environmental Effects**

### Significance Criteria

Any adverse effects on cultural resources that are listed or eligible for listing in the NRHP are considered to be significant. Cultural resources listed or eligible for listing in the NRHP are considered “historic properties” and must undergo particular evaluation of effects in order to determine if an alternative is adverse. An alternative would be considered to have a significant adverse effect on historic properties if it diminishes the integrity of the resource’s location, design, setting, materials, workmanship, feeling, or association. Types of effects include:

- Physical destruction, damage, or alteration of all or part of the historic property;



- Isolation of the historic property from or alteration of the character of the historic property's setting when that character contributes to the historic property's qualifications for the NRHP;
- Introduction of visual, audible, or atmospheric elements that are out of the character with the historic property or alter setting;
- Neglect of a historic property, resulting in its deterioration or destruction; and,
- Transfer, lease, or sale of the historic property.

#### Alternative 1 (No Action)

Under the no action alternative, the Corps would not participate in the construction of the MRL improvements. As a result, there would be no adverse effect on existing cultural resources or historic properties in or near the APE.

#### Alternative 2 (Proposed Action)

This alternative would have no adverse effect on existing cultural resources or historic properties that are listed or are eligible for listing in the NRHP. There are four known cultural resources within the APE. Two of the cultural resources, the Marysville Sand Company Plant and the Western Pacific Railroad Spur have been determined not eligible for listing in the NRHP and would not be affected by the project. There are two cultural resources (the Marysville Ring Levee and the Bok Kai Temple) that are considered eligible or are listed in the NRHP.

The Marysville Ring Levee is a cultural resource eligible for listing on the NRHP. The levee is eligible for listing due to its role as a flood protection feature for Marysville and because it has played an important part in the city's history. Construction of the project would not affect those characteristics that make the levee eligible for listing in the NRHP. As a result, there would be no affect to the Marysville Ring Levee and no mitigation would be required.

The Bok Kai Temple is a resource that is listed in a number of local and state historic registers and is listed in the NRHP. The Bok Kai Temple is located near the landside toe of a portion of the Phase 2 project. Project activities in this area would include installation of a secant pile wall to a depth of approximately 70 feet deep constructed below the levee crown centerline. One of the advantages of this type of construction is that it minimizes the level of vibration and possible effects to the Bok Kai Temple, which is considered structurally sensitive.

In order to assess the structural sensitivity of the temple, Corps Structural Engineers completed a visual inspection of the temple on October 14, 2009. They concluded that the Bok Kai Temple appeared to be very sound structurally for its age. The foundation and footings of the overall structure were observed to be well-constructed

brick spread footing, which allowed the weight of the structure to be distributed over a larger footing area, thus reducing the potential for settlement. The footings of the structure appeared robust and additional structural beams were observed in sensitive locations in the temple. Some small cracks were observed in the exterior walls of the building, but conservation work such as removal of the heavy clay tile roof and replacement of two timber columns at the temple's entrance were noted as efforts that have improved the temple's structural stability.

Based on the current level of design, an analysis of the proposed project was initiated by Corps Structural Engineers. The results of the analysis has determined that the installation of the secant pile wall and associated construction activity in the area, such as equipment hauling, would not likely result in vibrations that would have a significant effect on the Bok Kai Temple. In addition to this structural analysis, a Corps Civil Engineer conducted an evaluation of proposed project construction. The construction analysis was based on the structural analysis and applied vibration level equations from the Caltrans *Transportation- and Construction-Induced Vibration Guidance Manual*. A determination was then made on whether the Bok Kai Temple would likely be adversely affected by the proposed construction in Phase 2.

The Caltrans vibration manual provides estimates of the vibration generated by construction equipment, which is specific to the types of equipment used on the site. For the proposed construction, secant pile walls with associated earthwork, these walls are installed using overlapping drilled piles. Of the proposed construction in Phase 2, the largest vibration would be generated by the secant pile walls. The Caltrans vibration manual provides the following equation to determine the vibration level from construction equipment associated with this kind of construction:

$$PPV_{Equipment} = PPV_{Ref}(25/D)^n \text{ (in/sec) (Equation 10)}$$

The Caltrans vibration manual provides a reference value of 0.089 PPV (peak particle velocity) at 25 feet for drilling pile foundations. "D" is the distance from the equipment to the structure receiving the vibration. The analysis from the Corps Civil Engineer used a conservative value of 40 feet for "D" and 1.1 for "n" as recommended by the Caltrans vibration manual. Based on these conservative values and the current level of design, it was determined the value of vibration would be:

$$PPV_{Equipment} = 0.05$$

The Caltrans vibration manual lists the value for the most fragile buildings (including ruins and ancient monuments) as 0.08. It was determined, taking into account the conclusions from Corps Structural Engineers, that the Bok Kai Temple is unlikely to be as weak as those structures, and is more likely to be in the fragile or historic category (e.g. max PPV of 0.1 to 0.25). Therefore, it was concluded that the proposed construction of a drilled secant pile wall would likely produce less vibration than the threshold value for continuous sources for the most conservative case, and as a result, the

Bok Kai Temple is unlikely to be damaged by vibrations due to secant pile wall installation.

However, during the Phase 2 detailed engineering design, and in accordance with stipulations contained in a Memorandum of Agreement (MOA) for the Bok Kai Temple for this undertaking, the Corps will conduct a more extensive analysis of the potential construction affects and monitoring measures that can be implemented to protect the temple and ensure that there are no adverse effects to the resource. To ensure that vibration levels would be kept at a level that would not adversely affect the temple, a variety of precautionary construction methods and seismic monitoring would occur during project construction in accordance with the recommendations of the Corps Structural Observations and Analysis, Corps Civil Engineers, and the MOA.

Recommendations include:

- Pre-design surveys to determine potentially affected structures;
- Pre- and post-construction surveys for visual record;
- Limitation of heavy equipment speeds along the work areas to reduce ground vibrations (e.g. maintain scraper speeds below five miles per hour within 500 feet of the Bok Kai Temple);
- Choice of construction methods that would mitigate vibration effects (e.g. drilled piles instead of driven piles);
- Limitation of vibrations from compacting equipment (e.g. kneading or tamping foot compactors instead of vibrating drum rollers);
- Use of accelerometers, seismometers and inclinometers to monitor structures;
- Visual inspection by trained field personnel and other monitoring equipment used to measure ground motion; and,
- Conduct pre-construction training for contractor employees.

During construction of Phase 2 vibratory equipment would be used within the APE and near the Bok Kai Temple to monitor the vibrations from the construction and equipment. In the event that vibrations reach a level that would possibly result in damage to the temple, construction activities in the area would be reduced. The seismic monitoring and compliance with the stipulations of the MOA would ensure that there would be no adverse effects to the Bok Kai Temple and therefore no mitigation would be required.

## **Mitigation**

The Corps has made determinations of eligibility for all of the cultural resources not previously determined eligible within the APE. There are two existing historic properties, the Bok Kai Temple and the Marysville Ring Levee, within the APE. Neither of these cultural resources would be adversely affected by the proposed project. Construction of the proposed project would have no adverse effects on any historic properties listed in, or eligible for listing in, the National Register of Historic Places and there would be no need for mitigation measures.

However, if archeological deposits are found during project activities, work would be stopped pursuant to 36 CFR 800.13(b), Discoveries without Prior Planning, to determine the significance of the find and, if necessary, complete appropriate discovery procedures.

### **3.3.10 Public Utilities**

#### **Existing Conditions**

Public services in or near the project area includes street cleaning, trash pickup, potable water supply, electricity, telephone, natural gas supply, storm water discharge, and sanitary sewage. These public services are provided by local utilities and Yuba County. Significant public utility facilities in the project area that could be affected by construction of the MRL Improvements vary by phase, but generally include power lines leading to a substation adjacent to the project area, an underground natural gas distribution line, and a 60kV line.

#### **Environmental Effects**

##### Significance Criteria

A project would significantly affect public utilities if it would:

- Disrupt or significantly diminish the quality of the public utilities for an extended period of time, or,
- Damage public utility facilities, pipelines, conduits, or power lines.

##### Alternative 1 (No Action)

Under the no action alternative, the Corps would not participate in the construction of the MRL Improvements. As a result, there would be no adverse effects on public utilities in the project area. There would be no change in type, quality, or availabilities of utility services in the project area.

## Alternative 2 (Proposed Action)

Construction of the MRL Improvements would not disrupt or diminish the quality of any utility services in the project area. Any utilities running on or through the levee may need to be either temporarily or permanently relocated. As detailed design progresses through each phase, determinations would be made on which utilities would be affected in this manner and what efforts would be needed in order to relocate the lines without disrupting service.

During Phase 1, there is a  $\frac{3}{4}$  inch natural gas line running through the levee that would need to be relocated prior to project construction. The design and location of the relocation would be designed and coordinated with PG&E. This effort would be completed prior to the start of construction.

In addition, there is one power pole located in the Phase 1 levee that would be removed prior to construction. The connecting poles on either side of the levee would be replaced with taller poles, allowing the line to span the levee. This would remove the need for the center pole in the levee, which would be permanently removed. This work would be done by PG&E prior to construction.

Currently the existing design for Phases 2 through 4 does not identify any adverse effects to existing utilities. However, if during detailed design any removals or relocations of utility lines are required, coordination with appropriate entities would be undertaken. There would be no disruption of public services resulting from the removal or relocation of any future utility lines.

### **Mitigation**

No public services would be disrupted as a result of construction of the MRL Improvements project. Any relocations of utility lines would be constructed in a manner that would not have an affect on any of the services provided. Since no effects to public utilities are expected, no additional mitigation would be required.

## **4.1 CUMULATIVE AND GROWTH-INDUCING EFFECTS**

### **4.2 Cumulative Effects**

NEPA and CEQA require the consideration of cumulative effects of the proposed project combined with the effects of other projects. NEPA defines a cumulative effect as an effect on the environment that results from the incremental effect of an action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions (CFR 40 Part 1508.7). The CEQA Guidelines define cumulative effects as “two or more individual effects which, when considered together, compound or increase other environmental impacts” (Section 15355).

### **4.3 Geographic Scope**

The geographic area that could be affected by the project alternative varies depending on the type of environmental resources being considered. When the effects of the project alternative are considered in combination with those of other past, present, and future projects to identify cumulative impacts, the other projects that are considered may also vary depending on the type of environmental effects being assessed. The following are the general geographic areas associated with the different resources addressed in the analysis:

- Air Quality: regional (area under the jurisdiction of the FRAQMD, consisting of Yuba and Sutter Counties).
- Land Use and Agriculture: City of Marysville (the city is the local agency with land use authority over a majority of the project area).
- Traffic and Circulation: regional (roadways in the project region where traffic generated by multiple projects might interact on a cumulative basis).
- Cultural Resources: local area (cultural resources sites are stationary and effects are typically limited to the borders of a project site).

### **4.4 Past, Present and Reasonably Foreseeable Future Projects**

This section describes implemented, developed, or planned projects that may result in environmental effects similar to those of the identified alternatives, such that these effects, when combined, constitute cumulative impacts.

#### **4.3.1 Historical Flood Control Efforts**

Early levee construction was conducted primarily by landowners to address local flooding issues and did not consider the hydraulic impacts on other areas or the natural processes of the rivers. The early levees cut off areas of the floodplain and its water storage capacity, causing flood flows to greatly exceed the capacity of channels in many areas. Sediment deposition in river channels from upstream hydraulic gold mining exacerbated the flooding problems by reducing hydraulic conveyance capacities. In the early 1900s, the Federal and state governments began construction of system-wide flood management facilities that included levees, weirs, and bypass channels designed to protect lives and property, aid navigation, and flush sediment remaining from hydraulic mining. These conveyance facilities improved flood protection and navigation and allowed continued agricultural and urban development but constrained the rivers to specific alignments, significantly reducing channel meandering, and further isolating rivers from their historical floodplains (Corps and Reclamation 2002). As agricultural and urban development increased within the floodplain, more communities and properties were at risk of flooding, and system improvements were made periodically to meet local

needs. Major modifications, reconstructions, and upgrades have been implemented by the Corps over the years in response to deficiencies identified during flood events.

Large-scale dam construction began in the 1930's and continued into the 1970's. Major dams include Oroville Dam on the Feather River and New Bullards Bar Dam and Englebright Dam on the Yuba River. These and other dams and reservoirs provide flood control benefits by reducing seasonal high flows so that downstream flood conveyance systems can operate more safely and effectively. They also provide numerous other benefits, such as recreational opportunities and water supply for municipal uses, crop irrigation, and energy generation.

#### **4.3.2 Current and Local Flood Control Efforts**

The Yuba River Basin Flood Risk Management Project, authorized by WRDA 1999 and WRDA 2007, is currently under reevaluation in the Yuba Basin GRR. The authorized project includes components to raise the level of flood protection to the Feather River, Bear River, and the Yuba River.

During the project reevaluation, it was determined that the MRL was considered a separable element and could be constructed while the remainder of the GRR remains under investigation. This determination was made because the design of the MRL has not changed substantially from the 1999 authorized project, basic technical issues regarding the stability of the MRL have been resolved, the MRL is hydraulically separate from the rest of the Yuba GRR, and the MRL is common to all alternatives under consideration in the GRR. The Yuba GRR is expected to be presented to Congress for its reauthorization in 2010.

Future project components would include deepening slurry cutoff walls, berm removal, installation of new slurry cutoff walls, widening berms, adding impervious fill and drain blankets to the levees, relocating slurry cutoff walls from the levee toe to crown, and levee reshaping. The majority of these components have either already been constructed by Reclamation District (RD) 784 in a local early implementation effort, or are expected to be constructed by 2011.

#### **Three Rivers Levee Improvement Authority Four-Phase Program**

The Three Rivers Levee Improvement Authority (TRLIA) began construction of their Four-Phase levee improvement program in the Yuba River Basin in 2004. The program is expected to be completed in 2011. There are several sponsors that are supporting these projects, some of which overlap with the proposed components of the Yuba River Basin GRR. The local sponsors have begun construction on these proposed components as an early implementation effort for the proposed Yuba River Basin Project.

The four phases of the TRLIA Program are as follows:

#### TRLIA Phase 1

- *Yuba River Levee.* Slurry cutoff walls were constructed on the Yuba River levee in 2004.

#### TRLIA Phase 2

- *Yuba River Levee.* Landside seepage berms were constructed along the Yuba River levee in 2005.
- *Olivehurst Detention Basin.* The Olivehurst Detention Basin was constructed in 2005 for additional floodwater storage, and improvements were made to major drain channels in the area. A ring levee was constructed around the Olivehurst Detention in 2006.
- *Western Pacific Interceptor Canal.* Slurry cutoff walls were constructed in the canal levees in 2005, and a ditch in the existing landside levee toe was filled. In 2006, the canal levee crown was raised.
- *Upper Bear River Levee.* The Upper Bear River levee was reconstructed in 2005, and rock slope protection was installed. In 2006, the Upper Bear River levee crown was raised.
- *RD 784 Pump Station No. 6.* In 2006 the existing pump station was removed and a new pump station was installed.

#### TRLIA Phase 3

- *Lower Bear River Levee.* In 2006, a setback levee, associated infrastructure, and habitat restoration was constructed along the Lower Bear River.

#### TRLIA Phase 4

- *Upper Yuba River Levee.* Slurry cutoff walls were constructed in the Upper Yuba River levee in 2006, and a ditch in the existing waterside levee toe was filled.
- *The Feather River Levee Repair Project.* Segments 1 and 3 and the Feather River Levee Repair Project were constructed in 2008. These segments consisted of installation of a slurry cutoff wall, stability berms, waterside blankets, and relief wells along various locations within these segments of the Feather River levee. In 2009, Segment 2 will be constructed, consisting of a setback levee and degradation of the existing levee in segment 2 of the Feather River.



### **4.3.3 Local Development Projects**

#### **Rideout Hospital Expansion**

In September 2009, the EIR was approved by Marysville City Council to expand Rideout Hospital. The expansion would enlarge the current 234,000 square foot hospital to 265,000 square feet. Initial demolition began in 2009, which will require detouring city storm drains underneath G, Fourth, F and Third Streets. Demolition will also include taking down the Witt, I.S. and Hardie buildings on G Street. Construction is expected to continue through 2012 (Appeal-Democrat 2009a).

#### **Washington Square Development**

In September 2009, the EIR was approved by Marysville City Council for the Washington Square Development. The development encompasses 2.4 acres where Highway 20 meets Highway 70, bordered by E Street. The proposed development includes three buildings with 24,000 square feet of retail space for up to five tenants, 130 parking spaces, and approximately 100 trees (Appeal-Democrat 2009b).

#### **Other Potential Local Projects**

The following projects are planned but are not authorized:

*East Linda Specific Plan.* This plan would develop 1,760 acres, of which 1,330 acres would be residential development and 114 acres would be commercial and business/professional development. The specific plan area is bounded by the Linda levee on the north, Erle Road on the south, Yuba College and urban areas of Linda on the west, and Griffith Avenue on the east. Planned land uses include schools, parks, and recreation/floodway easements.

*Olivehurst Specific Plan.* This plan encompasses approximately 55 acres of underdeveloped exclusively commercial-zoned land that is the business center of the community. One of the stated goals of the specific plan is to rezone and redevelop this commercially-zoned land into unique zones of residential, commercial, public, and mixed uses.

### **4.4 Cumulative Effects**

Chapter 3.0 of the EA/IS identifies potential direct environmental effects of the proposed action. These effects are assessed in the following analysis in terms of their potential to combine with similar environmental effects of the projects listed above, resulting in cumulative impacts. The analysis is focused on considering the potential for those impacts identified in Chapter 3.0 to make a considerable contribution to significant adverse cumulative effects.

The extent of the geographic area that may be affected with implementation of the alternatives varies depending on the resource under consideration. Not all projects discussed above would contribute, along with the alternatives, to cumulative environmental effects for each environmental issue area. Therefore, for each discussion below, the past, present, and reasonably foreseeable future projects that are considered are limited to those having potential effects similar to those of Alternative 2 and that could interact with impacts generated by the proposed action.

The MRL Improvements project would not have any significant adverse effects on any of the discussed resources. However, some of the resources would have temporary, short-term effects for the duration of construction. These resources include air quality, agriculture, traffic and circulation, and cultural resources. The potential cumulative effects to these resources, in combination with the above discussed local projects, are discussed below.

#### **4.4.1 Air Quality**

No air district in California has identified a significance threshold for analyzing greenhouse gas emissions generated by a proposed project or methodology for analyzing cumulative effects related to global warming. Although the state of California has identified greenhouse gas goals through the adoption of the California Global Warming Solutions Act of 2006, the effect of greenhouse gas emissions as they relate to global climate change is inherently a cumulative impact issue. While the emissions of one single project would not cause global climate change, greenhouse gas emissions from multiple projects throughout the world could result in a cumulative effect with respect to global climate change.

Within the discussion of concerns related to global warming, carbon dioxide (CO<sub>2</sub>) is now being tracked as one of the contributors to greenhouse gas emissions. For projects that occur in, and around, the Sacramento Valley area, the Sacramento Metropolitan Air Quality Management District (SMAQMD) has emissions models that will calculate several air emissions based on various input criteria (construction phase, duration, type of equipment, project area, etc.). FRAQMD, due to the linear nature of many of the levee repair projects being undertaken by the Corps, has suggested the use of the SMAQMD Road Construction Emissions Model. The outputs of these models address criteria pollutants associated with the NAAQS, as well as those associated with the CAAQS, which are considered to be more stringent than the Federal standards.

In response to the concerns regarding greenhouse gas emissions, the most recent version of the SMAQMD Road Construction Emissions Model now generates an output for CO<sub>2</sub>. The results from the emissions model include CO<sub>2</sub>. It should be noted that although CO<sub>2</sub> emissions can now be calculated, there is no Federal standard, or any State or local threshold, to meet, which makes it difficult to fully analyze under NEPA and CEQA. Also, because the focus on CO<sub>2</sub> emissions is relatively recent, specific mitigation measures, as they relate to construction, are not fully developed. For these reasons, the

BMPs and Mitigation Measures listed in Section 3.3.2, Air Quality Mitigation, would also be employed to minimize CO<sub>2</sub>/greenhouse gas emissions.

The MRL Improvements would combine with the local development projects to have a potential cumulative effect on air quality. It is expected that impacts from the local projects would be similar to the proposed project in that effects would be due primarily to construction. Construction of these projects would increase emissions of criteria pollutants, including VOC, NO<sub>x</sub>, CO, SO<sub>2</sub>, and PM emissions, from construction and transport of materials. Individually these projects would mitigate emissions below significance threshold levels. If these construction projects are implemented concurrently, the combined cumulative effects could be above CEQA thresholds for air quality emissions and the *de minimus* thresholds. If this were the case, without consideration for scheduling and sequence of activities, concurrent construction projects within and adjacent to Marysville could have adverse cumulative air quality impacts, although these impacts would be temporary.

#### **4.4.2 Land Use and Agriculture**

The two local development projects listed above are likely to affect land use in the city of Marysville. The Rideout Hospital expansion would consist of the demolition of three buildings in the city to allow for the hospital to expand its footprint. However, because these buildings are already designated for the city's commercial zone, this would not be a significant change in land use.

The Washington Square development does have the potential to permanently change land use in the city of Marysville. Washington Square is currently designated as primary open space, and the development of the area will change the land use to commercial properties (City of Marysville 2007). The MRL Improvements construction would only have temporary, short-term effects on land use, therefore, it is unlikely that these effects would combine with the construction of the Washington Square development to create a significant effect.

The expansion of Rideout Hospital and the development of Washington Square Park, would have no effects on agriculture in the project area, because both of these development projects are contained within the city of Marysville itself. The land being converted by these projects is not delineated as agricultural area, therefore, these projects will not result in the conversion of any additional agricultural area to other forms of land uses. Since the MRL Improvements would only result in temporary impacts, there would be no cumulative effects to agriculture as a result of the construction of this project.

#### **4.4.3 Traffic and Circulation**

The MRL Improvements would overlap with the local development projects and would likely overlap with the USACE Yuba River Basin GRR projects on the Feather and Yuba Rivers. It is expected that traffic impacts from projects in the City of

Marysville would be similar to the current projects in that impacts would be primarily from the hauling of equipment and material to and from the proposed project sites.

The proposed construction activities would have short-term effects on traffic levels on local and regional roadways, which would temporarily decrease their LOS. The contractor would coordinate with the City of Marysville, Caltrans and other responsible agencies to reduce adverse effects on traffic and circulation. Local development projects would likely cause an increase in long term effects on traffic, whereas the levee projects would not. Based on the trips per day and durations, construction for Alternative 2 would increase the volume by approximately 15 to 42 roundtrip truck trips per day. The estimate was based on a one season construction period. Each of the related projects would be analyzing traffic under NEPA or CEQA, and would be reducing any effects to less than significant.

#### **4.4.4 Cultural Resources**

The MRL Improvements, combined with the two local development projects listed above, would not have an effect on cultural resources in the project area. The two local development projects are not within the specific area of potential effects examined for cultural resources and none of the cultural resources inventoried and evaluated as part of the MRL Improvements are located within the project areas for the local development projects. However, the local development projects would be required to undergo, as part of their separate compliance with NEPA/CEQA, appropriate actions to inventory, record, and evaluate any cultural resources within their designated areas of potential effect. Because any cultural resources affected would be outside of the area of potential effects for the MRL Improvements they would not combine with the actions of the local area projects to create any cumulative effects.

#### **4.5 Growth-Inducing Effects**

The proposed action would not directly remove obstacles to growth, result in population increases, or encourage and facilitate other activities that could significantly affect the environment. Local population growth and development would be consistent with the Land Use Element of the City of Marysville General Plan (1985). The goal of the proposed action alternative is to construct levee improvements in four areas along the Marysville Ring Levee that would meet Corps requirements for levee height and width. The city is completely surrounded by levees, which prohibits it from growing outward. In addition, construction, operation, and maintenance of the improved levee would not result in a substantial increase in the number of permanent workers or employees.

## 5.1 COMPLIANCE WITH ENVIRONMENTAL LAWS AND REGULATIONS

### 5.2 Federal Requirements

**Bald and Golden Eagle Protection Act of 1940, as amended, 16 U.S.C. § 668-668c, et seq. Full Compliance.** This Act prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald eagles, including their parts, nests, or eggs. The Act provides criminal penalties for persons who "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle ... [or any golden eagle], alive or dead, or any part, nest, or egg thereof." The Act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." Preconstruction surveys would be conducted by a qualified Corps biologist. If any eagle nests are sighted in or near the project area, a protective buffer would be established and the area would be avoided until the nests are no longer active.

**Clean Air Act of 1972, as amended, 42 U.S.C. § 7401, et seq. Full Compliance.** Section 3.3.2 of this document discusses the effects of the proposed plan on the local and regional air quality. The analysis shows that expected project-related emissions will fall under the EPA's general conformity *de minimus* thresholds. Therefore, the project is in compliance with the Federal Clean Air Act.

**Clean Water Act of 1972, as amended, 33 U.S.C. § 1251, et seq. Full Compliance.** The proposed project is not expected to have impacts on water quality. Compliance with Clean Water Act Section 404(b)(1) was not required, because there would be no fill or discharge of material into the waters of the United States. Since the project would disturb one or more acres of land and involve possible storm water discharges to surface waters, the contractor would be required to obtain a NPDES permit from the Central Valley Regional Water Quality Control Board. As part of the permit, the contractor would be required to prepare a SWPPP identifying best management practices to be used to avoid or minimize any adverse effects of construction on surface waters.

**Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. § 9601, et seq. Full Compliance.** An HTRW ESA was conducted within and around the project area. The ESA did not identify any known contamination due to HTRW in the survey area and construction activities would not affect potential HTRW sources.

**Federal Endangered Species Act of 1973, as amended, 16 U.S.C. § 1531, et seq. Full Compliance.** A list of threatened and endangered species that may be affected by the project was obtained from the USFWS website on October 1, 2009 (Appendix C). Two Federally-listed species have the potential to be affected by the project: the valley elderberry longhorn beetle and the giant garter snake. The Corps has consulted with USFWS and received a biological opinion on April 12, 2009 concurring with the Corps' determination that the project may affect, but is not likely to adversely affect both species. The biological opinion is included in Appendix E.

The Corps, as the action agency, has made the determination that there would be no effect on any listed species under the jurisdiction of the National Marine Fisheries Service. As a result, no formal consultation was required with NMFS under Section 7 of the Endangered Species Act.

**Executive Order 11988, Floodplain Management.** *Full Compliance.* This order directs all Federal agencies approving or implementing a project to consider the effects that project may have on flood plains and flood risks. This project would not result in development of floodplains.

**Executive Order 11990, Protection of Wetlands.** *Full Compliance.* (Appendix A). This order directs the Corps to provide leadership and take action to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands in implementing civil works. A wetland delineation was conducted by USFWS for the MRL. Wetlands near the project area would be marked and protected by K-rails. The proposed project would not affect wetlands in the area.

**Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations.** *Full Compliance.* The proposed project would not adversely affect any minority or low-income populations. No relocations would be associated with this project. Any minority or low-income populations within the project area would be benefited by the construction of this project as a result of the improved flood protection to the city of Marysville.

**Executive Order 13112, Invasive Species.** *Full Compliance.* This order directs Federal agencies not to authorize, fund, or carry out actions that they believe are likely to cause or promote the introduction or spread of invasive species. To avoid introduction or spread of invasive species, the Corps would ensure that appropriate control measures are implemented during project construction that would comply with applicable State and county invasive species control regulations.

**Farmland Protection Policy Act, 7 U.S.C. § 4201 et seq.** *Full Compliance.* There would be no permanent loss of prime and unique farmlands associated with this project. All effects to farmland are temporary in nature and the landowners would be compensated for their losses. Agricultural production would continue in the area at its current level after the completion of the MRL Improvements.

**Fish and Wildlife Coordination Act of 1958, as amended, 16 U.S.C. § 661, et seq.** *Full Compliance.* The Corps has coordinated with USFWS to determine the effects on vegetation and wildlife in the project area. USFWS has prepared a Coordination Act Report to address these effects. The Corps has considered USFWS's recommendations and implemented the listed measures, as appropriate. The Coordination Act Report is included in Appendix D.

**Magnuson-Stevens Fishery Conservation and Management Act 16 U.S.C. § 1801 et seq. Full Compliance.** This legislation requires that all Federal agencies consult with National Marine Fisheries Service regarding all actions or proposed actions permitted, funded, or undertaken that may adversely affect essential fish habitat. Essential fish habitat is defined as “waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” The Corps has determined the project would have “no effect” on Federal special status fish species and essential fish habitat.

**Migratory Bird Treaty Act of 1936, as amended, 16 U.S.C. § 703 et seq. Full Compliance.** The proposed action would not result in the removal of any suitable nesting habitat. To ensure the project would not affect migratory birds, preconstruction surveys by a biologist would be conducted. If breeding birds are found in the area, a protective buffer would be delineated and USFWS and CDFG would be consulted for further actions.

**National Environmental Policy Act of 1969, as amended, 42 U.S.C. § 4321, et seq. Full Compliance.** This final EA/IS is in full compliance with this act. Comments received during the public review period have been considered and incorporated into this final EA/IS, as appropriate, and a comments and responses appendix has been prepared (Appendix H). The final EA/IS is accompanied by a FONSI.

**National Historic Preservation Act of 1966, as amended, 16 U.S.C. § 470, et seq. Full Compliance.** Section 106 of the National Historic Preservation Act requires Federal agencies to take into account the effects of a proposed undertaking on properties that have been determined to be eligible for listing in, or are listed in, the National Register of Historic Places. The Corps has concluded that there are two historic properties within the APE. Compliance with the stipulations in an MOA that specifies further efforts to analyze the Bok Kai Temple’s stability, and develop a monitoring plan to avoid adverse effects will be agreed, signed and executed between the Corps and the SHPO. The Advisory Council on Historic Preservation and other interested parties will be invited to participate in the execution of the MOA. Proposed precautionary construction methods such as seismic monitoring would ensure that the Bok Kai Temple is not damaged by vibrations during construction, and the Corps has determined that the project as proposed would not affect the characteristics that make the Marysville Ring Levee eligible for listing in the NRHP. Therefore there would be no adverse effects to any historic properties listed in, or eligible for listing in, the National Register of Historic Places. A letter to the SHPO documenting these findings was sent on January 22, 2010. In a letter dated January 27, 2010 the SHPO concurred with the Corps’ findings on condition of the execution of the MOA.

Letters to potentially interested Native Americans were sent on September 21, 2009 asking for their knowledge of locations of archeological sites, or areas of traditional cultural interest or concern. In a letter dated December 15, 2009, the Enterprise Rancheria contacted the Corps and requested information and to meet on the proposed project. A Corps representative contacted Mr. Ren Reynolds, EPA Planner, Site Monitor and Tribal Historic Preservation Officer of the Enterprise Rancheria, in late December

2009 and on February 19, 2010 to propose meeting with tribal representatives and will continue to pursue providing them with the information they have requested in advance of construction.

**Noise Control Act of 1972, 42 U.S.C. § 4901 to 4918.** *Full Compliance.* This act establishes a national policy to promote an environment for all Americans free from noise that jeopardized their health and welfare. Compliance with this act is being addressed through compliance with the Yuba County Noise Ordinance and CEQA. Mitigation measures to minimize potential project effects on sensitive receptors, including restricting hours of construction, have been provided in section 3.3.8.

**Wild and Scenic Rivers Act, 16 U.S.C. § 1271 et seq.** *Full Compliance.* There are no components of the Federal Wild and Scenic River system in the project area.

### 5.3 State of California Requirements

**California Clean Air Act of 1988, California Health and Safety Code § 40910, et seq.** *Full Compliance.* Section 3.3.2 of this document discusses the effects of the proposed plan on the local and regional air quality. The analysis shows that expected short-term project-related emissions will exceed existing local thresholds of the CCAA as administered by the FRAQMD for NOx (ozone). The project is located in a non-attainment area for State ozone and PM10 standards. It is expected that emission reductions from mitigation measures and participating in FRAQMD's off-site mitigation program would reduce emissions to less-than-significant.

**Streambed Alteration Agreement.** *Full Compliance.* The Streambed Alteration Agreement is a permit for any activity that will change the natural state of any lake, river, or stream in California. This permit is regulated and enforced by Region 2 of CDFG. Since the Corps is the Federal lead for the project, the CDFG considers the project to be a Federal project, exempt from this State requirement under Section 1602 regulations.

**California Environmental Quality Act.** *Full Compliance.* The CVFPB, as the non-Federal sponsor and CEQA lead agency, will undertake activities to ensure compliance with the requirements of this act. CEQA requires the full disclosure of the environmental effects, potential mitigation, and environmental compliance of the proposed project. Adoption of this final EA/IS and FONSI by the CVFPB will provide full compliance with the requirements of CEQA.

**California Endangered Species Act.** *Full Compliance.* This act requires the non-Federal agency to consider the potential adverse effects to State-listed species. As a joint NEPA/CEQA document, this EA/IS has considered the potential effects and has provided conservation measures where appropriate. With the implementation of the listed conservation measures, no affects to State-listed species are expected.

**Clean Water Act, Section 401(a)(1).** *Full Compliance.* The Section 401 water quality certification certifies that the proposed activity would not violate state water



quality standards. The SWRCB and the CVRWQCB administer the Section 401 program by prescribing measures necessary to avoid, minimize, or mitigate adverse impacts of proposed project on water quality and ecosystems. There would be no effect to water quality as a result of this project. There would be no discharge of fill material into waters of the United States.

#### **5.4 Local Laws, Programs, and Permit Requirements**

**Feather River Air Quality Management District.** *Full Compliance.* Section 3.3.2 of this document discusses the effects of the proposed plan on the local and regional air quality. The analysis shows that short-term project-related emissions will exceed local thresholds of the CCAA as administered by the FRAQMD for NO<sub>x</sub> (ozone). The project is located in a non-attainment area for State ozone and PM<sub>10</sub> standards. It is expected that emission reductions from mitigation measures and participating in FRAQMD's off-site mitigation program would reduce emissions to less-than-significant.

**Yuba County General Plan.** *Full Compliance.* The project area is located within the jurisdiction of the Yuba County General Plan. The proposed project would comply with all of the relevant local plans.

#### **6.0 COORDINATION AND REVIEW OF EA/IS**

The draft EA/IS was circulated for 30 days to agencies, organizations, and individuals who have an interest in the proposed project. Copies of the draft EA/IS were posted on the USACE website, made available for viewing at local public libraries, and provided by mail upon request. All comments received were considered and incorporated into the final EA/IS, as appropriate (Appendix H). This project has been coordinated with all relevant government resource agencies including USFWS, SHPO, CDFG, and the California Department of Water Resources.

A public meeting was held on February 10, 2010 in the city of Marysville. The purpose of the meeting was to present the proposed project and obtain public input. The Corps had visual displays explaining the project location, schedule, and environmental and cultural considerations. The public was encouraged to submit comment sheets. Comments received during this meeting are included in Appendix H.

#### **7.0 FINDINGS**

This EA/IS evaluated the environmental effects of the proposed Marysville Ring Levee Improvements. Potential adverse effects to the following resources were evaluated in detail: water resources and quality, air quality, vegetation and wildlife, special-status species, agriculture and prime and unique farmlands, traffic and circulation, recreation, noise, and cultural resources.

Based on the information in this EA/IS, the Marysville Ring Levee Improvements would have no significant adverse effects on the quality of the human environment, and the BMPs and other measures proposed in the EA/IS are sufficient to reduce all potential effects to less than significant. The proposed project meets the definition of a FONSI (40 CFR §1508.13) and Negative Declaration (14 CCR §15070), and therefore, an EIS/EIR is not necessary.

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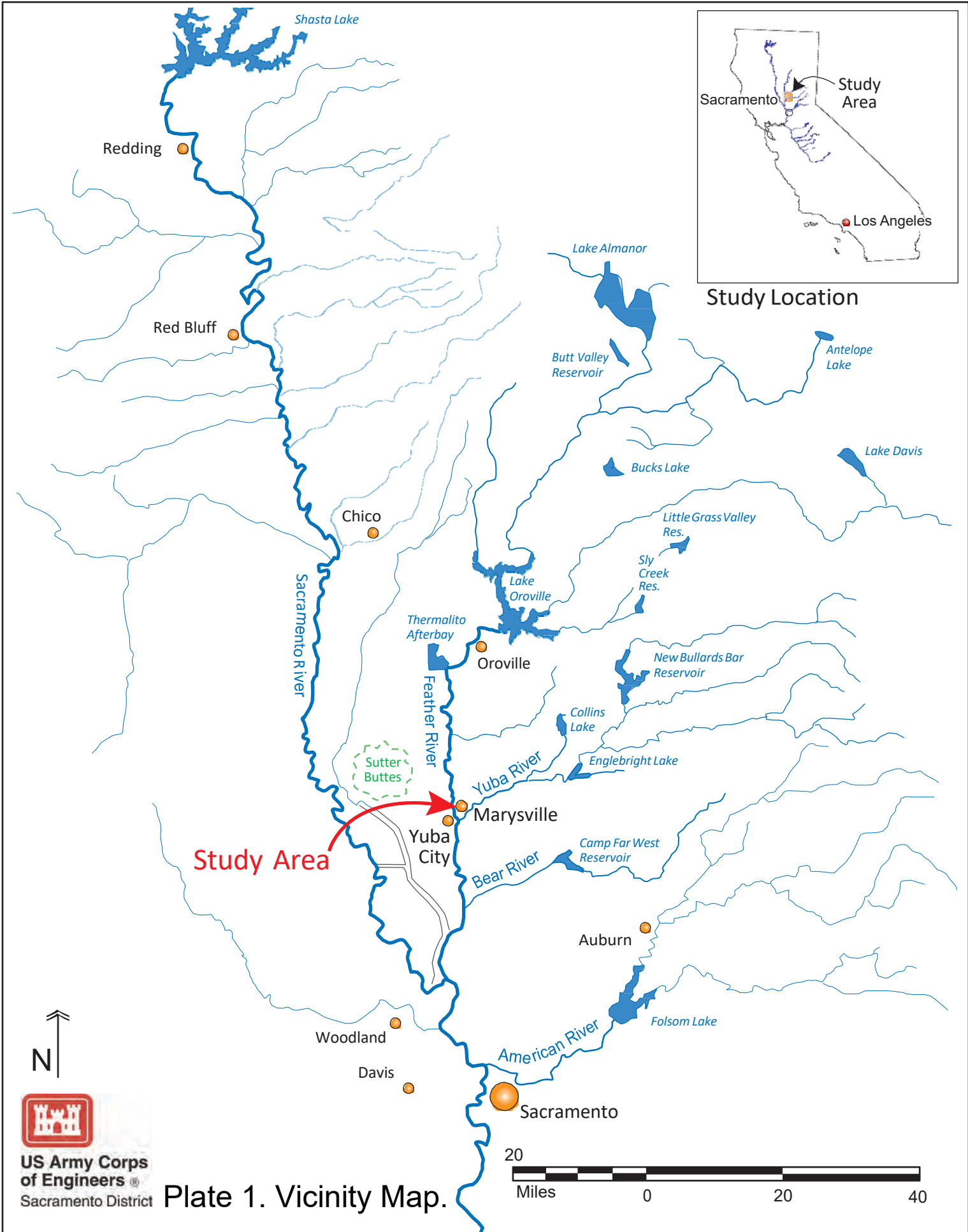
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## **PLATES**



**Study Area**

**Study Location**

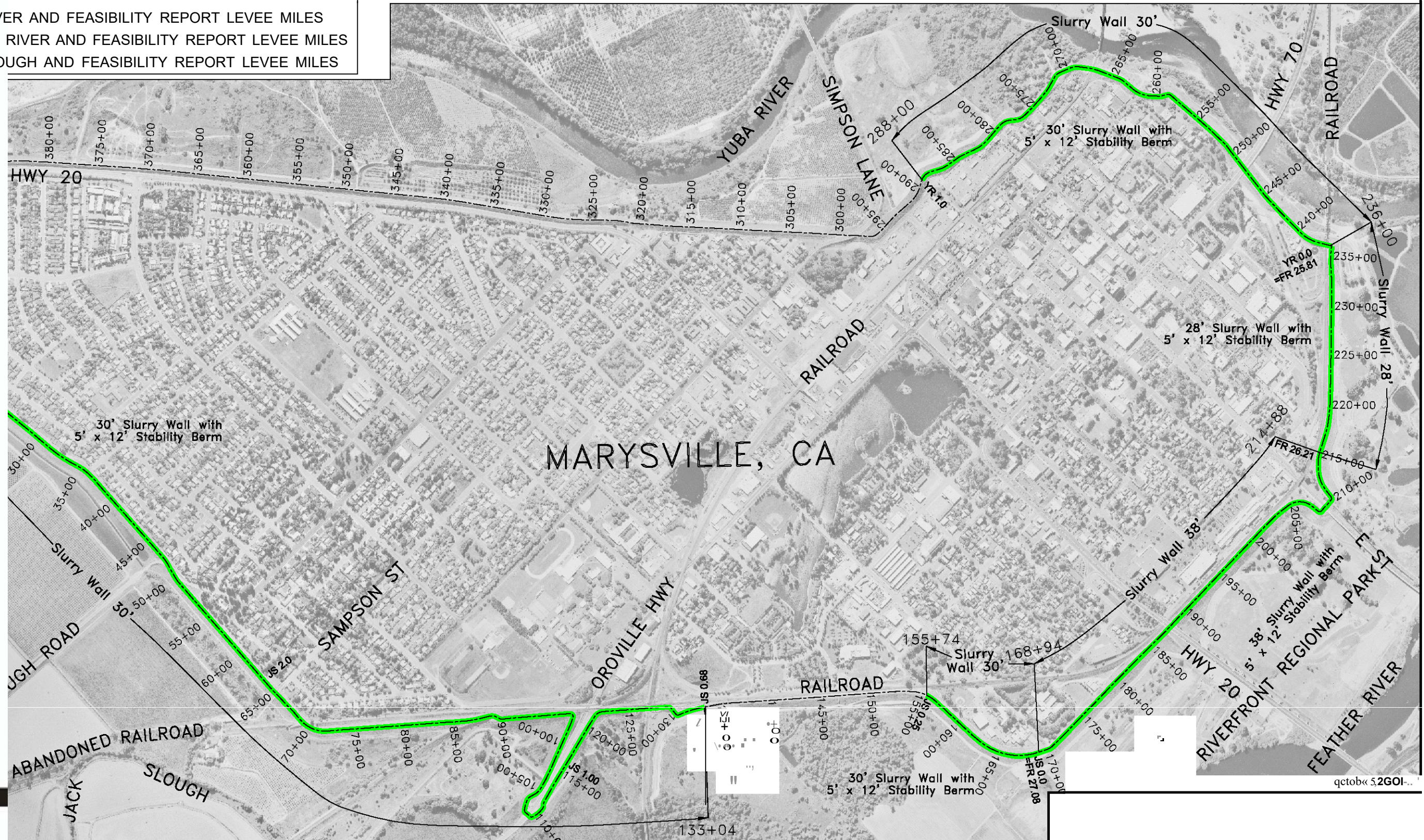
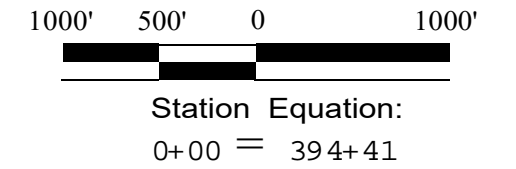


**Plate 1. Vicinity Map.**



# LEGEND

- SLURRY WALL AND WATERSIDE STABILITY BERM
- LEVEE CENTERLINE
- 3B0+00 CURRENT STATIONING
- YR00 YUBA RIVER AND FEASIBILITY REPORT LEVEE MILES
- FR00 FEATHER RIVER AND FEASIBILITY REPORT LEVEE MILES
- JS00 JACK SLOUGH AND FEASIBILITY REPORT LEVEE MILES



-Plate 2. Yuba River Basin Authorized Project.

# LEGEND

SECANT PILE WALL

SLURRY WALL

STABILITY BERM

JET GROUTING

SLURRY WALL WITH  
LEVEE WIDENING

RAIL ROAD

ROADWAY

WATERWAY

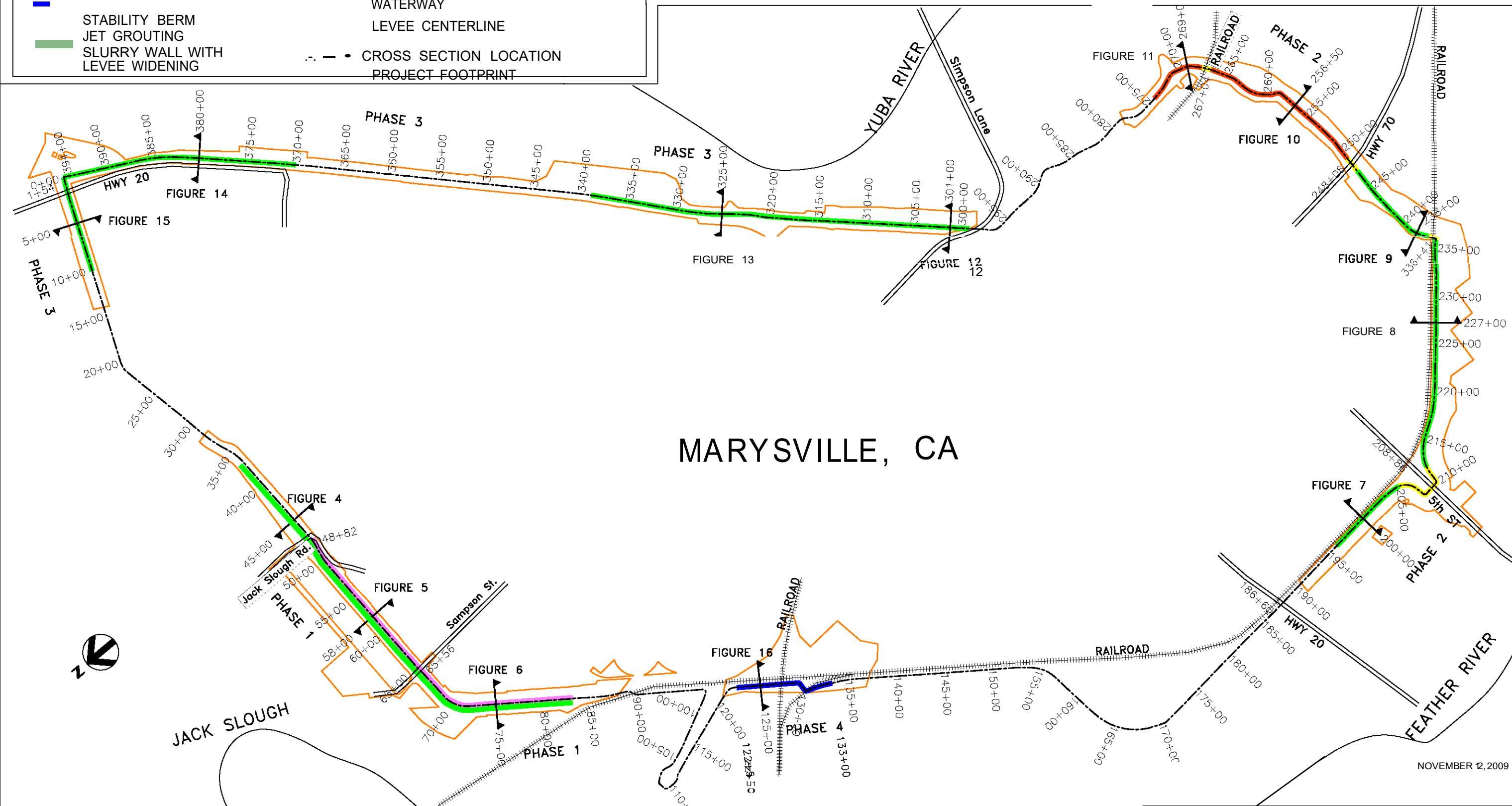
LEVEE CENTERLINE

CROSS SECTION LOCATION

PROJECT FOOTPRINT

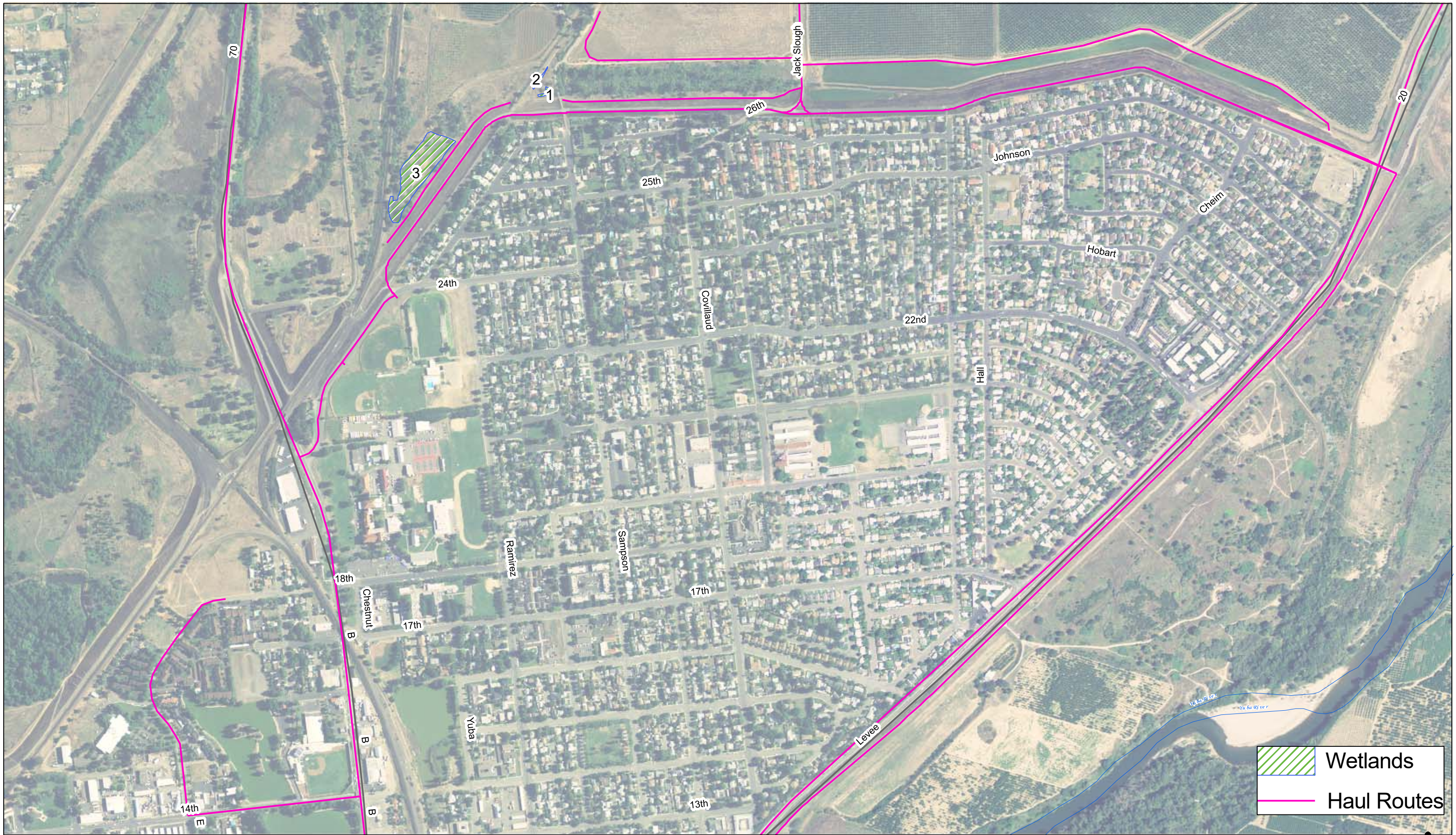
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Station Equation:  
0+00 = 394+41



## MARYSVILLE, CA

NOVEMBER 12, 2009





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US Army Corps  
of Engineers  
Sacramento District

# Plate 4b. Haul Routes

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Feet



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Marysville  
Catholic

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catholic  
Catholic

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Public Pool

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Marysville  
High School

Marysville  
High School

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Bryant  
Field  
839

East Lake  
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Park

E 17th St.

E 16th St.

E 15th St.

E 14th St.

E 13th St.

E 12th St.

E 11th St.

E 10th St.

E 9th St.

E 8th St.

E 7th St.

E 6th St.

E 5th St.

E 4th St.

E 3rd St.

E 2nd St.

E 1st St.

E 0th St.

E -1st St.

E -2nd St.

839  
Stephen Field  
Park

Rideout Way

Boulton Way

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E 18th St.

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Miner  
park  
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Kynoch  
Elementary  
School

747/787

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Bottler Dr.

Aldridge Dr.

Comiskey St.

Card St.

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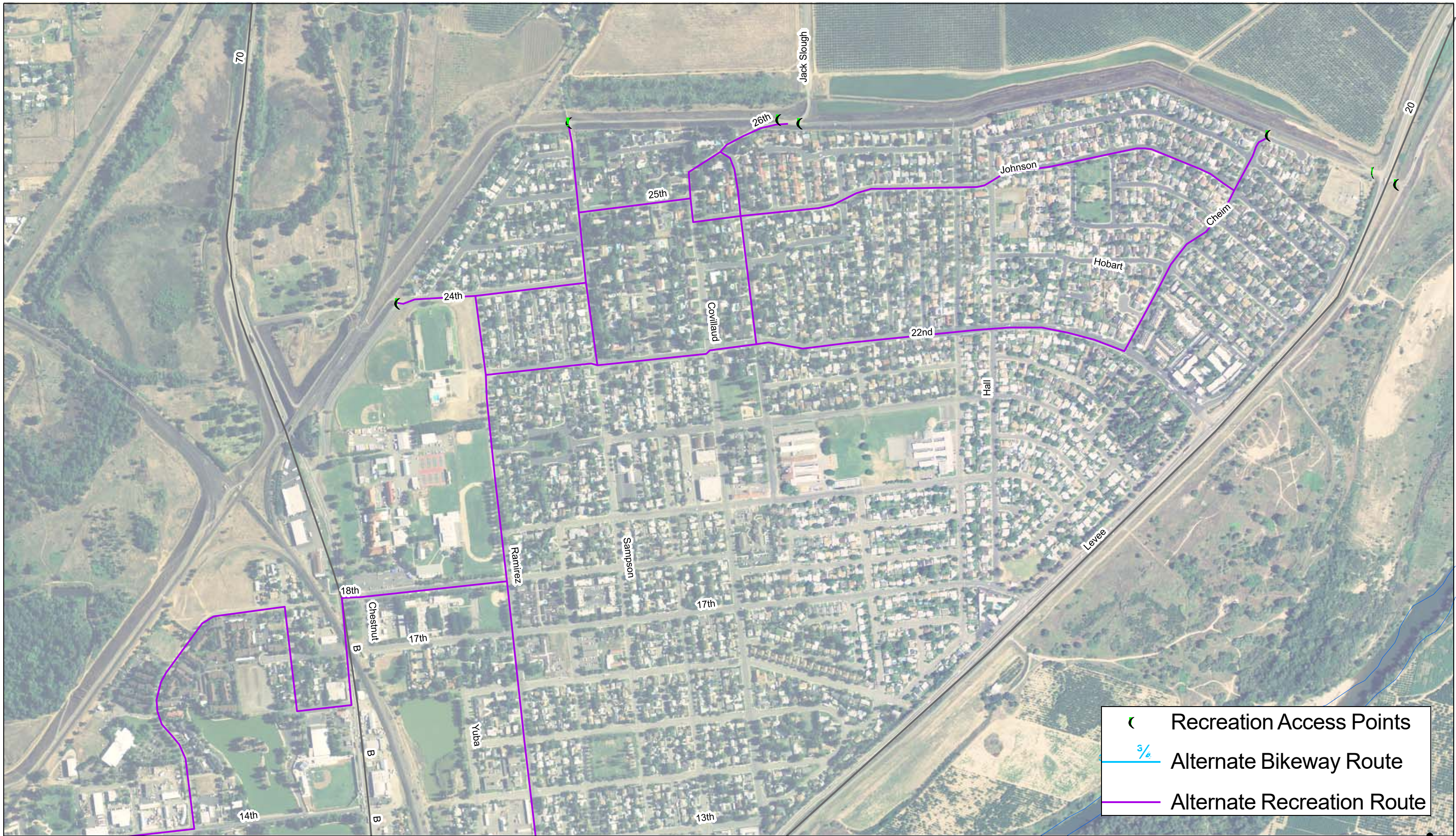
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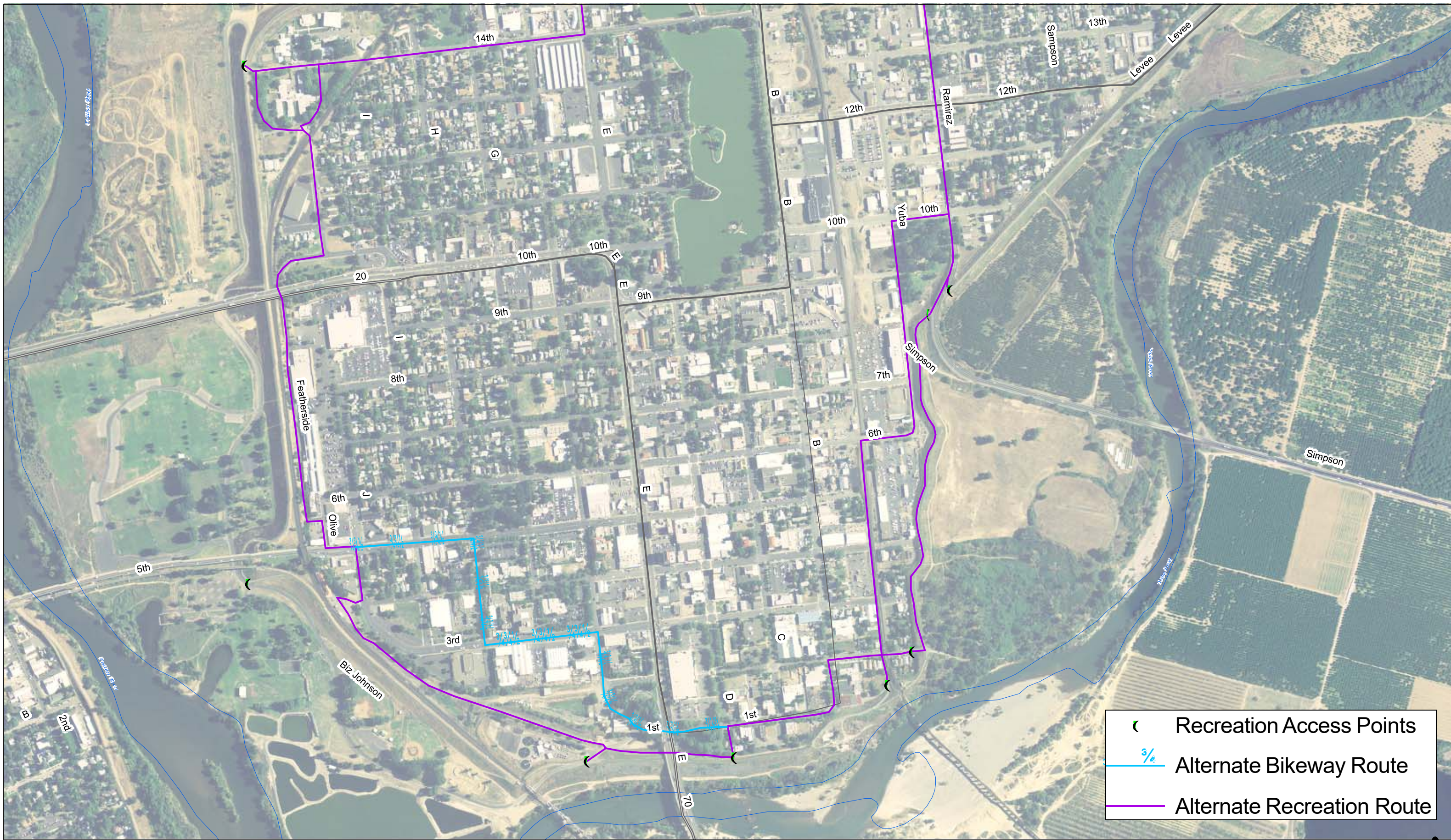
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	Recreation Access Points
	Alternate Bikeway Route
	Alternate Recreation Route



	Recreation Access Points
	Alternate Bikeway Route
	Alternate Recreation Route

## **APPENDICES**

**APPENDIX A**

**WETLAND DELINEATION**



# United States Department of the Interior

## FISH AND WILDLIFE SERVICE

Sacramento Fish and Wildlife Office  
2800 Cottage Way W-2605  
Sacramento, California 95825



In reply refer to:  
81420-2009-FA-0459-1

**NOV 17 2009**

Mr. Francis C. Piccola  
Chief, Planning Division  
Corps of Engineers, Sacramento District  
Sacramento, California 95814-2922

Dear Mr. Piccola:

The Fish and Wildlife Service's draft Wetland Delineation Report for the Yuba River Basin Investigation -Marysville Ring Levee Project is attached. We are providing this report for the United States Army Corps of Engineers (Corps) to include in the Corp's environmental documents currently being prepared for the Yuba River Basin Investigation –Marysville Ring Levee Project.

Thank you for providing the opportunity to contribute to your planning process; If you have any questions or comments, please contact either Harry Kahler at 916-414-6612 or Mark Littlefield at 916-414-6520.

Sincerely,

M. Kathleen Wood  
Field Supervisor

Enclosure

cc:

Jane Rinck, COE, Sacramento, California  
Lindsay Dembosz, COE, Sacramento California  
April Murazzo, COE, Sacramento, California



Yuba River Basin Investigation -Marysville Ring Levee Project DRAFT  
Wetland Delineation Report for the  
United States Army Corps of Engineers -Marysville, California



Prepared for:

United States Army Corps of Engineers  
1325 J Street, 10<sup>th</sup> Floor  
Sacramento, California

Prepared by:

United States Department of Interior  
Fish and Wildlife Service  
Sacramento Fish and Wildlife Office  
Sacramento, California

November 2009



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## Summary

On behalf of the U.S. Army Corps of Engineers (Corps), the U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office (Service) has conducted a delineation of waters for the United States (wetland delineation) for the proposed 36.8-acre Phase 1 portion of the Marysville Ring Levee Project (proposed project). The proposed project is located in the City of Marysville, Yuba County, California. The project site includes areas north of Marysville, adjacent to the waterside toe of Phase 1 of the Marysville Ring Levee Project. The project site is hereinafter referred to as the "Phase 1 study area." This delineation identifies the type and extent of "navigable waters," "wetlands," and "other waters" that occur within or adjacent to the 46-acre Phase 1 study area. A total of 2.9 acres of seasonal wetlands in 3 distinct parts was delineated adjacent to the study area. The Phase 1 study area, as currently proposed, does not include any navigable waters. Additionally, results of the wetland delineation reported herein indicate that the Phase 1 project footprint does not include wetlands.

The delineation of waters of the United States, including wetlands, is subject to verification by the U.S. Army Corps of Engineers (Corps). The Service advises all parties to treat the information contained herein as preliminary until the Corps provides written verification of the boundaries of its jurisdiction.

## Introduction

The Corps regulates impacts to waters of the United States under the jurisdictional authority of Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act of 1972 (33 U.S.C. 403; 33 U.S.C. 1344). Jurisdictional waters of the United States include all navigable waters, interstate waters, their tributaries, and adjacent wetlands (Environmental Laboratory 1987; Federal Register 1986).

The purpose of this report is to describe the extent and type of navigable waters, jurisdictional wetlands and other waters of the United States present within or nearby the proposed Phase 1 study area that fall under the jurisdiction of Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act. Accordingly, this report addresses all identified potential jurisdictional waters of the United States, including wetlands, for the proposed project. Data and conclusions contained in this report are based on information gathered in the field, the 1987 *U.S. Army Corps of Engineers Wetland Delineation Manual*, the *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (U.S. Army Corps of Engineers 2006), and Federal regulations governing waters of the United States.

### a) Definitions and Criteria

***Navigable Waters of the United States.*** Generally, waters of the United States are subject to the ebb and flow of the tide shoreward to the mean high water mark, and/or are presently used, or have been used in the past, or may be susceptible to use transport interstate or foreign commerce (33 CFR §329).

***Other waters of the United States.*** As used in this report, this term refers to features determined to be waters of the United States by the Corps, and includes unvegetated waterways and water bodies with a defined bed and bank and an ordinary high water mark, such as drainages, creeks, rivers, and lakes. Other waters of the United States typically lack hydrophytic vegetation and may also lack hydric soils (33 CFR §328.3).

***Wetlands.*** For regulatory purposes, wetlands are a subgroup of waters of the United States defined as areas that are inundated, or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated conditions. Wetlands generally include swamps, marshes, bogs, and similar areas (33 CFR §328.3; 40 CFR §230.3).

### **Study Area Location**

- a) **Project Location:** The study area is located north of the Marysville Ring Levee between levee stations 65+00 and 82+00, at the City of Marysville, Yuba County, California. The study area is located within the Sutter Buttes 7.5-minute U.S. Geological Survey quadrangle. Phase **1** of the study area is centered around latitude 39° 9' 32.4" and longitude 121° 35' 3.7", which in Universal Transverse Mercator (UTM) Zone 10 coordinates is northing 4335993 and easting 622301.07.
- b) **Acreage:** Phase 1 of the Marysville Ring Levee Project encompasses about 46 acres. Adjacent areas under consideration as wetlands comprise an additional 9 acres. Of the total 55 acres, we studied an area that encompassed about 15 acres (Figure **1**).
- c) **Proximity to Major Highways and Streets:** California Highway 70 passes through Marysville and within 1800 feet to the west of the study area. It crosses below the levee grade by levee station 97+00. East 26th street crosses the levee at station 50+00 at the east end of the Phase **1** area, and continues directly northward on the waterside of the levee. Sampson Street ends at station 65+00 and a small, private road continues across the levee northward. The private road borders the eastern edge of the wetland area.

In addition to these roads, the Burlington Northern and Santa Fe (BNSF) Railway operates a rail line directly adjacent to the Phase **1** study area. The BNSF line leaves the levee at station 87+00 and continues directly northward, while the levee follows a vector about 30 degrees east of these tracks. Also, the Union Pacific Railroad operates along track line across the levee about 2500 feet to the southwest of the Phase **1** study area.

- d) **USGS Hydrologic Unit:** The study area is located within the Lower Feather, California USGS Hydrologic Map Unit (Number 18020106).

Figure 1 Study Area, ...

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## Environmental Setting

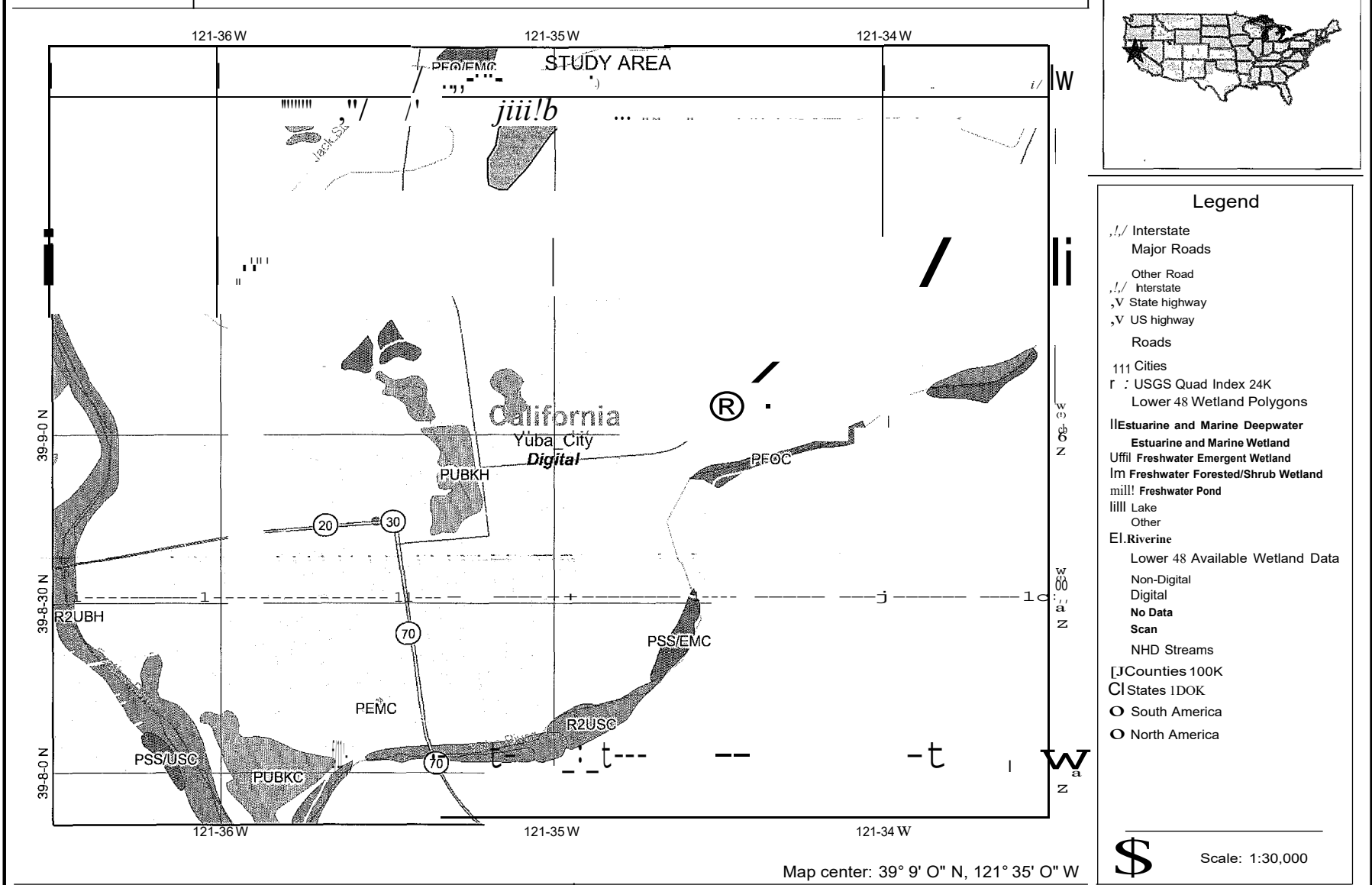
- a) **Current/Recent Land Use:** Much of the Phase 1 study area is maintained as the levee crown and slopes. The crown is paved and used as a maintenance road as well as for recreational functions (i.e., bike riding, walking, etc.). Most of the levee slopes and the study area in general consists of ruderal herbaceous habitat.

An abandoned railroad bed runs parallel to the levee on the waterside between stations 90+00 and 70+00, where it crosses the levee and follows a northerly path. The abandoned railroad grade cuts the study area into two portions, and wetland areas were analyzed on both sides of the grade. The area east of the railroad bed and west of the private road has been used as a dumping site in the past, and a few concrete slabs still litter the ground.

Evidence of recreational vehicle use exists on the waterside of the levee by stations 70+00 and 74+00, as well as on the landside by station 85+00. These trails continue through the study area and outward from the levee to a walnut orchard. The site appears to have been utilized as a borrow area during the construction of the levee. The borrow area is about 250 feet wide and extends the length of the project area.

- b) **Site Elevation:** Currently the levee rises about 20 feet above otherwise flat ground on the waterside. The elevation of the study area ranges from about 50 to 65 feet above mean sea level.
- c) **Climate:** The climate is typically Mediterranean, with cool, wet winters and hot, dry summers. Annual precipitation for the City of Marysville averages 20.96 inches, of which 18.03 inches fall from October through March (Western Regional Climate Center 2007). However, according to the National Oceanic Atmospheric Administration (NOAA) Satellite and Information Service Weekly Palmer Drought Indices, the study area is experiencing its fourth straight severe drought year (NOAA Satellite and Information Service 2009). The annual maximum air temperature for Marysville is 75.3°F, ranging from an average in July of 96.3 °F to 54.1 °F in January (Western Regional Climate Center 2007). The growing season for Marysville generally runs from January 9 through December 28 each year (WETS Station: Marysville, CA5385 2002).
- d) **Site Topography/Landscape:** The levees rise some 20 feet above the landscape, and the railroad beds generally are raised about 10 feet from the natural soil. The natural landscape is otherwise regular, with no pronounced features. Within the study area, there are a few natural depressions that fall 2-5 feet below the surrounding landscape. These depressions vary in size and can be seasonally flooded, depending on yearly precipitation levels.
- e) **Hydrology/Hydrologic Features/Hydrologic Connectivity:** To the north of the study area, Jack Slough flows from the east to the Feather River on the west. The Feather River flows from north to south. There is a small, flooded drainage ditch to

**Figure 2: National Wetlands Inventory, Marysville, California**



This map is a user generated static output from an Internet mapping site and is for general reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.

Notes: <http://www.fws.gov/wetlands/Data/Mapper.html>  
 Accessed 10/20/2009

the east of the study area that flows northward to Jack Slough. Previously, no wetlands have been delineated according to the National Wetland Inventory map, although the map is meant to be used as a general reference only (Wetlands Online Mapper 2009; Figure 2).

During wetter periods the water table rises such that lower depressions of the study area hold standing water. It's likely that the water flows from the existing flooded drainage ditch westward under the private road grade to the study area, and then further westward through the study area under the abandoned railroad grade (Frank Miller, Marysville Levee Commission, personal communication).

- f) **Soils:** Other than the levee, the soils of the study area are predominantly San Joaquin loam (Soil Survey Staff 2008; Figure 3). However, based on the site visit it appears that as much as 4 feet of material has been removed from the study area for use as construction material in the adjacent levee. The landside portions of the study area are largely a San Joaquin-Urban land complex. Conejo loam and Perkins loam are found adjacent to the study area. A description of each of these soils follows (Soil Survey Staff 2008).

San Joaquin loam -All delineated wetlands in this study were found on San Joaquin loam. Typically, San Joaquin loams are found on fan terraces and toe slopes. The parent material is mixed alluvium, and the general shape of the setting is linear. The profile is loam from 0 – 16 inches, with clay 16 – 25 inches below. Minor components include Perkins and Capay soils, both typically less than 2 percent of the soil unit.

The slope of the setting is generally less than 1 percent. The soil is classified as well drained, although the capacity of the limiting layer (clay) to transmit water is very low to moderately low. The depth to the water table is usually more than 80 inches, and the frequency of flooding is occasional. No ponding is said to occur.

San Joaquin-Urban land complex – The San Joaquin urban land complex soils are found on fan terraces and toe slopes, as with the San Joaquin loam. Also, the parent material is mixed alluvium, and the general shape of the setting is linear. The typical profile is the same as the San Joaquin loam: 0-16 inches loam with 16- 25 inches below as clay. In most other aspects the San Joaquin-Urban land complex matches the San Joaquin loam, although the frequency of flooding is rare.

Conejo loam – The Conejo loams are located along stream terraces and toe slopes. They are of mixed alluvium parent material, generally in a linear setting. The profile shows loam from 0 – 6 inches, and clay loam from 6 – 65 inches. Horst soils are a minor component comprising about 5 percent of the total soil composition.

The slope of the setting is generally less than 1 percent. The soil is classified as well drained, and the capacity of the limiting layer to transmit water is moderately high.

Soil Map-Yuba County, California  
 (Figure 3 - Phase 1 Study Area Soils)



Map Scale: 1:10,900 if printed on A size (8.5" x 11") sheet.





Soil Map-Yuba County, California  
(Figure 3 - Phase 1 Study Area Soils)

**MAP LEGEND**

Area of Interest (AOI)	G)	Very Stony Spot
<b>D</b> Area of Interest (AOI)	<b>t</b>	Wet Spot
Soils	....	Other
<b>D</b> Soil Map Units		
Special Point Features	Special Line Features	
<U 181	↳	Gully
★	...	Short Steep Slope
●	---	Other
X	Political Features	
⋈	E	Cities
⊙	Water Features	
A	Oceans	
Marsh or swamp	Streams and Canals	
⌈	Transportation	
@	-+++	Rails
@	█	Interstate Highways
∨	...../	US Routes
+	—	Major Roads
+		Local Roads
—		
0		
p		
%		
—		
e)		

**MAP INFORMATION**

Map Scale: 1:10,900 if printed on A size (8.5" x 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service  
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>  
Coordinate System: UTM Zone 10N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Yuba County, California  
Survey Area Data: Version 5, Dec 14, 2007

Date(s) aerial images were photographed: 6/30/2005

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

## Map Unit Legend

Yuba County, California (CAs1s)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
142	Conejo loam, 0 to 1 percent slopes, occasionally flooded	25.3	4.3%
185	Kimball loam, 0 to 1 percent slopes	66.1	11.2%
186	Kimball loam, 0 to 1 percent slopes, occasionally flooded	27.8	4.7%
204	Perkins loam, 0 to 1 percent slopes, occasionally flooded	75.6	12.8%
216	San Joaquin loam, 0 to 1 percent slopes, occasionally flooded	76.0	12.8%
217	San Joaquin-Urban land complex, 0 to 1 percent slopes	177.4	30.0%
248	Trainer loam, 0 to 1 percent slopes, occasionally flooded	133.9	22.6%
254	WATER	9.7	1.6%
<b>Totals for Area of Interest</b>		<b>591.8</b>	<b>100.0%</b>

The depth to the water table is usually more than 80 inches, and the frequency of flooding is occasional. No ponding is said to occur.

Perkins loam – Perkins loams are also located along stream terraces and toe slopes. They are of mixed alluvium parent material, generally in a linear setting. The profile shows loam from 0 – 5 inches, clay loam from 5 – 58 inches, stratified sandy loam to clay loam from 58 – 66 inches, and stratified very gravelly sandy loam to very cobbly clay loam from 66 – 72 inches. Conejo and Shanghai soils are typical minor components, and the minor components in total comprise about 15 percent of the total soil composition.

- g) **Plant communities:** Four major plant community cover-types were identified in the project area: seasonal wetland, riparian woodland, annual grassland, agriculture, and other. These land cover-types include jurisdictional wetlands and other waters of the United States, as well as non-jurisdictional upland habitat. The land cover-type's are listed below and described in the following sections, including the wildlife species that utilize each cover-type.

Seasonal wetland – Seasonal wetlands occur in depressions along the waterside of the levee within the study area. These depressions appear to have been created by borrowing material during past levee construction. Although some riparian trees and shrubs may overhang the wetlands around edges, no predominant shrub layer exists within the seasonal wetlands. As with wet meadows across the state, the common genera of the study area seasonal wetlands include *Agrostis*, *Carex*, *Danthonia*, *Juncus*, *Salix*, and *Scirpus* (Ratliff 1988). Common species include rye grass (*Lolium perenne*), rushes (*Juncus* sp.), soft chess (*Bromus hordeaceus*), ripgut brome (*Bromus diandrus*), turkey tangle fogfruit (*Phyla nodiflora*), and annual hairgrass (*Deschampsia danthonioides*), for examples.

Riparian woodland – Riparian woodland is found on the waterside of the levee within the study area. The upper canopy is dominated by several species including box elder (*Acer negundo*), white alder (*Alnus rhombifolia*), northern California black walnut (*Juglans californica* var. *hindsii*), sycamore (*Platanus racemosa*), Fremont cottonwood (*Populus fremontii*), valley oak (*Quercus lobata*), coast live oak (*Quercus agrifolia*), Goodding's willow (*Salix gooddingii*), and other willow species. The lower shrub canopy is dense and thicket-like, with dominant species including California rose (*Rosa californica*), blackberry (*Rubus ursinus*), blue elderberry (*Sambucus mexicanus*), coyote brush (*Baccharis pilularis*), and shrub-like forms of the various willow species. Lianas species such as California grape (*Vitis californica*) and virgin's bower (*Clematis ligusticifolia*) are also present in the shrub layer. The herbaceous understory ranges from very developed to sparse depending on the amount of light filtering through the upper canopies, but typically includes various grasses, sedges, and rushes.

Annual grassland -Annual grasslands occur on both the landside and waterside of the levee. Areas with annual grassland vegetation in the project area are dominated by a

mixture of annual grasses and herbaceous, nonnative or ruderal, weedy species. This cover type generally occurs in disturbed areas subject to periodic disturbance. Ruderal areas are common along the edge of agricultural fields and on the faces of levees. The following species have been found on the top of the levee and on the sideslopes: wild oats (*Avena fatua*), creeping wildrye (*Leymus triticoides*), Johnson grass (*Sorghum halepense*), Bermuda grass (*Cynodon dactylon*), western ragweed (*Ambrosia psilostachya*), tumbleweed (*Salsola tragus*), and yellow star-thistle (*Centaurea solstitialis*). The levee slopes are regularly maintained through prescribed fire and/or mowing, limiting the cover to grasses and forbs.

Agricultural – Agricultural lands exist on the levee side toe. Major crops and cover types in agricultural production include orchard crops, vineyards, and field crops. Orchard crops in the area include various fruit and walnut trees that surround the project limits of the study area. Also adjacent to the study area is a small vineyard and rice field that is also considered a seasonal wetland. The seasonal wetland land cover-type occurs in areas that are ephemerally or seasonally inundated or saturated with water and are subject to Corps jurisdiction under Section 404 of the CWA as "other waters of the U.S."

#### **Delineation Methods and References**

- a) **Overall Technical Method:** The on-site wetland determination was based on field observations of soil, vegetation, and hydrologic characteristics as defined in the 1987 *U.S. Army Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) and the *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (U.S. Army Corps of Engineers 2006). Six 3-parameter data points were characterized and documented. Data forms are presented in Appendix A.
- b) **Review of aerial photographs:** Prior to making field observations, Aerial photographs were reviewed to assess the study area for potential wetland acreage.
- c) **Date of Field Observations:** The field observations for this delineation occurred on September 3, 2009. All observations were made by Service biologists Mark Littlefield and Harry Kahler, while Corps personnel Lindsay Dembosz and April Murazzo were also present.
- d) **Wetland Vegetation Indicator Status Reference:** Taxonomic nomenclature for plant species is in accordance with the *Jepson Manual* (Hickman 1993), wetland indicator status for plant species was determined using *National List of Plant Species That Occur in Wetlands: California (Region 0)* (Reed 1988), and the "Dominance Test" and Prevalence Index" were applied to determine plant dominance (U.S. Army Corps of Engineers 2006).
- e) **Hydric Soil Method of Determination Followed:** A soil pit to a depth of 12 to 18 inches was dug within each suspected wetland feature. Soils were examined in order

to assess field indicators of hydric soils. Positive indicators of hydric soils were observed in the field in accordance with the criteria outlined in Field Indicators of Hydric Soils in the United States (Hurt 2006) and the *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (U.S. Army Corps of Engineers 2006). The color of the soils was determined using a Munsell® soil color chart.

- f) **Wetland Hydrology Method of Determination Followed:** Presence of primary and secondary wetland hydrology indicators were documented for each suspected wetland feature. These include inundation, saturation within the upper 12 inches of the soil profile, water marks, drift lines, sediment deposits, surface soil cracks, oxidized rhizospheres along living roots, presence of reduced iron, hydrogen sulfide odor, biotic crust, salt crust, and drainage patterns in wetlands.
- g) **Wetland Mapping:** All sample points and wetland polygon boundaries were recorded using a Trimble Global Positioning System (GPS) unit capable of sub-meter accuracy (NAD 83 projection, UTM Zone 10). The data was then overlaid onto a site-specific topographic map and a color aerial National Agriculture Imagery Program photograph taken in 2005.

## Delineation Results and Discussion

### Waters of the United States

Figures 4a and 4b depict the boundaries of waters of the United States, including wetlands, within the study area. An I-cubed (2009) image, taken prior to 2005, shows standing water over the ground where sample points 1-4 were taken. Table 1 provides an acreage summary of waters of the United States. Completed Wetland Data Forms – Arid West region are provided in Appendix A.

After examining aerial photographs, we took sample points within minor depressional areas, ditches, basins, and took samples in a few upland areas to find where the wetland boundaries ended. Although upland vegetation exists at all sample points, soil surveys at sample points 1-4 show mottling resulting from anaerobic conditions. These conditions indicate a duration of saturation sufficient to support the growth and reproduction of hydrophytic vegetation.

Table 1. Acreage Summary of Waters of the United States

<b>WATERS OF THE UNITED STATES</b>		
<b>WETLANDS</b>	<b>ACREAGE</b>	<b>LINEAR FEET</b>
Wetland #1	0.08	<i>N/A</i>
Wetland #2	0.04	194
Wetland #3	2.78	<i>N/A</i>
Total Wetlands	2.90	194
<b>NAVIGABLE WATERS</b>	<b>ACREAGE</b>	<b>LINEAR FEET</b>
Total Navigable Waters	0.0	N/A
<b>TOTAL WATERS OF THE UNITED STATES</b>	2.90	194

As previously mentioned, the study area is experiencing its fourth straight severe drought year (NOAA Satellite and Information Service 2009). This may have created a temporal shift in vegetation, allowing more upland species to grow in areas that would support predominantly hydrophytic vegetation under normal circumstances. Under natural conditions the soils at sample point 1 would normally be saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation (Wetlands Online Mapper, 2008; Soil Survey Staff, 2008a). Wetland 3 was delineated based on topography, the known existence of standing water in most years, the presence of wetland indicator plant species, and the soil characteristics of sample points 1-4.

The area surrounding sample point 5 is not classified as a wetland on National Wetland Inventory maps, and soil features indicate the area is not saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation. Soil features at sample point 6 showed mottling that indicates hydric conditions. Based on these and other soil features, the presence of wetland vegetation, and the topography of the landscape, the boundaries for wetlands 1 and 2 were established.

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Figure 4b. Wetland 3







L005

Wetland 1

Wetland 2

L007

L006

Appendix A

Wetland Determination Data Forms - Arid West Region

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site f lue / - f tvot J tk f rry t 2 e City/County: r - d - - - - 7 H Sampling Date f-1-, 3.0 1  
 Applicant/Owner: Co " i q / / fl / b l . . . . . State: / / t Sampling Point: / f / /  
 Investigator(s) / ; 4 e ? . c : l d , / ( g . f t ) e v , ' / j e V A 6 s z 1 Section, Township, Range: \_\_\_\_\_  
 Landform (hillslope, terrace, etc.): \_\_\_\_\_ Local relief (concave, convex, none): < / o / A . Co ? - v < / . . . . . Slope (%) 0 . . . / %  
 Subregion (LRR): \_\_\_\_\_ Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: \_\_\_\_\_

Soil Map Unit Name z i ( . S 4 . " ! ° 1 0 4 . g u . : " - - L e ° " " " " " " NWI classification: \_\_\_\_\_  
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ significantly disturbed? Are "Normal Circumstances" present? Yes \_\_\_\_\_ No \_\_\_\_\_  
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Hydic Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Wetland Hydrology Present? Yes <input type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes _____ No _____
Remarks: <u>Sat / ; ' E t l : &gt; + . . . . .</u> <u>Ac actually flooded</u> <u>A - f e ; f o . . o " v e r y s t r o n g l y c e m e n t e d</u> <u>Note: local soil survey (NRCS) lists this soil as partially hydric.</u>			

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1. <u>W</u>				Number of Dominant Species That Are OBL, FACW, or FAC: <u>.5"</u> (A)
2. _____				Total Number of Dominant Species Across All Strata: <u>, B</u> (B)
3. _____				Percent of Dominant Species That Are OBL, FACW, or FAC: <u>.h 2.</u> (A/B)
4. _____				Prevalence Index worksheet:
Total Cover: _____				Total % Cover of: _____ Multiply by: _____
Sampling/Shrub Stratum				OBL species <u>01</u> x 1 = <u>..2</u>
1. <u>, J J V t . . . . .</u>				FACW species _____ x 2 = _____
2. _____				FAC species _____ x 3 = _____
3. _____				FACU species <u>1</u> x 4 = <u>t i -</u>
4. _____				Overall Totals: <u>S</u> (A) = <u>10</u> (B)
5. _____				Prevalence Index = BIA = _____
Herb Stratum				Hydrophytic vegetation indicators =
1. <u>Curly Rock</u>	<u>1-2</u>		<u>Y: At - u : &gt;</u>	"1". Dominance Test is >50%
2. <u>Spines spp.</u>	<u>40</u>	<u>1</u>	<u>o b l ; &gt;</u>	VPrevalence Index is s3.0 <sup>1</sup>
3. <u>Scarpus</u>	<u>10</u>		<u>U .</u>	Morphological Adaptations <sup>1</sup> (Provide supporting <u>i -</u> data in Remarks or on a separate sheet)
4. <u>Mysid spp</u>	<u>3</u>		<u>o b l ,</u>	Problematic Hydrophytic Vegetation <sup>1</sup> (Explain!)
5. <u>Polygon</u>	<u>1-2</u>		<u>B J .</u>	
6. <u>Vetch</u>	<u>2</u>		<u>J :</u>	
7. <u>unknown #1</u>	<u>5</u>		<u>h J</u>	
8. <u>Bromus Rabens</u>	<u>2</u>			
Other sp. in bags				
Total Cover: <u>66%</u>				Indicators of hydric soil and wetland hydrology must be present.
Woody Vine Stratum				Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
2. _____				
Total Cover: <u>0%</u>				
% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____				
Remarks: <u>11 willow trees adjacent to site have died</u> <u>0) site has experienced 3-4 years</u> <u>site has been altered for</u> <u>construction of adjacent levee</u>				<u>J e . v . , ( j - l . - - 1 - c</u> <u>. " " " J . . d x S</u> <u>a A " - ' 9 o v 1 1 1 &gt; W p . " " . f . . I A . - 1 ' 1 2</u>

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Color (moist)		Type <sup>1</sup>	Texture	Remarks
	Color (moist)	%	Color (moist)	%			
1,	4/23 10YR		5/8		7.5/R	f1 > Ae? jf!l:k v<./	
h if	4/2 10YR					S L	"--
b,,							

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix. <sup>2</sup>Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

Indicators for Problematic Hydric Soils<sup>3</sup>:

- |  |   |   |
|--|---|---|
| <input type="checkbox"/> Histic Epipedon (A2)              | <input type="checkbox"/> Sandy Redox (S5)           | <input type="checkbox"/> 1 cm Muck (A9) (LRR C)     |
| <input type="checkbox"/> Black Histic (A3)                 | <input type="checkbox"/> Stripped Matrix (S6)       | <input type="checkbox"/> 2 cm Muck (A10) (LRR B)    |
| <input type="checkbox"/> Hydrogen Sulfide (A4)             | <input type="checkbox"/> Loamy Mucky Mineral (F1)   | <input type="checkbox"/> Reduced Vertic (F18)       |
| <input type="checkbox"/> Stratified Layers (A5) (LRR C)    | <input type="checkbox"/> Loamy Gleyed Matrix (F2)   | <input type="checkbox"/> Red Parent Material (TF2)  |
| <input type="checkbox"/> 1 cm Muck (A9) (LRR D)            | <input type="checkbox"/> Depleted Matrix (F3)       | <input type="checkbox"/> Other (Explain in Remarks) |
| <input type="checkbox"/> Depleted Below Dark Surface (A11) | <input type="checkbox"/> Redox Dark Surface (F6)    |   |
| <input type="checkbox"/> Thick Dark Surface (A12)          | <input type="checkbox"/> Depleted Dark Surface (F7) |   |
| <input type="checkbox"/> Sandy Mucky Mineral (S1)          | <input type="checkbox"/> Redox Depressions (FB)     |   |
| <input type="checkbox"/> Sandy Gleyed Matrix (S4)          | <input type="checkbox"/> Vernal Pools (F9)          |   |

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (.if present):

Type: Dc.c."2R,  
Depth (inches): 01.0-110"

Hydric Soil Present? Yes

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Secondary Indicators (2 or more required)

Primary Indicators (at least one indicator is sufficient)

Water Marks (B1) (Riverine)

- |  |   |   |
|--|---|---|
| <input type="checkbox"/> Surface Water (A1)                        | <input type="checkbox"/> Salt Crust (B11)                             | <input type="checkbox"/> Sediment Deposits (B2) (Riverine)                    |
| <input type="checkbox"/> High Water Table (A2)                     | <input type="checkbox"/> Biotic Crust (B12)                           | <input type="checkbox"/> Drift Deposits (B3) (Riverine)                       |
| <input type="checkbox"/> Saturation (A3)                           | <input type="checkbox"/> Aquatic Invertebrates (B13)                  | <input type="checkbox"/> Drainage Patterns (B10)                              |
| <input type="checkbox"/> Water Marks (B1) (Nonriverine)            | <input type="checkbox"/> Hydrogen Sulfide Odor (C1)                   | <input type="checkbox"/> Dry-Season Water Table (C2)                          |
| <input type="checkbox"/> Sediment Deposits (B2) (Nonriverine)      | <input type="checkbox"/> Oxidized Rhizopheres along Living Roots (C3) | <input type="checkbox"/> Thin Muck Surface (C7)                               |
| <input type="checkbox"/> Drift Deposits (B3) (Nonriverine)         | <input type="checkbox"/> Occurrence of Reduced Iron (C4)              | <input type="checkbox"/> Crayfish Burrows (C8)                                |
| <input type="checkbox"/> Surface Soil Cracks (B6)                  | <input type="checkbox"/> Recent Iron Reduction in Plowed Soils (C6)   | <input checked="" type="checkbox"/> Saturation Visible on Aerial Imagery (C9) |
| <input type="checkbox"/> Saturation Visible on Aerial Imagery (B7) | <input type="checkbox"/> Other (Explain in Remarks)                   | <input type="checkbox"/> Shallow Aquitard (D3)                                |
| <input type="checkbox"/> Water-Stained Leaves (B9)                 |   | <input type="checkbox"/> FAC-Neutral Test (D5)                                |

Field Observations:

- Surface, Water Present? Yes  No  Depth (inches): \_\_\_\_\_
- Water Table Present? Yes  No  Depth (inches): \_\_\_\_\_
- Saturation Present? Yes  No  Depth (inches): \_\_\_\_\_

18' (at wet h)

Wetland Hydrology Present? Yes  No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site PhM c. / f111.7Jn1:J1e. ££)1 i- 'f: '1'1'1'1' Sampling Date: ft 3) 0,

County: \_\_\_\_\_  
 Applicant/Owner: Co. 1 M Mi. ti14.0 T State: IA Sampling Point: 0 'Z...  
 Investigator(s) (eLe\*, v4..hLeif, De''f.,;1a) Section, Township, Range: \_\_\_\_\_  
 Landform (hillslope, terrace, etc.): h: lfs/flc. Local relief (concave, convex, none): \_\_\_\_\_ Slope (%): \_\_\_\_\_  
 Subregion (LRR): \_\_\_\_\_ Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: \_\_\_\_\_  
 Soil Map Unit Name: QUIL S. "" dlo.f u. tv. oc. "" "" NWI classification: \_\_\_\_\_  
 Are climatic / hydrologic conditions on tes typical for this time of year? Yes \_\_\_\_\_ No \_\_\_\_\_ (If no, explain in Remarks.)  
 Are Vegetation Mc?, Soil \_\_\_\_\_ or Hydrology IA significantly disturbed? Are "Normal Circumstances" present? Yes V'' No \_\_\_\_\_  
 Are Vegetation \_\_\_\_\_, Soil \_\_\_\_\_, or Hydrology \_\_\_\_\_ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____ No <u>1/7</u>	Is the Sampled Area	Yes _____ No _____
Hydric Soil Present?	Yes _____ No <u>1/7</u>	within a Wetland?	Yes _____ No _____
Wetland Hydrology Present?	Yes _____ No _____		
Remarks:	<u>Site is on the very upper edge of a ponded wetland wetland is/was created as a result of borrow operation during the construction of the adjacent levee.</u>		

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1. <u>tP f Lntph..? £</u>			<u>Fk-</u>	Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)
<u>Lm-O!</u>			<u>OH.L</u>	Total Number of Dominant <u>\$! Li</u>
4. <u>06/A- L-C</u>			<u>E</u>	Species Across All Strata: _____ (B)
Sampling/Shrub Stratum	Total Cover:		<u>L</u>	Percent of Dominant Species That Are OBL, FACW, or FAC: <u>.s't./</u> (A/B)
1. <u>?</u>				Prevalence Index worksheet: Total % Cover of: Multiply by: OBL species <u>4-f'</u> x 1 = <u>y &lt;</u> FACW species <u>80</u> x 2 = <u>1.0</u> FAC species <u>5'</u> x 3 = <u>1</u> FACU species <u>3</u> x 4 = <u>12</u> UPL species <u>7</u> x 5 = <u>35</u> Column Totals: <u>100</u> (A) <u>2</u> (B)
2. _____				
3. _____				
4. _____				
Herb Stratum	Total Cover:			Prevalence Index = BIA = <u>1.9</u>
1. <u>Juncus</u>	<u>30</u>	<input checked="" type="checkbox"/>	<u>FACW</u>	Hydric Vegetation Indicators: Gyiinance Test is >50% Prevalence Index is S:3.0 <sup>1</sup> 1..-1<:7(orphological Adaptations <sup>1</sup> (Provide supporting data.in Remarks or on a separate sheet)  <u>S "" :S J, ..., +, L oo/</u>  *Indicators of hydric soil and wetland hydrology must be present.
2. <u>Ripbud Bromo</u>	<u>10</u>		<u>NI</u>	
3. <u>Uu Kuauh Forkl</u>	<u>2</u>			
4. <u>Dudlion</u>	<u>2</u>		<u>FACU</u>	
5. _____				
6. <u>BoR stuan</u>			<u>FACW</u>	
7. _____				Hydrophytic Vegetation % Cover of Biotic Crust _____
8. _____				
blematic Hydrophytic Vegetation <sup>1</sup> (Explain)	Total Cover: _____			
Woody Vine Stratum	Total Cover: _____			
1. <u>S!</u>				
2. <u>'Jh -6Y"</u>				
3. <u>±</u>				
4. <u>±</u>				
% Bare Ground in Herb Stratum	<u>1-10</u>			
Remarks				

Present? Yes .\,/'" No

Arid West -  
Version 11-1-  
2006

**SOIL**

Sampling Point: \_\_\_\_\_

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features			Loc <sup>2</sup>	Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>			
3"	4/4 10YR		4/6	7.5YR			Sandy Clay loam	
1	4/4 10YR						Sandy Clay loam	

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix. <sup>2</sup>Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

Indicators for Problematic Hydric Soils<sup>3</sup>:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5) (LRR C)
- 1 cm Muck (A9) (LRR D)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Loamy Mucky Mineral (F1)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (FS)
- Vernal Pools (F9)

- 1 cm Muck (A9) (LRR C)
- 2 cm Muck (A10) (LRR B)
- Reduced Vertic (F18)
- Red Parent Material (TF2)
- Other (Explain in Remarks)

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: D<sup>1</sup> (J<sup>1</sup> fi. Ol<sup>1</sup> p<sup>1</sup> Ir<sup>1</sup> > r

Depth (inches): 13 to

Hydric Soil Present? Yes  No

Remarks:

**HYDROLOGY**

Wetland Hydrology Indicators:

Secondary Indicators (2 or more required)

Primary: Indicators (any one indicator is sufficient)

- Surface Water (A1)
- High Water Table (A2)
- Saturation (A3)
- Water Marks (B-1) (Nonriverine)
- Sediment Deposits (B2) (Nonriverine)
- Drift Deposits (B3) (Nonriverine)
- Bare Soil Cracks (B6)
- Inundation Visible on Aerial Imagery (B7)
- Water-Stained Leaves (B9)
- Salt Crust (B11)
- Biotic Crust (B12)
- Aquatic Invertebrates (B13)
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres along Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Plowed Soils (C6)
- Other (Explain in Remarks)

- Water Marks (B1) (Riverine)
- Sediment Deposits (B2) (Riverine)
- Drift Deposits (B3) (Riverine)
- Drainage Patterns (B10)
- Dry-Season Water Table (C2)
- Thin Muck Surface (C7)
- Crayfish Burrows (CS)
- Duration Visible on Aerial Imagery (C9)
- Shallow Aquitard (D3)
- FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes  No  (inches): \_\_\_\_\_  
 Water Table Present? Yes  No  Depth (inches): \_\_\_\_\_  
 Saturation Present? Yes  No  Depth (inches): \_\_\_\_\_  
 (includes capillary fringe)

Wetland Hydrology Present? Yes  No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: — ;d.. ;((<-e;"" LtBc.>"" .. City/County: L...a b tJL Sampling Date: q/B+oa,1

Applicant/Owner: L :- (L1 . .t>...;Z rl,...ip'ho State: CA Sampling Point: !-ob3 --

Investigator(s): , ... , Section, Township, Range: - - - - - Ji

Landform (hillslope, terrace, etc.): \_\_\_\_\_ Local relief (concave, convex, none): tT Slope (%): 0

Subregion (LRR): \_\_\_\_\_ Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: \_\_\_\_\_

Soil Map Unit Name: 5!fL---!>)<111M.,...Jl"4U..f.i.<.. J ""-\_" i:c\$ \_J""ltil:111: — NWI classification: \_\_\_\_\_

Are climatic / hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)

Are Vegetation, Soil, or Hydrology significantly disturbed? Yes \_\_\_\_\_ No \_\_\_\_\_ Are "Normal Circumstances" present? Yes \_\_\_\_\_ No \_\_\_\_\_

Are Vegetation, Soil, or Hydrology naturally problematic? Yes \_\_\_\_\_ No \_\_\_\_\_ (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <u>1-.u</u> No	is the Sampled Area within a Wetland? Yes <u>  </u> No <u>  </u>
Hydric Soil Present?	Yes <u>  </u> No	
Wetland Hydrology Present?	Yes <u>  </u> No	
Remarks:		

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1. _____	_____	_____	_____	That Are OBL, FACW, or FAC: <u>1J</u> (A)
2. _____	_____	_____	_____	Number of Dominant Species _____
3. _____	_____	_____	_____	Total Number of Dominant Species Across All Strata: <u>(,)</u> (B)
4. _____	_____	_____	_____	Percent of Dominant Species _____
Total Cover: _____				That Are OBL, FACW, or FAC: <u>.G</u> (A/B)
Sapling/Shrub Stratum				Prevalence Index worksheet:
1. _____	_____	_____	_____	Total % Cover of: _____ Multiply by: _____
2. _____	_____	_____	_____	OBL species _____ x 4 _____
3. _____	_____	_____	_____	FACW species <u>95</u> x 2 = <u>190</u>
4. <u>Z</u>	_____	_____	_____	FAC species <u>3</u> x 3 = <u>9</u>
5. _____	_____	_____	_____	FACU species _____ x 4 = _____
Total Cover: _____				UPL species <u>1</u> x 5 = <u>5</u>
Herb Stratum				Column Totals <u>10</u> , (A) <u>21</u> (B)
1. <u>blRdock{!ee.kl '1</u>	<u>5</u>	<u>rf"" w</u>	<u>1-1</u>	Prevalence Index = <u>1A</u> = <u>J.0</u>
<u>ifr ;{/f :f ep'</u>	<u>1-1</u>	<u>t-0</u>	<u>fi). w</u>	Hydrophytic Vegetation Indicators:
4. <u>llfuda12clD.f uhi</u>	<u>1</u>	<u>ite. v</u>	<u>1</u>	; VfJominance Test is >50%
5. <u>ffnk -#5</u>	<u>1</u>	<u>ite. v</u>	<u>1</u>	revalence Index is s3.0
6. <u>lllk t:t l</u>	<u>1</u>	<u>ite. v</u>	<u>1</u>	phological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)
7. <u>raJiCus/lf!}</u>	<u>1</u>	<u>ite. v</u>	<u>1</u>	Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)
8. _____	_____	_____	_____	<u>.:t.,e l.ot;&gt;/</u>
Total Cover: <u>101-</u>				<sup>1</sup> Indicators of hydric soil and wetland hydrology must be present.
Woody Vine Stratum				Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
Total Cover: _____				
% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____				
Remarks:				





Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features		Type <sup>1</sup>	Loc <sup>2</sup>	Texture	Remarks
	Color (moist)	%	Color (moist)	%				
6p	10YR	4/4					clay loam	
6p	10YR	5/6						


<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix. <sup>2</sup>Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)		Indicators for Problematic Hydric Soils <sup>3</sup> :	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 1 cm Muck (A9) (LRR C)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> 2 cm Muck (A10) (LRR B)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1)	<input type="checkbox"/> Reduced Vertic (F18)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Red Parent Material (TF2)	
<input type="checkbox"/> Stratified Layers (A5) (LRR C)	<input type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> 1 cm Muck (A9) (LRR D)	<input type="checkbox"/> Redox Dark Surface (F6)		
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)		
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)		
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Vernal Pools (F9)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)			

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):		Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Type: t; w. f"-p 20-40"	Depth (inches):	
Remarks: L. -1ftn4-:t t - 0- -1- .....4A.		

Wetland Hydrology Indicators: (required) Primary Indicators (any one indicator is sufficient)		Secondary Indicators (2 or more)	
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Salt Crust (B11)	<input type="checkbox"/> Water Marks (B1) (Riverine)	
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Biotic Crust (B12)	<input type="checkbox"/> Sediment Deposits (B2) (Riverine)	
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Aquatic Invertebrates (B13)	<input type="checkbox"/> Drift Deposits (B3) (Riverine)	
<input type="checkbox"/> Water Marks (B1) (Nonriverine)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> rainage Patterns (B10)	
<input type="checkbox"/> Sediment Depositions (B2) (Nonriverine)	<input type="checkbox"/> Oxidized Rhizopheres along Living Roots (C3)	<input type="checkbox"/> Dry-Seas9n Water"Table (C2)	
<input type="checkbox"/> Drift Deposits (B3) (Nonriverine)	<input type="checkbox"/> esence of Reduced Iron (C4)	<input type="checkbox"/> Thin Muck Surface (C7)	
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Recent Irtn Reduction in Plowed Soils i(C6)	<input type="checkbox"/> Crayfish Burrows (CS)	
<input type="checkbox"/> vlnundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> turation Visible on Aerial Imagery (C9)	
<input type="checkbox"/> Water-Stained Leaves (B9)		<input type="checkbox"/> Shallow Aquitard (D3)	
		<input type="checkbox"/> FAC-Neutral Test (D5)	

Field Observations:		Wetland Hydrology Present? Yes <input type="checkbox"/> No <input type="checkbox"/>
Surface Water Present? Yes <input type="checkbox"/> No <input type="checkbox"/>	Depth (inches): _____	
Water Table Present? Yes <input type="checkbox"/> No <input type="checkbox"/>	7 Depth (inches): _____	
Saturation Present? Yes <input type="checkbox"/> No <input type="checkbox"/>	0 Depth (inches): _____	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site / - # 73. / : City/County: Y1ttii..... Sampling Date: 1/1/0?  
 Applica e; --- H'41/'42f.o State: CA Sampling Point: 1.00  
 Investigat Cov @ Section, Township, Range, --- Slope (%): V  
 Landform (hillslope, terrace, etc.): ---/e-t--- Section, Township, Range, --- Slope (%): V  
 Soil Map Unit Name: 2J1, :s; O.Lr.M&-1>c.oo...; t'j;0), C.t.l.. NWI classification: ---  
 Subregion (LRR): --- Lat: --- Long: --- Datum: ---

Are climatic / hydrologic conditions on the site typical for this time of year? Yes --- No --- (If no, explain in Remarks.)  
 Are Vegetation L'h\_Q, Soil --- or Hydrology ....0 significantly disturbed? Are "Normal Circumstances" present? Yes --- No ---  
 Are Vegetation --- Soil --- or Hydrology --- naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <u>---</u> No <u>L</u>	within a Wetland? Yes <u>V:0</u>
Hydric Soil Present? Yes <u>Y</u> No <u>---</u>	Is the Sampled Area <u>---</u>
Wetland Hydrology Present? Yes <u>---</u> No <u>---</u>	

Remarks: Three/four years of drought conditions seem to have affected vegetation on this site. Invasive annuals (Brome) are dominant

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1. _____	_____	_____	_____	Number of Dominant Species <u>3</u> (A)
2. _____	_____	_____	_____	Total Number of Dominant Species _____
3. _____	_____	_____	_____	Species Across All Strata: <u>8</u> (B)
4. _____	_____	_____	_____	Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)
Total Cover: _____				
Sapling/Shrub Stratum				Prevalence Index worksheet:
1. _____	_____	_____	_____	Total % Cover of: _____ Multiply by: _____
2. _____	_____	_____	_____	FACW species <u>...rt.</u> x 2 = <u>1or</u>
3. _____	_____	_____	_____	OBL species _____ x 1 = _____
4. _____	_____	_____	_____	FAC species <u>---</u> x 3 = <u>---</u>
5. _____	_____	_____	_____	Prevalence Index = BIA = <u>1</u>
Total Cover: _____				Hydrophytic Vegetation Indicators:
Herb Stratum				Dominance Test is >50% <u>---</u>
1. <u>UNK #5 Phala maliflora</u>	<u>50</u>	<u>---</u>	<u>fac w</u>	Prevalence Index is :s3.0 <sup>1</sup> <u>---</u>
2. <u>Yellow star thistle</u>	<u>2</u>	<u>---</u>	<u>uPL</u>	Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) <u>---</u>
3. <u>UNK #1</u>	<u>trace</u>	<u>---</u>	<u>---</u>	Problematic Hydrophytic Vegetation <sup>1</sup> (Explain) <u>---</u>
4. <u>Brome (annual)</u>	<u>90</u>	<u>Yes</u>	<u>uPL</u>	
5. <u>UNK #7</u>	<u>trace</u>	<u>---</u>	<u>---</u>	
6. <u>Rumex</u>	<u>1</u>	<u>---</u>	<u>FACW</u>	
7. <u>Plantain</u>	<u>1</u>	<u>---</u>	<u>FACW</u>	
8. <u>Mustard (yellow)</u>	<u>trace</u>	<u>---</u>	<u>FACW</u>	
Total Cover: _____				
Woody Vine Stratum				Indicators of hydric soil and wetland hydrology must be present. <u>---</u>
1. _____	_____	_____	_____	Hydrophytic Vegetation Present? Yes No
2. _____	_____	_____	_____	
Total Cover: _____				
% Bare Ground in Herb Stratum _____	% Cover of Biotic Crust _____			

Remarks: Site resembles a vernal pool in landform position but due to 3 years of drought appears to have been invaded by annual upland species primarily Rippgut brome

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Color (moist)	Matrix	Color (moist)	Redox	Features	Loc <sup>2</sup>	Texture	Remarks
<i>5</i>	<i>10YR 4/1</i>	<i>4/1</i>	<i>10YR 4/1</i>	<i>2/1</i>				<i>da? t - lca, 8 - "L" - "</i>
		<i>B</i>			<i>I</i>		<i>O</i>	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix. <sup>2</sup>Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)	Indicators for Problematic Hydric Soils <sup>3</sup> :
<input type="checkbox"/> Histosol (A1) <input type="checkbox"/> Histic Epipedon (A2) <input type="checkbox"/> Black Histic (A3) <input type="checkbox"/> Hydrogen Sulfide (A4) <input type="checkbox"/> Stratified Layers (A5) (LRR C) <input type="checkbox"/> 1 cm Muck (A9) (LRR D) <input type="checkbox"/> Depleted Below Dark Surface (A11) <input type="checkbox"/> Thick Dark Surface (A12) <input type="checkbox"/> Sandy Mucky Mineral (S1) <input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> 1 cm Muck (A9) (LRR C) <input type="checkbox"/> 2 cm Muck (A10) (LRR 8) <input type="checkbox"/> Reduced Vertic (F18) <input type="checkbox"/> Red-Parent Material (Tf.2) <input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Sandy Redox (S5) <input type="checkbox"/> Stripped Matrix (S6) <input type="checkbox"/> Loamy Mucky Mineral (F1) <input type="checkbox"/> Loamy Gleyed Matrix (F2) <input type="checkbox"/> Depleted Matrix (F3) <input type="checkbox"/> Redox Dark Surface (F6) <input type="checkbox"/> Depleted Dark Surface (fl) <input type="checkbox"/> Redox Depressions (8) <input type="checkbox"/> Vernal Pools ( )	<sup>3</sup> Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present): Type: <i>;/)IL.. Jj2""-</i> Depth (inches): <i>r:120 - !f. 0"</i>	Hydric Soil Present? Yes <input type="checkbox"/> No <input type="checkbox"/>
---	---

Remarks: *all Mg concentration - in frequent flooding*

HYDROLOGY

Wetland Hydrology Indicators: (required) Primary Indicators (any one indicator is sufficient)	Secondary Indicators (2 or more)
<input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Water Marks (B1) (Nonriverine) <input type="checkbox"/> Sediment Deposits (B2) (Nonriverine) <input type="checkbox"/> Drift Deposits (B3) (Nonriverine) <input type="checkbox"/> Surface Soil Cracks (B6) <input checked="" type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Water-Stained Leaves (B9)	<input type="checkbox"/> Salt Crust (B11) <input type="checkbox"/> Biotic Crust (B12) <input type="checkbox"/> Aquatic Invertebrates (B13) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Recent Iron Reduction in Plowed Soils (C6) <input type="checkbox"/> Other (Explain in Remarks)
	<input type="checkbox"/> Water Marks (B1) (Riverine) <input type="checkbox"/> Sediment Deposits (B2) (Riverine) <input type="checkbox"/> Drift Deposits (B3) (Riverine) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Inundation Visible on Aerial Imagery (C9) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> FAC-Neutral Test (D5)

Field Observations:	Wetland Hydrology Present? Yes <input type="checkbox"/> No <input type="checkbox"/>
Surface Water Present? Yes <input type="checkbox"/> No <input type="checkbox"/> Depth (inches): _____ Water Table Present? Yes <input type="checkbox"/> No <input type="checkbox"/> Depth (inches): _____ Saturation Present? Yes <input type="checkbox"/> No <input type="checkbox"/> Depth (inches): _____	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/State: ruitr<.. e:!"J Le III!<.. City/County: IMF:A Sampling Date: f,l,/σj/111--  
 Applicant/Owner: C'o'f "> State: CA Sampling Point: /, 00  
 Investigator(s): U, j U ttc (l'd'lection, Township, Range): \_\_\_\_\_  
 Landform (hillslope, terrace, etc.): \_\_\_\_\_ Local relief (concave, convex, none): ty&J- Slope (%): \_\_\_\_\_  
 Subregion (LRR): \_\_\_\_\_ Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: \_\_\_\_\_  
 Soil Map Unit Name: \_\_\_\_\_ NWI classification: \_\_\_\_\_

Are climatic / hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  
 Are Vegetation 0, Soil \_\_\_\_\_ or Hydrology 0 significantly disturbed? Are "Normal Circumstances" present? Yes \_\_\_\_\_ No \_\_\_\_\_  
 Are Vegetation \_\_\_\_\_ Soil \_\_\_\_\_ or Hydrology \_\_\_\_\_ naturally problematic? \_\_\_\_\_ (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	No	_____
Hydric Soil Present?	Yes	No	<input checked="" type="checkbox"/>
Wetland Hydrology Present?	Yes	No	<input type="checkbox"/>

ts the Sampled Area within a Wetland? Yes \_\_\_\_\_ No \_\_\_\_\_

Remarks: 5;--+e IA.v:"t 'e,.. il>-e.L c-H.. part anal used as a 60 site. "S.: :1") were moist at time of sampling (mid/late summer) other soils in the area were dry

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
<u>MONPKU f</u>	<u>2</u>			Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)
Total Cover: _____				Total Number of Dominant Species Across All Strata: _____ (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)				
Sapling/Shrub Stratum				Prevalence Index worksheet:
Total % Cover of: _____				Multiply by: _____
1. _____				OBL species _____
2. _____				FACW species <u>9</u> x 2 = <u>18</u>
3. _____				FAC species <u>1</u> x 3 = <u>3</u>
4. _____				FACU species <u>1.25</u> x 4 = <u>300</u>
5. <u>unk #5 10% phyla nali flora</u>				UPL species <u>3</u> x 5 = <u>15</u>
Total Cover: _____				Column Totals: <u>88</u> (A) <u>336</u> (B)
Prevalence Index = B/A = <u>3.8</u>				
Herb Stratum				Hydrophytic Vegetation Indicators:
1. <u>Plantain</u>				Dominance Test is >50%
2. <u>Rumex</u>				Prevalence Index is .03.0 <sup>1</sup>
3. <u>Yetch</u>				Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)
4. <u>Distichlis</u>				Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)
5. <u>Avena sativa</u>				
6. <u>Morning glory</u>				
7. <u>Star thistle</u>				
8. <u>unk #1</u>				
9. <u>Chickory 25%</u>				
Total Cover: <u>T</u>				
Woody Vine Stratum				'Indicators of hydric soil and wetland hydrology must be present.
1. _____				Hydrophytic vegetation Present? Yes _____ No <input checked="" type="checkbox"/>
2. _____				
Total Cover: _____				
% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____				

Remarks: \_\_\_\_\_

11  
.45

SOIL

Sampling Point: J D(;<:"

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

Depth (inches)	Matrix		Redox Features		Loe	Texture	Remarks
	Color (moist)	%	Color (moist)	%			
	Y:s'ik..	14				ny: 111ft.	...

Type: C=Concentration, D=Depletion, RM=Reduced Matrix. Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

<p>Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)</p> <p><input type="checkbox"/> Histosol (A1)</p> <p><input type="checkbox"/> Histic Epipedon (A2)</p> <p><input type="checkbox"/> Black Histic (A3)</p> <p><input type="checkbox"/> Hydrogen Sulfide (A4)</p> <p><input type="checkbox"/> Stratified Layers (A5) (LRR C)</p> <p><input type="checkbox"/> 1 cm Muck (A9) (LRR D)</p> <p><input type="checkbox"/> Depleted Below Dark Surface (A11)</p> <p><input type="checkbox"/> Thick Dark Surface (A12)</p> <p><input type="checkbox"/> Sandy Mucky Mineral (S1)</p> <p><input type="checkbox"/> Sandy Gleyed Matrix (S4)</p>	<p>Indicators for Problematic Hydric Soils:</p> <p><input type="checkbox"/> 1 cm Muck (A9) (LRR C)</p> <p><input type="checkbox"/> 2 cm Muck (A10) (LRR B)</p> <p><input type="checkbox"/> Reduced Vertic (F18)</p> <p><input type="checkbox"/> Red Parent Material (TF2)</p> <p><input type="checkbox"/> Other (Explain in Remarks)</p>
<p><input type="checkbox"/> Sandy Redox (S5)</p> <p><input type="checkbox"/> Stripped Matrix (S6)</p> <p><input type="checkbox"/> Loamy Mucky Mineral (F1)</p> <p><input type="checkbox"/> Loamy Gleyed Matrix (F2)</p> <p><input type="checkbox"/> Depleted Matrix (F3)</p> <p><input type="checkbox"/> Redox Dark Surface (F6)</p> <p><input type="checkbox"/> Depleted Dark Surface (F)</p> <p><input type="checkbox"/> Redox Depressions (F8)</p> <p><input type="checkbox"/> Vernal Pools (F9)</p>	<p>'Indicators of hydrophytic vegetation and wetland hydrology must be present.'</p>

Restrictive Layer (if present):

Type: \_\_\_\_\_

Depth (inches): \_\_\_\_\_

Remarks: Jo/n0Hl/rk1 rñ01,)f- U{A5/UIZD&g

Hydric Soil Present? Yes \_\_\_ No

HYDROLOGY

<p>Wetland Hydrology Indicators:</p> <p>Primary Indicators (any one indicator is "sufficient")</p> <p><input type="checkbox"/> Surface Water (A1)</p> <p><input type="checkbox"/> High Water Table (A2)</p> <p><input type="checkbox"/> Saturation (A3)</p> <p><input type="checkbox"/> Water Marks (B1) (Nonriverine)</p> <p><input type="checkbox"/> Sediment Deposits (B2) (Nonriverine)</p> <p><input type="checkbox"/> Drift Deposits (B3) (Nonriverine)</p> <p><input type="checkbox"/> Surface Soil Cracks (B6)</p> <p><input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)</p> <p><input type="checkbox"/> Water-Stained Leaves (B9)</p>	<p>Secondary Indicators (2 or more required)</p> <p><input type="checkbox"/> Water Marks (B1) (Riverine)</p> <p><input type="checkbox"/> Sediment Deposits (B2) (Riverine)</p> <p><input type="checkbox"/> Drift Deposits (B3) (Riverine)</p> <p><input type="checkbox"/> Drainage Patterns (B10)</p> <p><input type="checkbox"/> Dry-Season Water Table (C2)</p> <p><input type="checkbox"/> Thin Muck Surface (C7)</p> <p><input type="checkbox"/> Crayfish Burrows (CS)</p> <p><input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)</p> <p><input type="checkbox"/> Shallow Aquitard (D3)</p> <p><input type="checkbox"/> FAC-Neutral Test (D5)</p>
<p>Field Observations:</p> <p>Surface Water Present? Yes ___ No <input checked="" type="checkbox"/> Depth (inches): _____</p> <p>Water Table Present? Yes ___ No <input checked="" type="checkbox"/> Depth (inches): _____</p> <p>Saturation Present? (includes capillary fringe) Yes ___ No _____ Depth (inches): _____</p>	<p>Wetland Hydrology Present? Yes ___ No <input checked="" type="checkbox"/></p>

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: ;

WETLAND DETERMINATION DATA FORM - Arid West Region

///lt>/GKf

Project/Site **AS'1V: e { : flc /2: w, le., e.E'.....** City/County: **-Y&#8;** Sampling Date **foo6**  
 Applicant/Owner: **IS... :sr e.** State: \_\_\_\_\_  
 Investigator(s): **(S:J:ttJJ(J J )(-ol) :** Section, Township, Range: \_\_\_\_\_  
 Landform (hillslope, terrace, etc.): **.fief ilis>S -:-;-;** Local relief (concave, convex, none): \_\_\_\_\_ Slope (%): **12..L**  
 Subregion (LRR): \_\_\_\_\_ Lat: \_\_\_\_\_ Long: \_\_\_\_\_ Datum: \_\_\_\_\_

Soil Map Unit Name: **(J(J\_4:t\_a\_i''--LJ'-IM IA..J.A'A'..... !ut!:JLln! "J! "E:J)** NWI classification: \_\_\_\_\_  
 Are climatic /hydrologic conditions on the site typical for this time of year? Yes \_\_\_\_\_ (If no, explain in Remarks.)  
 Are Vegetation Soil or Hydrology significantly disturbed? Yes \_\_\_\_\_ No \_\_\_\_\_ Are "Normal Circumstances" present? Yes \_\_\_\_\_ No \_\_\_\_\_  
 Are Vegetation Soil or Hydrology naturally problematic? Yes \_\_\_\_\_ No \_\_\_\_\_ (If needed, explain any answers in Remarks.)

**SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.**

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Is the Sampled Area within a Wetland?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Hydric Soil Present?	Yes <input type="checkbox"/>	No <input type="checkbox"/>			
Wetland Hydrology Present?	Yes <input type="checkbox"/>	No <input type="checkbox"/>			
Remarks:					

**VEGETATION**

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status	.Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <b>:l_</b> (A) Total Number of Dominant Species Across All Strata: <b>:2...</b> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <b>1 0-fo</b> (A/B)
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
Total Cover: _____				
SaQling/Shrub Stratum				.Hydrophytic Vegetation Indicators: .Dominance Test is >50% _____ .Prevalence Index is >3.0 _____ .Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) _____ .Problematic Hydrophytic Vegetation <sup>1</sup> (Explain) _____ <sup>11</sup> Indicators of hydric soil and wetland hydrology must be present.
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
Total Cover: <b>LtPO</b>				
Herb Stratum				.Hydrophytic Vegetation Present? Yes <input type="checkbox"/> No <input type="checkbox"/>
1. <b>pl.c</b> <b>tlcb! y,</b> <b>:2-</b> <b>.Ql.c.Y</b>	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
Total Cover: _____				
Woody Vine Stratum				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
Total Cover: _____				
% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____				
Remarks: <b>-:5wtJ e&gt;dl-t.J..p&lt; c} ul( kv C=7 /&lt;-..,</b> <b>"11</b> <b>Jl?:?t. /</b> <b>-,;.,#v-</b> <b>”</b>				





SOIL

Sampling Point: J..Db'

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Redox Features Color (moist)	Loc <sup>2</sup>	Texture	Remarks
10"	6/8 10"/	3/5 to/yL			Iron concretions Reduced Iron

Type: C=Concentration, D=Depletion, RM=Reduced Matrix. <sup>2</sup>Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

Indicators for Problematic Hydric Soils<sup>3</sup>:

<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 1 cm Muck (A9) (LRR C)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> 2 cm Muck (A10) (LRR B)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1)	<input type="checkbox"/> Reduced Vertic (F18)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Red Parent Material (TF2)
<input type="checkbox"/> Stratified Layers (A5) (LRR C)	<input type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> 1 cm Muck (A9) (LRR D)	<input type="checkbox"/> Redox Dark Surface (F6)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)	
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Vernal Pools (F9)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)		

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: <:J4 19 **t**  
 Depth (inches): ..... .ee- w--l...p

Hydric Soil Present? Yes **V.** No     

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:	Secondary Indicators (2 or more required)
Primary Indicators (any one indicator is sufficient)	<input type="checkbox"/> Water Marks (B1) (Riverine)
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Sediment Deposits (B2) (Riverine)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Drift Deposits (B3) (Riverine)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Water Marks (BI) (Nonriverine)	<input type="checkbox"/> Dry-Season Water Table (C2)
<input type="checkbox"/> Sediment Deposits (B2) (Nonriverine)	<input type="checkbox"/> Thin Muck Surface (C7)
<input type="checkbox"/> Drift Deposits (B3) (Nonriverine)	<input type="checkbox"/> Crayfish Burrows (CB)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Water-Stained Leaves (B9)	<input type="checkbox"/> FAG-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes      No      Depth (inches):       
 Water Table Present? Yes      No      **Z** Depth (inches):       
 Saturation Present? Yes      No      **V** Depth (inches):       
 (includes capillary fringe)

Wetland Hydrology Present? Yes      No     

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Toe drain along existing levee

**WETLAND DETERMINATION DATA FORM - Arid West Region**

Project/Site: J11 (q1) (vi) 1f R, 1 le 1-U. City/County: Yubö Sampling Date: 11/13/07  
 Applicant/Owner: --- State: CA Sampling Point: U#1? Z  
 Investigator(s): --- Section, Township, Range: ---  
 Landform (hillslope, terrace, etc.): --- Local relief (concave, convex, none): LOVi C #12 Slope (%): ---  
 Subregion (LRR): --- Lat: --- Long: --- Datum: ---  
 Soil Map Unit Name: J21.Lf2. ....u:!!E.li.<H< !M.!!.....-!<Al --!..4LJMM!!d!!WIR.dM:;ÿ NWI classification: ---  
 Are climatic /hydrologic conditions on the site typical for this time of year? --- (f no, explain in Remarks.)  
 Are Vegetation, Soil, or Hydrology "k-f" significantly disturbed? --- Are "Normal Circumstances" present? Yes V No ---  
 Are Vegetation, Soil, or Hydrology naturally problematic? --- (If needed, explain any answers in Remarks.)

**SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.**

Hydrophytic Vegetation Present?	Yes <u>---</u> No <u>✓</u>	Is the Sampled Area within a Wetland? Yes <u>✓</u> No <u>---</u>
Hydric Soil Present?	Yes <u>✓</u> No <u>---</u>	
Wetland Hydrology Present?	Yes <u>✓</u> No <u>---</u>	

Remarks: Site is a wetland: 3 years of drought has shifted site toward a dominance of annual weedy/invasive? f'p.c'r.te. ....>. danger liord species, adjacent to, and within the area are wetland species cottonwood, blackberry, wild rose

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1. <u>---</u>				Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A)
2. <u>---</u>				
3. <u>---</u>				
Total Cover: <u>---</u>				Total Number of Dominant Species Across All Strata: <u>1</u> (B)
Total Cover: <u>---</u>				Percent of Dominant Species That Are OBL, FACW, or FAC: <u>63</u> (A/B)
Sapling/Shrub Stratum	Total Cover: <u>---</u>			Prevalence Index worksheet:
1. <u>---</u>				Total % Cover of: <u>---</u> Multipl. b): <u>---</u>
2. <u>---</u>				OBL species <u>---</u>
3. <u>---</u>				FACW species <u>LI</u> x 2 = <u>22...</u>
4. <u>---</u>				FAC species <u>---</u>
5. <u>---</u>				FACU species <u>3</u> x 4 = <u>12</u>
Total Cover: <u>---</u>				UPL species <u>0</u> x 5 = <u>0</u>
Total Cover: <u>---</u>				Column Totals: (A) <u>36</u> (B) <u>---</u>
Herb Stratum	Total Cover: <u>---</u>			Prevalence Index = B/A = <u>4.0</u>
1. <u>Ve(f-i-Vl.vl t7..wrvh)</u>	<u>ii</u>			Dominance Test is >50% Prevalence Index is 53.0 Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present
2. <u>zvrll rVrJc.f</u>	<u>---</u>			
3. <u>bo t f(i..)</u>	<u>---</u>			
4. <u>(rJo 1;V&lt;V r ti</u>	<u>---</u>			
5. <u>Yl/ J&amp;t f(1\ tuY. of</u>	<u>---</u>			
6. <u>r   f(1\ tuY. of</u>	<u>---</u>			
7. <u>Pur, Le. V.t f tel;J</u>	<u>10</u>			
8. <u>A/P, J, i (dV II/</u>	<u>2</u>			
Total Cover: <u>---</u>				
Woody Vine Stratum	Total Cover: <u>---</u>			
1. <u>---</u>				
2. <u>---</u>				
Total Cover: <u>---</u>				
% Bare Ground in Herb Stratum <u>---</u> % Cover of Biotic Crust <u>---</u>				
Hydrophytic Vegetation Present? Yes <u>---</u> No <u>---</u>				

Remarks: Cotton wood on edge FAC  
Blackberry on edge FAC  
Wild rose on edge FAC  
Fig on edge

SOIL

Sampling Point: \_\_\_\_\_

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inch.es)	Matrix		Redox Features			Loc <sup>2</sup>	Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type <sup>1</sup>			
								1
								Vi?

<sup>1</sup>Type: C=Concentration, D=Depletion, RM=Reduced Matrix. <sup>2</sup>Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)	Indicators for Problematic Hydric Soils <sup>3</sup> :
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> 1 cm Muck (A9) (LRR C)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> 2 cm Muck (A10) (LRR B)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Reduced Vertic (F18)
<input type="checkbox"/> Stratified Layers (A,5) (LRR C)	<input type="checkbox"/> Red Parent Material (TF2)
<input type="checkbox"/> 1 cm Muck (A9) (LRR D)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	
<input type="checkbox"/> Thiek Dark Surface (A12i)	
<input type="checkbox"/> Sandy Mucky Mineral (S1)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	
<input type="checkbox"/> Sandy Redox (S5)	
<input type="checkbox"/> Stripped Matrix (S6)	
<input type="checkbox"/> Loamy Mucky Mineral (F1)	
<input type="checkbox"/> Loamy Gleyed Matrix (F2)	
<input type="checkbox"/> Depleted Matrix (F3)	
<input type="checkbox"/> Redox Dark Surface (F6)	
<input type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Rdbx depressions (F8)	
<input type="checkbox"/> Vernal Pools (F9)	

<sup>3</sup>Indicator of hydrophytic vegetation and wetland hydrology must be present

Restrictive Layer (if present):  
 Type: \_\_\_\_\_  
 Depth (inches): \_\_\_\_\_ *pan but at surface*  
 Hydric Soil Present? Yes / No  
 Remarks: *at this location site has been used as a borrow area.*

HYDROLOGY

Wetland Hydrology Indicators: (any one indicator is sufficient)	Secondary Indicators (2 or more required)
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Water Marks (B1) (Riverine)
<input type="checkbox"/> High Water-Table (A2)	<input type="checkbox"/> Sediment Deposits (B2) (Riverine)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Drift Deposits (B3) (Riverine)
<input type="checkbox"/> Water Marks (B1) (Nonriverine)	<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Sediment Deposits (B2) (Nonriverine)	<input type="checkbox"/> Dry-Season Water Table (C2)
<input type="checkbox"/> Drift Deposits (B3) (Nonriverine)	<input type="checkbox"/> Thin Muck Surface (C7)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Fish Burrows (C8)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Water-Stained Leaves (B9)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Salt Crust (B11)	<input type="checkbox"/> FAG-Neutral Test (D5)
<input type="checkbox"/> Biotic Crust (B12)	
<input type="checkbox"/> Aquatic Invertebrates (B13)	
<input type="checkbox"/> Sulfide Odor (C1)	
<input type="checkbox"/> Reduced Iron (C4)	
<input type="checkbox"/> Recent iron Reduction in Plowed Soils (C6)	
<input type="checkbox"/> Other (Explain in Remarks)	

Field Observations:  
 Surface Water Present? Yes No Depth (inches): \_\_\_\_\_  
 Water Table Present? Yes No Depth (inches): \_\_\_\_\_  
 Saturation Present? Yes No Depth (inches): \_\_\_\_\_  
 Wetland Hydrology Present? Yes No \_\_\_\_\_

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:  
 Remarks: *Soil was moist but not saturated*

**APPENDIX B**

**AIR QUALITY**

# Road Construction Emissions Model Data Entry Worksheet

Version 6.3.2



Optional data input sections have a blue background. Only areas with a yellow or blue background can be modified. Program defaults have a white background. The user is required to enter information in cells C10 through C25.

## Input Type

Project Name	MRL - Phase 1B -no gens	
Construction Start Year	2011	Enter a Year between 2005 and 2025 (inclusive)
Project Type		1 New Road Construction 2 Road Widening 3 Bridge/Overpass Construction
Project Construction Time	7.0	months
Predominant Soil/Site Type: Enter 1, 2, or 3		1. Sand Gravel 2. Weathered Rock-Earth 3. Blasted Rock
Project Length	1.1	miles
Total Project Area	10.7	acres
Maximum Area Disturbed/Day	2.0	acres
Water Trucks Used?	1	1. Yes 2. No
Soil Imported	205.0	yd <sup>3</sup> /day
Soil Exported	182.0	yd <sup>3</sup> /day
Average Truck Capacity	20.0	yd <sup>3</sup> (assume 20 if unknown)

The remaining sections of this sheet contain areas that can be modified by the user, although those modifications are optional.

Note: The program's estimates of construction period phase length can be overridden in cells C34 through C37.

Construction Periods	User Override of		Program
	Construction Months		Calculated
Grubbing/Land Clearing	0.30	0.70	0.00
Grading/Excavation	2.50	2.80	0.00
Drainage/Utilities/Sub-Grade	4.00	2.45	0.00
Paving	0.20	1.05	0.00
<b>Totals</b>	<b>7.00</b>	<b>7.00</b>	<b>0.00</b>

2005	%	2006	%	2007	%
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00

Hauling emission default values can be overridden in cells C45 through C46.

Soil Hauling Emissions	User Override of							
	Soil Hauling Defaults	Default Values	ROG	NOx	CO	PM10	PM2.5	CO2
User Input								
Miles/round trip	10.00	30						
Round trips/day	21.00	19						
Vehicle miles traveled/day (calculated)					210			
<b>Hauling Emissions</b>								
Emission rate (grams/mile)	1.02	13.03	6.99	0.49	0.43	1861.89		
Emission rate (grams/trip)	11.39	8.02	196.83	0.02	0.01	217.22		
Pounds per day	1.4	6.7	20.0	0.2	0.2	879.7		
Tons per construction period	0.04	0.18	0.55	0.01	0.01	24.19		



Fugitive Dust - Grubbing/Land Clearing	1.00	2	10.0	0.0	2.1	0.0
Fugitive Dust - Grading/Excavation	0.50	2	5.0	0.2	1.0	0.0
Fugitive Dust - Drainage/Utilities/Subgrade	1.00	2	10.0	0.3	2.1	0.1



# Road Construction Emissions Model Data Entry Worksheet

Version 6.3.2



Note: Required data input sections have a yellow background.  
Optional data input sections have a blue background. Only areas with a yellow or blue background can be modified. Program defaults have a white background.  
The user is required to enter information in cells C10 through C25.

## Input Type

Project Name	MRL - Phase 1A	
Construction Start Year	2010	Enter a Year between 2005 and 2025 (inclusive)
Project Type	2	1 New Road Construction 2 Road Widening 3 Bridge/Overpass Construction
Project Construction Time	3.0	months
Predominant Soil/Site Type: Enter 1, 2, or 3	1	1. Sand Gravel 2. Weathered Rock-Earth 3. Blasted Rock
Project Length	0.5	miles
Total Project Area	8.1	acres
Maximum Area Disturbed/Day	0.5	acres
Water Trucks Used?	1	1. Yes 2. No
Soil Imported	762.0	yd <sup>3</sup> /day
Soil Exported	0.0	yd <sup>3</sup> /day
Average Truck Capacity	20.0	yd <sup>3</sup> (assume 20 if unknown)

To begin a new project, click this button to clear data previously entered. This button will only work if you opted not to disable macros when loading this spreadsheet.

The remaining sections of this sheet contain areas that can be modified by the user, although those modifications are optional.

Note: The program's estimates of construction period phase length can be overridden in cells C34 through C37.

Construction Periods	User Override of		Program
	Construction Months	Months	Calculated
Grubbing/Land Clearing	0.30	0.30	0.00
Grading/Excavation	2.70	1.20	0.00
Drainage/Utilities/Sub-Grade	0.00	1.05	0.00
Paving	0.00	0.45	0.00
<b>Totals</b>	<b>3.00</b>	<b>3.00</b>	

2005	%	2006	%	2007	%
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00

Hauling emission default values can be overridden in cells C45 through C46.

Soil Hauling Emissions	User Override of							
	Soil Hauling Defaults	Default Values	ROG	NOx	CO	PM10	PM2.5	CO2
User Input								
Miles/round trip	10.00	30						
Round trips/day		38						
Vehicle miles traveled/day (calculated)					381			
<b>Hauling Emissions</b>								
Emission rate (grams/mile)	1.11	14.47	7.75	0.56	0.48	1855.42		
Emission rate (grams/trip)	11.78	8.19	205.93	0.02	0.01	223.55		

Pounds per day	2.9	13.5	41.1	0.5	0.4	1594.6
Tons per construction period	0.09	0.40	1.22	0.01	0.01	47.36

Worker commute default values can be overridden in cells C60 through C65.

Worker Commute Emissions	User Override of Worker		Default Values					
	Commute Default Values	Default Values	ROG	NOx	CO	PM10	PM2.5	CO2
Miles/ one-way trip		20						
One-way trips/day		2						
No. of employees: Grubbing/Land Clearing	6.00	4						
No. of employees: Grading/Excavation		6						
No. of employees: Drainage/Utilities/Sub-Grade	0.00	6						
No. of employees: Paving	0.00	5						
			ROG	NOx	CO	PM10	PM2.5	CO2
Emission rate - Grubbing/Land Clearing (grams/mile)			0.169	0.294	2.971	0.034	0.019	426.400
Emission rate - Grading/Excavation (grams/mile)			0.169	0.294	2.971	0.034	0.019	426.400
Emission rate - Draining/Utilities/Sub-Grade (gr/mile)			0.000	0.000	0.000	0.000	0.000	0.000
Emission rate - Paving (grams/mile)			0.000	0.000	0.000	0.000	0.000	0.000
Emission rate - Grubbing/Land Clearing (grams/trip)			0.953	0.402	9.269	0.120	0.012	191.400
Emission rate - Grading/Excavation (grams/trip)			0.953	0.402	9.269	0.120	0.012	191.400
Emission rate - Draining/Utilities/Sub-Grade (gr/trip)			0.000	0.000	0.000	0.000	0.000	0.000
Emission rate - Paving (grams/trip)			0.000	0.000	0.000	0.000	0.000	0.000
Pounds per day - Grubbing/Land Clearing			0.140	0.177	2.061	0.024	0.011	235.528
Tons per const. Period - Grub/Land Clear			0.000	0.001	0.007	0.000	0.000	0.777
Pounds per day - Grading/Excavation			0.140	0.177	2.061	0.024	0.011	235.528
Tons per const. Period - Grading/Excavation			0.004	0.005	0.061	0.001	0.000	6.995
Pounds per day - Drainage/Utilities/Sub-Grade			0.000	0.000	0.000	0.000	0.000	0.000
Tons per const. Period - Drain/Util/Sub-Grade			0.000	0.000	0.000	0.000	0.000	0.000
Pounds per day - Paving			0.000	0.000	0.000	0.000	0.000	0.000
Tons per const. Period - Paving			0.000	0.000	0.000	0.000	0.000	0.000
tons per construction period			0.005	0.006	0.068	0.001	0.000	7.772

Water truck default values can be overridden in cells C91 through C93 and E91 through E93.

Water Truck Emissions	User Override of		Program Estimate of		User Override of Truck		Default Values					
	Default # Water Trucks	Number of Water Trucks	Number of Water Trucks	Miles Traveled/Day	Miles Traveled/Day	Miles Traveled/Day	ROG	NOx	CO	PM10	PM2.5	CO2
Grubbing/Land Clearing - Exhaust		1	1	10.00	40							
Grading/Excavation - Exhaust		1	1	10.00	40							
Drainage/Utilities/Subgrade	0.00	1	1	0.00	40							
			ROG	NOx	CO	PM10	PM2.5	CO2				
Emission rate - Grubbing/Land Clearing (grams/mile)			1.11	14.47	7.75	0.56	0.48	1855.42				
Emission rate - Grading/Excavation (grams/mile)			1.11	14.47	7.75	0.56	0.48	1855.42				
Emission rate - Draining/Utilities/Sub-Grade (gr/mile)			0.00	0.00	0.00	0.00	0.00	0.00				
Pounds per day - Grubbing/Land Clearing			0.02	0.32	0.17	0.01	0.01	40.87				
Tons per const. Period - Grub/Land Clear			0.00	0.01	0.01	0.00	0.00	1.21				
Pound per day - Grading/Excavation			0.02	0.32	0.17	0.01	0.01	40.87				
Tons per const. Period - Grading/Excavation			0.00	0.01	0.01	0.00	0.00	1.21				
Pound per day - Drainage/Utilities/Subgrade			0.00	0.00	0.00	0.00	0.00	0.00				
Tons per const. Period - Drainage/Utilities/Subgrade			0.00	0.00	0.00	0.00	0.00	0.00				

Fugitive dust default values can be overridden in cells C110 through C112.

<b>Fugitive Dust</b>	User Override of Max	Default	PM10	PM10	PM2.5	PM2.5
	Acreage Disturbed/Day	Maximum Acreage/Day	pounds/day	tons/per period	pounds/day	tons/per period
Fugitive Dust - Grubbing/Land Clearing		0.5	5.0	0.0	1.0	0.0
Fugitive Dust - Grading/Excavation		0.5	5.0	0.1	1.0	0.0
Fugitive Dust - Drainage/Utilities/Subgrade		0	0.0	0.0	0.0	0.0

### Off-Road Equipment Emissions

Grubbing/Land Clearing		Default	ROG	CO	NOx	PM10	PM2.5	CO2
Override of Default Number of Vehicles	Number of Vehicles	Type	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
	<i>Program-estimate</i>							
		Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00
		Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00
		Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00
		Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00
		Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00
		Cranes	0.00	0.00	0.00	0.00	0.00	0.00
		Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00
1.00		Excavators	0.72	3.27	5.44	0.32	0.30	547.36
		Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00
		Graders	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00
		Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Pavers	0.00	0.00	0.00	0.00	0.00	0.00
		Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00
		Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00
		Pumps	0.00	0.00	0.00	0.00	0.00	0.00
		Rollers	0.00	0.00	0.00	0.00	0.00	0.00
		Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1	Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00
		Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00
0.50	1	Scrapers	0.92	3.82	8.65	0.35	0.32	811.88
0.00	1	Signal Boards	0.00	0.00	0.00	0.00	0.00	0.00
		Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00
		Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00
		Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00
		Trenchers	0.00	0.00	0.00	0.00	0.00	0.00
		Welders	0.00	0.00	0.00	0.00	0.00	0.00
	Grubbing/Land Clearing	pounds per day	1.6	7.1	14.1	0.7	0.6	1359.2
	Grubbing/Land Clearing	tons per phase	0.0	0.0	0.0	0.0	0.0	4.5

Grading/Excavation		Default	ROG	CO	NOx	PM10	PM2.5	CO2
Override of Default Number of Vehicles	Number of Vehicles	Type	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
	<i>Program-estimate</i>							
		Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00
		Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00
		Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00
		Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00
		Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00

	0	Cranes	0.00	0.00	0.00	0.00	0.00	0.00	
		Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	
	1	Excavators	0.72	3.27	5.44	0.32	0.30	547.36	
		Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	
		Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00	
0.00	1	Graders	0.00	0.00	0.00	0.00	0.00	0.00	
		Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	
		Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	
2.00	0	Other Construction Equipment	0.94	3.86	6.16	0.53	0.49	575.56	
		Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00	
		Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00	
		Pavers	0.00	0.00	0.00	0.00	0.00	0.00	
		Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00	
		Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00	
		Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	
		Pumps	0.00	0.00	0.00	0.00	0.00	0.00	
1.00		Rollers	0.61	2.12	3.75	0.33	0.30	299.86	
		Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	
		Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00	
	1	Rubber Tired Loaders	0.64	2.73	4.98	0.29	0.26	458.86	
0.50	1	Scrapers	0.92	3.82	8.65	0.35	0.32	811.88	
0.00	1	Signal Boards	0.00	0.00	0.00	0.00	0.00	0.00	
		Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	
		Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	
		Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	
		Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00	
		Trenchers	0.00	0.00	0.00	0.00	0.00	0.00	
		Welders	0.00	0.00	0.00	0.00	0.00	0.00	
		Grading/Excavation	pounds per day	3.8	15.8	29.0	1.8	1.7	2693.5
		Grading	tons per phase	0.1	0.5	0.9	0.1	0.0	80.0

Drainage/Utilities/Subgrade	Default Number of Vehicles		ROG	CO	NOx	PM10	PM2.5	CO2
			Override of Default Number of Vehicles	Program-estimate	pounds/day	pounds/day	pounds/day	pounds/day
		Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00
		Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00
		Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00
		Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00
		Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00
		Cranes	0.00	0.00	0.00	0.00	0.00	0.00
		Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Excavators	0.00	0.00	0.00	0.00	0.00	0.00
		Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1	Graders	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00
		Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Pavers	0.00	0.00	0.00	0.00	0.00	0.00
		Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1	Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00

		Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00
		Pumps	0.00	0.00	0.00	0.00	0.00	0.00
		Rollers	0.00	0.00	0.00	0.00	0.00	0.00
		Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00
		Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1	Scrapers	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1	Signal Boards	0.00	0.00	0.00	0.00	0.00	0.00
		Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00
		Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00
		Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1	Trenchers	0.00	0.00	0.00	0.00	0.00	0.00
		Welders	0.00	0.00	0.00	0.00	0.00	0.00
	Drainage	pounds per day	0.0	0.0	0.0	0.0	0.0	0.0
	Drainage	tons per phase	0.0	0.0	0.0	0.0	0.0	0.0

Paving	Default		ROG	CO	NOx	PM10	PM2.5	CO2	
	Override of Default Number of Vehicles	Number of Vehicles <i>Program-estimate</i>	Type	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
			Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00
			Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00
			Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00
			Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00
			Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00
			Cranes	0.00	0.00	0.00	0.00	0.00	0.00
			Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00
			Excavators	0.00	0.00	0.00	0.00	0.00	0.00
			Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
			Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00
			Graders	0.00	0.00	0.00	0.00	0.00	0.00
			Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00
			Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00
			Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00
			Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00
			Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1		Pavers	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1		Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00
			Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00
			Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00
			Pumps	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1		Rollers	0.00	0.00	0.00	0.00	0.00	0.00
			Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
			Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00
			Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00
			Scrapers	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1		Signal Boards	0.00	0.00	0.00	0.00	0.00	0.00
			Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00
			Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00
			Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00
			Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00
			Trenchers	0.00	0.00	0.00	0.00	0.00	0.00
			Welders	0.00	0.00	0.00	0.00	0.00	0.00

Paving	pounds per day	0.0	0.0	0.0	0.0	0.0	0.0
Paving	tons per phase	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total Emissions all Phases (tons per construction period) =&gt;</b>		0.1	0.5	0.9	0.1	0.1	84.5

Equipment default values for horsepower, load factor, and hours/day can be overridden in cells C285 through C317, E285 through E317, and G285 through G317.

Equipment	Default Values Horsepower	Default Values Load Factor	Default Values Hours/day
Aerial Lifts	60	0.46	8
Air Compressors	106	0.48	8
Bore/Drill Rigs	291	0.75	8
Cement and Mortar Mixers	10	0.56	8
Concrete/Industrial Saws	19	0.73	8
Cranes	399	0.43	8
Crushing/Proc. Equipment	142	0.78	8
Excavators	168	0.57	8
Forklifts	145	0.30	8
Generator Sets	549	0.74	8
Graders	174	0.61	8
Off-Highway Tractors	267	0.65	8
Off-Highway Trucks	479	0.57	8
Other Construction Equipment	75	0.62	8
Other General Industrial Equipment	238	0.51	8
Other Material Handling Equipment	191	0.59	8
Pavers	100	0.62	8
Paving Equipment	104	0.53	8
Plate Compactors	8	0.43	8
Pressure Washers	1	0.60	8
Pumps	53	0.74	8
Rollers	95	0.56	8
Rough Terrain Forklifts	93	0.60	8
Rubber Tired Dozers	357	0.59	8
Rubber Tired Loaders	157	0.54	8
Scrapers	313	0.72	8
Signal Boards	20	0.78	8
Skid Steer Loaders	44	0.55	8
Surfacing Equipment	362	0.45	8
Sweepers/Scrubbers	91	0.68	8
Tractors/Loaders/Backhoes	108	0.55	8
Trenchers	63	0.75	8
Welders	45	0.45	8

0

END OF DATA ENTRY SHEET

### Off-Road Equipment Emissions

Grubbing/Land Clearing		Default	ROG	CO	NOx	PM10	PM2.5	CO2
Override of Default Number of Vehicles	Number of Vehicles	Type	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
	<i>Program-estimate</i>							
		Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00
		Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00
		Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00
		Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00
		Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00
		Cranes	0.00	0.00	0.00	0.00	0.00	0.00
		Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00
	1.00	Excavators	0.72	3.27	5.44	0.32	0.30	547.36
		Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00
		Graders	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00
		Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Pavers	0.00	0.00	0.00	0.00	0.00	0.00
		Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00
		Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00
		Pumps	0.00	0.00	0.00	0.00	0.00	0.00
		Rollers	0.00	0.00	0.00	0.00	0.00	0.00
		Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	1 Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00
		Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00
		1 Scrapers	1.84	7.65	17.29	0.70	0.64	1623.76
	0.00	2 Signal Boards	0.00	0.00	0.00	0.00	0.00	0.00
		Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00
		Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00
		Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00
		Trenchers	0.00	0.00	0.00	0.00	0.00	0.00
		Welders	0.00	0.00	0.00	0.00	0.00	0.00
		Grubbing/Land Clearing	2.6	10.9	22.7	1.0	0.9	2171.1
		Grubbing/Land Clearing	0.0	0.0	0.1	0.0	0.0	7.2

Grading/Excavation		Default	ROG	CO	NOx	PM10	PM2.5	CO2
Override of Default Number of Vehicles	Number of Vehicles	Type	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
	<i>Program-estimate</i>							
		Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00
		Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00
		Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00
		Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00
		Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00
	0	Cranes	0.00	0.00	0.00	0.00	0.00	0.00
		Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00
	2.00	1 Excavators	1.43	6.54	10.89	0.65	0.60	1094.72



		Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	
		Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00	
	1	Graders	0.91	3.87	7.08	0.41	0.38	647.87	
		Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	
		Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	
	3.00	0 Other Construction Equipment	1.41	5.79	9.24	0.79	0.73	863.34	
		Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00	
		Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00	
		Pavers	0.00	0.00	0.00	0.00	0.00	0.00	
		Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00	
		Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00	
		Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	
		Pumps	0.00	0.00	0.00	0.00	0.00	0.00	
	2.00	Rollers	1.22	4.25	7.51	0.65	0.60	599.72	
		Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	
		Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00	
	1	Rubber Tired Loaders	0.64	2.73	4.98	0.29	0.26	458.86	
	1	Scrapers	1.84	7.65	17.29	0.70	0.64	1623.76	
	0.00	2 Signal Boards	0.00	0.00	0.00	0.00	0.00	0.00	
		Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	
		Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	
		Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	
		Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00	
		Trenchers	0.00	0.00	0.00	0.00	0.00	0.00	
		Welders	0.00	0.00	0.00	0.00	0.00	0.00	
		Grading/Excavation	pounds per day	7.5	30.8	57.0	3.5	3.2	5288.3
		Grading	tons per phase	0.2	0.8	1.6	0.1	0.1	145.4

Drainage/Utilities/Subgrade	Default Number of Vehicles Override of Default Number of Vehicles	Program-estimate	ROG	CO	NOx	PM10	PM2.5	CO2
			pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
		Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00
	2.00	Air Compressors	0.92	3.46	6.13	0.56	0.51	488.07
		Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00
		Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00
		Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00
	1.00	Cranes	0.75	2.71	7.28	0.28	0.26	739.64
		Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00
	2.00	Excavators	1.43	6.54	10.89	0.65	0.60	1094.72
		Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	1 Graders	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00
		Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Pavers	0.00	0.00	0.00	0.00	0.00	0.00
		Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	1 Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00
		Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00
	1.00	Pumps	0.53	1.92	3.42	0.28	0.25	293.41
		Rollers	0.00	0.00	0.00	0.00	0.00	0.00
	0.50	Rough Terrain Forklifts	0.33	1.20	1.98	0.18	0.17	168.52
		Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00

		Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1	Scrapers	0.00	0.00	0.00	0.00	0.00	0.00
0.00	2	Signal Boards	0.00	0.00	0.00	0.00	0.00	0.00
0.50		Skid Steer Loaders	0.21	0.65	0.64	0.06	0.05	66.50
		Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00
1.00		Tractors/Loaders/Backhoes	0.20	2.14	1.34	0.06	0.05	327.38
0.00	1	Trenchers	0.00	0.00	0.00	0.00	0.00	0.00
		Welders	0.00	0.00	0.00	0.00	0.00	0.00
	Drainage	pounds per day	4.4	18.6	31.7	2.1	1.9	3178.2
	Drainage	tons per phase	0.2	0.8	1.4	0.1	0.1	139.8

Paving	Default		ROG	CO	NOx	PM10	PM2.5	CO2
	Override of Default Number of Vehicles	Number of Vehicles <i>Program-estimate</i>						
			pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
		Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00
		Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00
		Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00
		Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00
		Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00
		Cranes	0.00	0.00	0.00	0.00	0.00	0.00
		Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Excavators	0.00	0.00	0.00	0.00	0.00	0.00
		Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00
		Graders	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00
		Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00
	1	Pavers	0.92	2.92	5.41	0.48	0.44	386.18
0.00	1	Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00
		Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00
		Pumps	0.00	0.00	0.00	0.00	0.00	0.00
	1	Rollers	0.61	2.12	3.75	0.33	0.30	299.86
		Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00
		Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00
		Scrapers	0.00	0.00	0.00	0.00	0.00	0.00
0.00	2	Signal Boards	0.00	0.00	0.00	0.00	0.00	0.00
		Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00
		Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00
1.00		Tractors/Loaders/Backhoes	0.20	2.14	1.34	0.06	0.05	327.38
		Trenchers	0.00	0.00	0.00	0.00	0.00	0.00
		Welders	0.00	0.00	0.00	0.00	0.00	0.00
	Paving	pounds per day	1.7	7.2	10.5	0.9	0.8	1013.4
	Paving	tons per phase	0.0	0.0	0.0	0.0	0.0	2.2
<b>Total Emissions all Phases (tons per construction period) =&gt;</b>			<b>0.4</b>	<b>1.7</b>	<b>3.1</b>	<b>0.2</b>	<b>0.2</b>	<b>294.7</b>

Equipment default values for horsepower, load factor, and hours/day can be overridden in cells C285 through C317, E285 through E317, and G285 through G317.

Equipment	Default Values		Default Values		Default Values
	Horsepower		Load Factor		Hours/day
Aerial Lifts	60		0.46		8
Air Compressors	106		0.48		8
Bore/Drill Rigs	291		0.75		8
Cement and Mortar Mixers	10		0.56		8
Concrete/Industrial Saws	19		0.73		8
Cranes	399		0.43		8
Crushing/Proc. Equipment	142		0.78		8
Excavators	168		0.57		8
Forklifts	145		0.30		8
Generator Sets	549		0.74		8
Graders	174		0.61		8
Off-Highway Tractors	267		0.65		8
Off-Highway Trucks	479		0.57		8
Other Construction Equipment	75		0.62		8
Other General Industrial Equipment	238		0.51		8
Other Material Handling Equipment	191		0.59		8
Pavers	100		0.62		8
Paving Equipment	104		0.53		8
Plate Compactors	8		0.43		8
Pressure Washers	1		0.60		8
Pumps	53		0.74		8
Rollers	95		0.56		8
Rough Terrain Forklifts	93		0.60		8
Rubber Tired Dozers	357		0.59		8
Rubber Tired Loaders	157		0.54		8
Scrapers	313		0.72		8
Signal Boards	20		0.78		8
Skid Steer Loaders	44		0.55		8
Surfacing Equipment	362		0.45		8
Sweepers/Scrubbers	91		0.68		8
Tractors/Loaders/Backhoes	108		0.55		8
Trenchers	63		0.75		8
Welders	45		0.45		8

# Road Construction Emissions Model

Version 6.3.2

## Data Entry Worksheet

Note: Required data input sections have a yellow background.

Optional data input sections have a blue background. Only areas with a

yellow or blue background can be modified. Program defaults have a white background.

The user is required to enter information in cells C10 through C25.



### Input Type

Project Name	MRL - Phase 2- no gens	
Construction Start Year	2012	Enter a Year between 2005 and 2025 (inclusive)
Project Type	2	1 New Road Construction 2 Road Widening 3 Bridge/Overpass Construction
Project Construction Time	7.0	months
Predominant Soil/Site Type: Enter 1, 2, or 3	1	1. Sand Gravel 2. Weathered Rock-Earth 3. Blasted Rock
Project Length	1.7	miles
Total Project Area	8.5	acres
Maximum Area Disturbed/Day	3.0	acres
Water Trucks Used?	1	1. Yes 2. No
Soil Imported	572.0	yd <sup>3</sup> /day
Soil Exported	244.0	yd <sup>3</sup> /day
Average Truck Capacity	20.0	yd <sup>3</sup> (assume 20 if unknown)

To begin a new project, click this button to clear data previously entered. This button will only work if you opted not to disable macros when loading this spreadsheet.

The remaining sections of this sheet contain areas that can be modified by the user, although those modifications are optional.

Note: The program's estimates of construction period phase length can be overridden in cells C34 through C37.

Construction Periods	User Override of		Program
	Construction Months	Months	Calculated
Grubbing/Land Clearing	0.50	0.70	0.00
Grading/Excavation	3.00	2.80	0.00
Drainage/Utilities/Sub-Grade	3.20	2.45	0.00
Paving	0.30	1.05	0.00
<b>Totals</b>	<b>7.00</b>	<b>7.00</b>	

2005	%	2006	%	2007	%
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00

Hauling emission default values can be overridden in cells C45 through C46.

User Input	User Override of		Default Values					
	Soil Hauling Defaults	Default Values	ROG	NOx	CO	PM10	PM2.5	CO2
Miles/round trip	10.00	30						
Round trips/day	42.00	41						
Vehicle miles traveled/day (calculated)					420			
<b>Hauling Emissions</b>								
Emission rate (grams/mile)	0.93	11.59	6.20	0.45	0.38	1868.60		
Emission rate (grams/trip)	10.89	7.79	185.47	0.02	0.01	209.04		
Pounds per day	2.8	12.1	39.1	0.4	0.4	1766.2		

Tons per construction period	0.09	0.40	1.29	0.01	0.01	58.29
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Worker commute default values can be overridden in cells C60 through C65.

Worker Commute Emissions	User Override of Worker		Default Values			
	Commute Default Values					
Miles/ one-way trip						20
One-way trips/day						2
No. of employees: Grubbing/Land Clearing	10.00					7
No. of employees: Grading/Excavation	10.00					10
No. of employees: Drainage/Utilities/Sub-Grade	10.00					9
No. of employees: Paving	5.00					9
	<b>ROG</b>	<b>NOx</b>	<b>CO</b>	<b>PM10</b>	<b>PM2.5</b>	<b>CO2</b>
Emission rate - Grubbing/Land Clearing (grams/mile)	0.135	0.244	2.515	0.033	0.018	426.920
Emission rate - Grading/Excavation (grams/mile)	0.132	0.235	2.427	0.033	0.018	426.640
Emission rate - Draining/Utilities/Sub-Grade (gr/mile)	0.132	0.235	2.427	0.033	0.018	426.640
Emission rate - Paving (grams/mile)	0.132	0.235	2.427	0.033	0.018	426.640
Emission rate - Grubbing/Land Clearing (grams/trip)	0.839	0.359	8.253	0.130	0.012	192.050
Emission rate - Grading/Excavation (grams/trip)	0.809	0.343	7.916	0.130	0.012	192.280
Emission rate - Draining/Utilities/Sub-Grade (gr/trip)	0.809	0.343	7.916	0.130	0.012	192.280
Emission rate - Paving (grams/trip)	0.809	0.343	7.916	0.130	0.012	192.280
Pounds per day - Grubbing/Land Clearing	0.193	0.247	2.943	0.041	0.017	393.062
Tons per const. Period - Grub/Land Clear	0.001	0.001	0.016	0.000	0.000	2.162
Pounds per day - Grading/Excavation	0.188	0.237	2.836	0.041	0.017	392.835
Tons per const. Period - Grading/Excavation	0.006	0.008	0.094	0.001	0.001	12.964
Pounds per day - Drainage/Utilities/Sub-Grade	0.188	0.237	2.836	0.041	0.017	392.835
Tons per const. Period - Drain/Util/Sub-Grade	0.007	0.008	0.100	0.001	0.001	13.828
Pounds per day - Paving	0.129	0.237	2.836	0.041	0.017	204.888
Tons per const. Period - Paving	0.000	0.001	0.009	0.000	0.000	0.676
tons per construction period	0.014	0.018	0.219	0.003	0.001	29.629

Water truck default values can be overridden in cells C91 through C93 and E91 through E93.

Water Truck Emissions	User Override of	Program Estimate of	User Override of Truck	Default Values		
	Default # Water Trucks	Number of Water Trucks	Miles Traveled/Day	Miles Traveled/Day		
Grubbing/Land Clearing - Exhaust		1				40
Grading/Excavation - Exhaust		1				40
Drainage/Utilities/Subgrade		1				40
	<b>ROG</b>	<b>NOx</b>	<b>CO</b>	<b>PM10</b>	<b>PM2.5</b>	<b>CO2</b>
Emission rate - Grubbing/Land Clearing (grams/mile)	0.97	12.07	6.48	0.47	0.39	1866.20
Emission rate - Grading/Excavation (grams/mile)	0.93	11.59	6.20	0.45	0.38	1868.60
Emission rate - Draining/Utilities/Sub-Grade (gr/mile)	0.92	11.59	6.20	0.45	0.38	1868.60
Pounds per day - Grubbing/Land Clearing	0.09	1.06	0.57	0.04	0.03	164.42
Tons per const. Period - Grub/Land Clear	0.00	0.04	0.02	0.00	0.00	5.43
Pound per day - Grading/Excavation	0.08	1.02	0.55	0.04	0.03	164.63
Tons per const. Period - Grading/Excavation	0.00	0.03	0.02	0.00	0.00	5.43
Pound per day - Drainage/Utilities/Subgrade	0.08	1.02	0.55	0.04	0.03	164.63
Tons per const. Period - Drainage/Utilities/Subgrade	0.00	0.04	0.02	0.00	0.00	5.80

Fugitive dust default values can be overridden in cells C110 through C112.

Fugitive Dust	User Override of Max	Default	PM10	PM10	PM2.5	PM2.5
	Acreage Disturbed/Day	Maximum Acreage/Day	pounds/day	tons/per period	pounds/day	tons/per period
Fugitive Dust - Grubbing/Land Clearing	1.50	3	15.0	0.1	3.1	0.0
Fugitive Dust - Grading/Excavation	0.50	3	5.0	0.2	1.0	0.0
Fugitive Dust - Drainage/Utilities/Subgrade	0.50	3	5.0	0.1	1.0	0.0

## Off-Road Equipment Emissions

Grubbing/Land Clearing		Default	ROG	CO	NOx	PM10	PM2.5	CO2
Override of Default Number of Vehicles	Number of Vehicles	Type	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
	<i>Program-estimate</i>							
		Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00
		Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00
		Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00
		Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00
		Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00
		Cranes	0.00	0.00	0.00	0.00	0.00	0.00
		Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00
2.00		Excavators	1.32	6.52	9.94	0.59	0.54	1094.72
		Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00
		Graders	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00
		Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Pavers	0.00	0.00	0.00	0.00	0.00	0.00
		Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00
		Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00
		Pumps	0.00	0.00	0.00	0.00	0.00	0.00
		Rollers	0.00	0.00	0.00	0.00	0.00	0.00
		Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
0.00		1 Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00
		Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00
0.50		1 Scrapers	0.87	3.36	7.99	0.32	0.29	811.88
0.00		3 Signal Boards	0.00	0.00	0.00	0.00	0.00	0.00
		Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00
		Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00
		Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00
		Trenchers	0.00	0.00	0.00	0.00	0.00	0.00
		Welders	0.00	0.00	0.00	0.00	0.00	0.00
		Grubbing/Land Clearing	2.2	9.9	17.9	0.9	0.8	1906.6
		Grubbing/Land Clearing	0.0	0.1	0.1	0.0	0.0	10.5

Grading/Excavation		Default	ROG	CO	NOx	PM10	PM2.5	CO2
Override of Default Number of Vehicles	Number of Vehicles	Type	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
	<i>Program-estimate</i>							
		Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00
		Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00
		Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00
		Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00
		Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00
	0	Cranes	0.00	0.00	0.00	0.00	0.00	0.00
		Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00

1.00	1	Excavators	0.63	3.26	4.70	0.28	0.26	547.36	
		Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	
		Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00	
	1	Graders	0.81	3.85	6.25	0.36	0.33	647.87	
		Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	
		Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	
4.00	0	Other Construction Equipment	1.58	7.58	10.75	0.90	0.83	1151.12	
		Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00	
		Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00	
		Pavers	0.00	0.00	0.00	0.00	0.00	0.00	
		Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00	
		Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00	
		Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	
		Pumps	0.00	0.00	0.00	0.00	0.00	0.00	
2.00		Rollers	1.07	4.17	6.73	0.59	0.54	599.72	
		Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	
		Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00	
	1	Rubber Tired Loaders	0.57	2.71	4.38	0.25	0.23	458.86	
	1	Scrapers	1.68	6.55	15.24	0.60	0.55	1623.76	
0.00	3	Signal Boards	0.00	0.00	0.00	0.00	0.00	0.00	
		Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	
		Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	
		Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	
		Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00	
		Trenchers	0.00	0.00	0.00	0.00	0.00	0.00	
		Welders	0.00	0.00	0.00	0.00	0.00	0.00	
		Grading/Excavation	pounds per day	6.3	28.1	48.0	3.0	2.7	5028.7
		Grading	tons per phase	0.2	0.9	1.6	0.1	0.1	165.9

Drainage/Utilities/Subgrade	Default Number of Vehicles		ROG	CO	NOx	PM10	PM2.5	CO2
			Override of Default Number of Vehicles	<i>Program-estimate</i>	pounds/day	pounds/day	pounds/day	pounds/day
		Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00
2.00		Air Compressors	0.80	3.39	5.44	0.50	0.46	488.07
2.00		Bore/Drill Rigs	1.43	5.83	13.86	0.46	0.42	3283.48
		Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00
		Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00
1.00		Cranes	0.67	2.33	6.30	0.23	0.22	739.64
1.00		Crushing/Proc. Equipment	1.09	5.01	8.49	0.49	0.45	868.00
1.00		Excavators	0.63	3.26	4.70	0.28	0.26	547.36
		Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
0.00		Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00
	1	Graders	0.81	3.85	6.25	0.36	0.33	647.87
		Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00
		Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Pavers	0.00	0.00	0.00	0.00	0.00	0.00
		Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1	Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00
		Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00
2.00		Pumps	0.91	3.77	6.08	0.49	0.45	586.82
		Rollers	0.00	0.00	0.00	0.00	0.00	0.00



0.50		Rough Terrain Forklifts	0.28	1.18	1.74	0.16	0.15	168.52	
		Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00	
		Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00	
0.00	1	Scrapers	0.00	0.00	0.00	0.00	0.00	0.00	
2.00	3	Signal Boards	0.86	2.44	2.42	0.22	0.20	245.82	
0.50		Skid Steer Loaders	0.16	0.61	0.63	0.05	0.04	66.50	
		Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	
		Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	
		Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00	
	1	Trenchers	0.74	2.58	4.50	0.39	0.36	353.84	
		Welders	0.00	0.00	0.00	0.00	0.00	0.00	
		Drainage	pounds per day	8.4	34.2	60.4	3.6	3.3	7995.9
		Drainage	tons per phase	0.3	1.2	2.1	0.1	0.1	281.5

Paving	Default		ROG	CO	NOx	PM10	PM2.5	CO2	
	Number of Vehicles	Type							
Override of Default Number of Vehicles	Program-estimate	Type	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	
		Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00	
		Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00	
		Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00	
		Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00	
		Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00	
		Cranes	0.00	0.00	0.00	0.00	0.00	0.00	
		Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	
		Excavators	0.00	0.00	0.00	0.00	0.00	0.00	
		Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	
		Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00	
		Graders	0.00	0.00	0.00	0.00	0.00	0.00	
		Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	
		Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	
		Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	
		Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00	
		Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00	
	1	Pavers	0.82	2.85	4.91	0.43	0.40	386.18	
0.00	1	Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00	
		Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00	
		Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	
		Pumps	0.00	0.00	0.00	0.00	0.00	0.00	
1.00	2	Rollers	0.54	2.08	3.37	0.29	0.27	299.86	
		Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	
		Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00	
		Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00	
		Scrapers	0.00	0.00	0.00	0.00	0.00	0.00	
0.00	3	Signal Boards	0.00	0.00	0.00	0.00	0.00	0.00	
		Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	
		Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	
		Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	
1.00		Tractors/Loaders/Backhoes	0.19	2.14	1.25	0.05	0.04	327.38	
		Trenchers	0.00	0.00	0.00	0.00	0.00	0.00	
		Welders	0.00	0.00	0.00	0.00	0.00	0.00	
		Paving	pounds per day	1.6	7.1	9.5	0.8	0.7	1013.4
		Paving	tons per phase	0.0	0.0	0.0	0.0	0.0	3.3

Equipment default values for horsepower, load factor, and hours/day can be overridden in cells C285 through C317, E285 through E317, and G285 through G317.

Equipment	Default Values Horsepower	Default Values Load Factor	Default Values Hours/day
Aerial Lifts	60	0.46	8
Air Compressors	106	0.48	8
Bore/Drill Rigs	291	0.75	8
Cement and Mortar Mixers	10	0.56	8
Concrete/Industrial Saws	19	0.73	8
Cranes	399	0.43	8
Crushing/Proc. Equipment	142	0.78	8
Excavators	168	0.57	8
Forklifts	145	0.30	8
Generator Sets	549	0.74	8
Graders	174	0.61	8
Off-Highway Tractors	267	0.65	8
Off-Highway Trucks	479	0.57	8
Other Construction Equipment	75	0.62	8
Other General Industrial Equipment	238	0.51	8
Other Material Handling Equipment	191	0.59	8
Pavers	100	0.62	8
Paving Equipment	104	0.53	8
Plate Compactors	8	0.43	8
Pressure Washers	1	0.60	8
Pumps	53	0.74	8
Rollers	95	0.56	8
Rough Terrain Forklifts	93	0.60	8
Rubber Tired Dozers	357	0.59	8
Rubber Tired Loaders	157	0.54	8
Scrapers	313	0.72	8
Signal Boards	20	0.78	8
Skid Steer Loaders	44	0.55	8
Surfacing Equipment	362	0.45	8
Sweepers/Scrubbers	91	0.68	8
Tractors/Loaders/Backhoes	108	0.55	8
Trenchers	63	0.75	8
Welders	45	0.45	8

0

END OF DATA ENTRY SHEET

# Road Construction Emissions Model Data Entry Worksheet

Version 6.3.2



Optional data input sections have a blue background. Only areas with a yellow or blue background can be modified. Program defaults have a white background. The user is required to enter information in cells C10 through C25.

### Input Type

Project Name	MRL - Phase 3 - no gens	
Construction Start Year	2013	Enter a Year between 2005 and 2025 (inclusive)
Project Type		1 New Road Construction 2 Road Widening 3 Bridge/Overpass Construction
Project Construction Time	7.0	months
Predominant Soil/Site Type: Enter 1, 2, or 3		1. Sand Gravel 2. Weathered Rock-Earth 3. Blasted Rock
Project Length	1.6	miles
Total Project Area	5.4	acres
Maximum Area Disturbed/Day	2.0	acres
Water Trucks Used?	1	1. Yes 2. No
Soil Imported	435.0	yd <sup>3</sup> /day
Soil Exported	213.0	yd <sup>3</sup> /day
Average Truck Capacity	20.0	yd <sup>3</sup> (assume 20 if unknown)

The remaining sections of this sheet contain areas that can be modified by the user, although those modifications are optional.

Note: The program's estimates of construction period phase length can be overridden in cells C34 through C37.

Construction Periods	User Override of		Program		2005		2006		2007	
	Construction Months	Months	Calculated	Months	%	%	%	%	%	
Grubbing/Land Clearing	0.30	0.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Grading/Excavation	2.50	2.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Drainage/Utilities/Sub-Grade	4.00	2.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Paving	0.20	1.05								
<b>Totals</b>	<b>7.00</b>	<b>7.00</b>								

Hauling emission default values can be overridden in cells C45 through C46.

Soil Hauling Emissions	User Override of					
	Soil Hauling Defaults	Default Values				
User Input						
Miles/round trip	10.00	30				
Round trips/day	33.00	32				
Vehicle miles traveled/day (calculated)			330			
<b>Hauling Emissions</b>	<b>ROG</b>	<b>NOx</b>	<b>CO</b>	<b>PM10</b>	<b>PM2.5</b>	<b>CO2</b>
Emission rate (grams/mile)	0.84	10.25	5.45	0.40	0.33	1874.76
Emission rate (grams/trip)	10.32	7.57	172.85	0.01	0.01	199.87

Pounds per day	2.1	8.5	28.6	0.3	0.2	1391.2
Tons per construction period	0.06	0.23	0.79	0.01	0.01	38.26

Worker commute default values can be overridden in cells C60 through C65.

Worker Commute Emissions		User Override of Worker Commute Default Values	Default Values			
Miles/ one-way trip						20
One-way trips/day						2
No. of employees: Grubbing/Land Clearing	6.00					7
No. of employees: Grading/Excavation	10.00					9
No. of employees: Drainage/Utilities/Sub-Grade	8.00					9
No. of employees: Paving	5.00					8
	<b>ROG</b>	<b>NOx</b>	<b>CO</b>	<b>PM10</b>	<b>PM2.5</b>	<b>CO2</b>
Emission rate - Grubbing/Land Clearing (grams/mile)	0.118	0.211	2.201	0.033	0.018	426.660
Emission rate - Grading/Excavation (grams/mile)	0.118	0.211	2.201	0.033	0.018	426.660
Emission rate - Draining/Utilities/Sub-Grade (gr/mile)	0.118	0.211	2.201	0.033	0.018	426.660
Emission rate - Paving (grams/mile)	0.118	0.211	2.201	0.033	0.018	426.660
Emission rate - Grubbing/Land Clearing (grams/trip)	0.746	0.316	7.305	0.130	0.013	192.690
Emission rate - Grading/Excavation (grams/trip)	0.746	0.316	7.305	0.130	0.013	192.690
Emission rate - Draining/Utilities/Sub-Grade (gr/trip)	0.746	0.316	7.305	0.130	0.013	192.690
Emission rate - Paving (grams/trip)	0.746	0.316	7.305	0.130	0.013	192.690
Pounds per day - Grubbing/Land Clearing	0.102	0.128	1.550	0.024	0.010	235.733
Tons per const. Period - Grub/Land Clear	0.000	0.000	0.005	0.000	0.000	0.778
Pounds per day - Grading/Excavation	0.102	0.128	1.550	0.024	0.010	235.733
Tons per const. Period - Grading/Excavation	0.003	0.004	0.043	0.001	0.000	6.483
Pounds per day - Drainage/Utilities/Sub-Grade	0.102	0.128	1.550	0.024	0.010	235.733
Tons per const. Period - Drain/Util/Sub-Grade	0.004	0.006	0.068	0.001	0.000	10.372
Pounds per day - Paving	0.091	0.128	1.550	0.024	0.010	198.142
Tons per const. Period - Paving	0.000	0.000	0.003	0.000	0.000	0.436
tons per construction period	0.008	0.010	0.119	0.002	0.001	18.069

Water truck default values can be overridden in cells C91 through C93 and E91 through E93.

Water Truck Emissions	User Override of	Program Estimate of	User Override of Truck	Default Values		
	Default # Water Trucks	Number of Water Trucks	Miles Traveled/Day	Miles Traveled/Day		
Grubbing/Land Clearing - Exhaust		1				40
Grading/Excavation - Exhaust		1				40
Drainage/Utilities/Subgrade		1				40
	<b>ROG</b>	<b>NOx</b>	<b>CO</b>	<b>PM10</b>	<b>PM2.5</b>	<b>CO2</b>
Emission rate - Grubbing/Land Clearing (grams/mile)	0.84	10.25	5.45	0.40	0.33	1874.76
Emission rate - Grading/Excavation (grams/mile)	0.84	10.25	5.45	0.40	0.33	1874.76
Emission rate - Draining/Utilities/Sub-Grade (gr/mile)	0.84	10.25	5.45	0.40	0.33	1874.76
Pounds per day - Grubbing/Land Clearing	0.07	0.90	0.48	0.04	0.03	165.18
Tons per const. Period - Grub/Land Clear	0.00	0.02	0.01	0.00	0.00	4.54
Pound per day - Grading/Excavation	0.07	0.90	0.48	0.04	0.03	165.18
Tons per const. Period - Grading/Excavation	0.00	0.02	0.01	0.00	0.00	4.54
Pound per day - Drainage/Utilities/Subgrade	0.07	0.90	0.48	0.04	0.03	165.18
Tons per const. Period - Drainage/Utilities/Subgrade	0.00	0.04	0.02	0.00	0.00	7.27

Fugitive dust default values can be overridden in cells C110 through C112.

<b>Fugitive Dust</b>	User Override of Max	Default	PM10	PM10	PM2.5	PM2.5
	Acreage Disturbed/Day	Maximum Acreage/Day	pounds/day	tons/per period	pounds/day	tons/per period
Fugitive Dust - Grubbing/Land Clearing	1.00	2	10.0	0.0	2.1	0.0
Fugitive Dust - Grading/Excavation	0.50	2	5.0	0.2	1.0	0.0
Fugitive Dust - Drainage/Utilities/Subgrade	1.00	2	10.0	0.3	2.1	0.1

Off-Road Equipment Emissions								
Grubbing/Land Clearing		Default	ROG	CO	NOx	PM10	PM2.5	CO2
Override of Default Number of Vehicles	Number of Vehicles	Type	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
	<i>Program-estimate</i>							
		Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00
		Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00
		Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00
		Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00
		Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00
		Cranes	0.00	0.00	0.00	0.00	0.00	0.00
		Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00
1.00		Excavators	0.59	3.25	4.37	0.25	0.23	547.36
		Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00
		Graders	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00
		Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Pavers	0.00	0.00	0.00	0.00	0.00	0.00
		Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00
		Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00
		Pumps	0.00	0.00	0.00	0.00	0.00	0.00
		Rollers	0.00	0.00	0.00	0.00	0.00	0.00
		Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
0.00		1 Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00
		Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00
1		Scrapers	1.61	6.11	14.29	0.55	0.51	1623.76
0.00		3 Signal Boards	0.00	0.00	0.00	0.00	0.00	0.00
		Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00
		Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00
		Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00
		Trenchers	0.00	0.00	0.00	0.00	0.00	0.00
		Welders	0.00	0.00	0.00	0.00	0.00	0.00
	Grubbing/Land Clearing	pounds per day	2.2	9.4	18.7	0.8	0.7	2171.1
	Grubbing/Land Clearing	tons per phase	0.0	0.0	0.1	0.0	0.0	7.2

Grading/Excavation		Default	ROG	CO	NOx	PM10	PM2.5	CO2
Override of Default Number of Vehicles	Number of Vehicles	Type	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
	<i>Program-estimate</i>							
		Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00
		Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00
		Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00
		Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00
		Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00

	0	Cranes	0.00	0.00	0.00	0.00	0.00	0.00	
		Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	
2.00	1	Excavators	1.18	6.51	8.73	0.50	0.46	1094.72	
		Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	
		Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00	
	1	Graders	0.77	3.84	5.86	0.33	0.30	647.87	
		Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	
		Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	
4.00	0	Other Construction Equipment	1.44	7.52	10.02	0.81	0.75	1151.12	
		Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00	
		Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00	
		Pavers	0.00	0.00	0.00	0.00	0.00	0.00	
		Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00	
		Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00	
		Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	
		Pumps	0.00	0.00	0.00	0.00	0.00	0.00	
2.00		Rollers	1.01	4.13	6.36	0.54	0.50	599.72	
		Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	
		Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00	
	1	Rubber Tired Loaders	0.54	2.71	4.11	0.23	0.21	458.86	
	1	Scrapers	1.61	6.11	14.29	0.55	0.51	1623.76	
0.00	3	Signal Boards	0.00	0.00	0.00	0.00	0.00	0.00	
		Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	
		Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	
		Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	
		Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00	
		Trenchers	0.00	0.00	0.00	0.00	0.00	0.00	
		Welders	0.00	0.00	0.00	0.00	0.00	0.00	
		Grading/Excavation	pounds per day	6.5	30.8	49.4	3.0	2.7	5576.1
		Grading	tons per phase	0.2	0.8	1.4	0.1	0.1	153.3

Drainage/Utilities/Subgrade	Default Number of Vehicles		ROG	CO	NOx	PM10	PM2.5	CO2
			Override of Default Number of Vehicles	Program-estimate	pounds/day	pounds/day	pounds/day	pounds/day
		Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00
2.00		Air Compressors	0.74	3.36	5.08	0.46	0.42	488.07
		Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00
		Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00
		Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00
1.00		Cranes	0.64	2.17	5.85	0.21	0.20	739.64
		Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00
2.00		Excavators	1.18	6.51	8.73	0.50	0.46	1094.72
		Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
0.00		Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1	Graders	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00
		Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Pavers	0.00	0.00	0.00	0.00	0.00	0.00
		Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1	Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00





Paving	pounds per day	1.5	7.0	9.0	0.7	0.7	1013.4
Paving	tons per phase	0.0	0.0	0.0	0.0	0.0	2.2
<b>Total Emissions all Phases (tons per construction period) =&gt;</b>		0.4	1.8	2.7	0.2	0.2	313.4

Equipment default values for horsepower, load factor, and hours/day can be overridden in cells C285 through C317, E285 through E317, and G285 through G317.

Equipment	Default Values Horsepower	Default Values Load Factor	Default Values Hours/day
Aerial Lifts	60	0.46	8
Air Compressors	106	0.48	8
Bore/Drill Rigs	291	0.75	8
Cement and Mortar Mixers	10	0.56	8
Concrete/Industrial Saws	19	0.73	8
Cranes	399	0.43	8
Crushing/Proc. Equipment	142	0.78	8
Excavators	168	0.57	8
Forklifts	145	0.30	8
Generator Sets	549	0.74	8
Graders	174	0.61	8
Off-Highway Tractors	267	0.65	8
Off-Highway Trucks	479	0.57	8
Other Construction Equipment	75	0.62	8
Other General Industrial Equipment	238	0.51	8
Other Material Handling Equipment	191	0.59	8
Pavers	100	0.62	8
Paving Equipment	104	0.53	8
Plate Compactors	8	0.43	8
Pressure Washers	1	0.60	8
Pumps	53	0.74	8
Rollers	95	0.56	8
Rough Terrain Forklifts	93	0.60	8
Rubber Tired Dozers	357	0.59	8
Rubber Tired Loaders	157	0.54	8
Scrapers	313	0.72	8
Signal Boards	20	0.78	8
Skid Steer Loaders	44	0.55	8
Surfacing Equipment	362	0.45	8
Sweepers/Scrubbers	91	0.68	8
Tractors/Loaders/Backhoes	108	0.55	8
Trenchers	63	0.75	8
Welders	45	0.45	8

# Road Construction Emissions Model Data Entry Worksheet

Version 6.3.2



Note: Required data input sections have a yellow background.  
Optional data input sections have a blue background. Only areas with a yellow or blue background can be modified. Program defaults have a white background.  
The user is required to enter information in cells C10 through C25.

## Input Type

Project Name	MRL - Phase 4	
Construction Start Year	2013	Enter a Year between 2005 and 2025 (inclusive)
Project Type	2	1 New Road Construction 2 Road Widening 3 Bridge/Overpass Construction
Project Construction Time	2.0	months
Predominant Soil/Site Type: Enter 1, 2, or 3	1	1. Sand Gravel 2. Weathered Rock-Earth 3. Blasted Rock
Project Length	0.4	miles
Total Project Area	0.9	acres
Maximum Area Disturbed/Day	0.9	acres
Water Trucks Used?	1	1. Yes 2. No
Soil Imported	283.0	yd <sup>3</sup> /day
Soil Exported	15.0	yd <sup>3</sup> /day
Average Truck Capacity	20.0	yd <sup>3</sup> (assume 20 if unknown)

To begin a new project, click this button to clear data previously entered. This button will only work if you opted not to disable macros when loading this spreadsheet.

Please note: maximum area disturbed per day cannot exceed total project area

The remaining sections of this sheet contain areas that can be modified by the user, although those modifications are optional.

Note: The program's estimates of construction period phase length can be overridden in cells C34 through C37.

Construction Periods	User Override of		2005		2006		2007	
	Construction Months	Program Calculated Months		%		%		%
Grubbing/Land Clearing	0.30	0.20	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation	1.70	0.80	0.00	0.00	0.00	0.00	0.00	0.00
Drainage/Utilities/Sub-Grade	0.00	0.70	0.00	0.00	0.00	0.00	0.00	0.00
Paving	0.00	0.30						
<b>Totals</b>	<b>2.00</b>	<b>2.00</b>						

Hauling emission default values can be overridden in cells C45 through C46.

## Soil Hauling Emissions

User Input	User Override of	Default Values
	Soil Hauling Defaults	
Miles/round trip	10.00	30
Round trips/day	15.00	15
Vehicle miles traveled/day (calculated)		150



Pounds per day - Grubbing/Land Clearing	0.07	0.90	0.48	0.04	0.03	165.18
Tons per const. Period - Grub/Land Clear	0.00	0.02	0.01	0.00	0.00	3.09
Pound per day - Grading/Excavation	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Grading/Excavation	0.00	0.00	0.00	0.00	0.00	0.00
Pound per day - Drainage/Utilities/Subgrade	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Drainage/Utilities/Subgrade	0.00	0.00	0.00	0.00	0.00	0.00

Fugitive dust default values can be overridden in cells C110 through C112.

Fugitive Dust	User Override of Max	Default	PM10	PM10	PM2.5	PM2.5
	Acreage Disturbed/Day	Maximum Acreage/Day	pounds/day	tons/per period	pounds/day	tons/per period
Fugitive Dust - Grubbing/Land Clearing		0.9	9.0	0.0	1.9	0.0
Fugitive Dust - Grading/Excavation		0.9	18.0	0.2	3.7	0.0
Fugitive Dust - Drainage/Utilities/Subgrade		0	0.0	0.0	0.0	0.0

## Off-Road Equipment Emissions

Grubbing/Land Clearing		Default	ROG	CO	NOx	PM10	PM2.5	CO2
Override of Default Number of Vehicles	Number of Vehicles	Type	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
	<i>Program-estimate</i>							
		Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00
		Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00
		Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00
		Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00
		Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00
		Cranes	0.00	0.00	0.00	0.00	0.00	0.00
		Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Excavators	0.00	0.00	0.00	0.00	0.00	0.00
		Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00
		Graders	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00
		Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Pavers	0.00	0.00	0.00	0.00	0.00	0.00
		Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00
		Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00
		Pumps	0.00	0.00	0.00	0.00	0.00	0.00
		Rollers	0.00	0.00	0.00	0.00	0.00	0.00
		Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
	1	Rubber Tired Dozers	1.51	6.67	12.84	0.53	0.49	1245.79
		Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00
	1	Scrapers	1.61	6.11	14.29	0.55	0.51	1623.76
	1	Signal Boards	0.31	0.94	0.93	0.08	0.07	98.33
		Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00
		Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00
		Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00
		Trenchers	0.00	0.00	0.00	0.00	0.00	0.00
		Welders	0.00	0.00	0.00	0.00	0.00	0.00
	Grubbing/Land Clearing	pounds per day	3.4	13.7	28.1	1.2	1.1	2967.9
	Grubbing/Land Clearing	tons per phase	0.0	0.0	0.1	0.0	0.0	9.8

Grading/Excavation		Default	ROG	CO	NOx	PM10	PM2.5	CO2
Override of Default Number of Vehicles	Number of Vehicles	Type	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
	<i>Program-estimate</i>							
		Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00
		Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00

		Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00	
		Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00	
		Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00	
		0 Cranes	0.00	0.00	0.00	0.00	0.00	0.00	
		Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	
		1 Excavators	0.59	3.25	4.37	0.25	0.23	547.36	
		Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	
		Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00	
0.00		1 Graders	0.00	0.00	0.00	0.00	0.00	0.00	
		Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	
		Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	
		0 Other Construction Equipment	0.03	0.17	0.23	0.02	0.02	25.90	
		Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00	
		Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00	
		Pavers	0.00	0.00	0.00	0.00	0.00	0.00	
		Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00	
		Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00	
		Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	
		Pumps	0.00	0.00	0.00	0.00	0.00	0.00	
		Rollers	0.00	0.00	0.00	0.00	0.00	0.00	
		Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	
		Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00	
0.00		1 Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00	
0.50		1 Scrapers	0.80	3.05	7.15	0.28	0.26	811.88	
0.00		1 Signal Boards	0.00	0.00	0.00	0.00	0.00	0.00	
		Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	
		Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	
		Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	
		Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00	
		Trenchers	0.00	0.00	0.00	0.00	0.00	0.00	
		Welders	0.00	0.00	0.00	0.00	0.00	0.00	
		Grading/Excavation	pounds per day	1.4	6.5	11.7	0.5	0.5	1385.1
		Grading	tons per phase	0.0	0.1	0.2	0.0	0.0	25.9

Drainage/Utilities/Subgrade	Default Number of Vehicles <i>Program-estimate</i>		ROG	CO	NOx	PM10	PM2.5	CO2
			pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
		Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00
		Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00
		Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00
		Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00
		Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00
		Cranes	0.00	0.00	0.00	0.00	0.00	0.00
		Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Excavators	0.00	0.00	0.00	0.00	0.00	0.00
		Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00
0.00		1 Graders	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00

		Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00
		Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Pavers	0.00	0.00	0.00	0.00	0.00	0.00
		Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00
	1	Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00
		Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00
		Pumps	0.00	0.00	0.00	0.00	0.00	0.00
		Rollers	0.00	0.00	0.00	0.00	0.00	0.00
		Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
1.00		Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00
		Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00
0.50	1	Scrapers	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1	Signal Boards	0.00	0.00	0.00	0.00	0.00	0.00
		Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00
		Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00
1.00		Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1	Trenchers	0.00	0.00	0.00	0.00	0.00	0.00
		Welders	0.00	0.00	0.00	0.00	0.00	0.00
		Drainage	pounds per day	0.0	0.0	0.0	0.0	0.0
		Drainage	tons per phase	0.0	0.0	0.0	0.0	0.0

Paving	Default		ROG	CO	NOx	PM10	PM2.5	CO2
	Number of Vehicles	Type						
Override of Default Number of Vehicles	Program-estimate	Type	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
		Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00
		Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00
		Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00
		Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00
		Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00
		Cranes	0.00	0.00	0.00	0.00	0.00	0.00
		Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Excavators	0.00	0.00	0.00	0.00	0.00	0.00
		Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00
		Graders	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00
		Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1	Pavers	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1	Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00
		Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00
		Pumps	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1	Rollers	0.00	0.00	0.00	0.00	0.00	0.00

		Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00
		Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00
		Scrapers	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1	Signal Boards	0.00	0.00	0.00	0.00	0.00	0.00
		Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00
		Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00
		Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00
		Trenchers	0.00	0.00	0.00	0.00	0.00	0.00
		Welders	0.00	0.00	0.00	0.00	0.00	0.00
		Paving pounds per day	0.0	0.0	0.0	0.0	0.0	0.0
		Paving tons per phase	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total Emissions all Phases (tons per construction period) =&gt;</b>			0.0	0.2	0.3	0.0	0.0	35.7

Equipment default values for horsepower, load factor, and hours/day can be overridden in cells C285 through C317, E285 through E317, and G285 through G317.

Equipment	Default Values		Default Values		Default Values	
		Horsepower		Load Factor		Hours/day
Aerial Lifts		60		0.46		8
Air Compressors		106		0.48		8
Bore/Drill Rigs		291		0.75		8
Cement and Mortar Mixers		10		0.56		8
Concrete/Industrial Saws		19		0.73		8
Cranes		399		0.43		8
Crushing/Proc. Equipment		142		0.78		8
Excavators		168		0.57		8
Forklifts		145		0.30		8
Generator Sets		549		0.74		8
Graders		174		0.61		8
Off-Highway Tractors		267		0.65		8
Off-Highway Trucks		479		0.57		8
Other Construction Equipment		75		0.62		8
Other General Industrial Equipment		238		0.51		8
Other Material Handling Equipment		191		0.59		8
Pavers		100		0.62		8
Paving Equipment		104		0.53		8
Plate Compactors		8		0.43		8
Pressure Washers		1		0.60		8
Pumps		53		0.74		8
Rollers		95		0.56		8
Rough Terrain Forklifts		93		0.60		8
Rubber Tired Dozers		357		0.59		8
Rubber Tired Loaders		157		0.54		8
Scrapers		313		0.72		8
Signal Boards		20		0.78		8
Skid Steer Loaders		44		0.55		8



Surfacing Equipment	362	0.45	8
Sweepers/Scrubbers	91	0.68	8
Tractors/Loaders/Backhoes	108	0.55	8
Trenchers	63	0.75	8
Welders	45	0.45	8

0

**END OF DATA ENTRY SHEET**

## **APPENDIX C**

### **ENDANGERED, THREATENED, AND CANDIDATE SPECIES LISTS**



**United States Department of the Interior**  
**FISH AND WILDLIFE SERVICE**

Sacramento Fish and Wildlife Office  
2800 Cottage Way, Room W-2605  
Sacramento, California 95825



October 1, 2009

Document Number: 091001105404

Lindsay Dembosz  
CESPK-PD-RA  
1325 J St  
Sacramento, CA 95814

Subject: Species List for Marysville Ring Levee

Dear: Ms. Dembosz

We are sending this official species list in response to your October 1, 2009 request for information about endangered and threatened species. The list covers the California counties and/or U.S. Geological Survey 7½ minute quad or quads you requested.

Our database was developed primarily to assist Federal agencies that are consulting with us. Therefore, our lists include all of the sensitive species that have been found in a certain area *and also ones that may be affected by projects in the area*. For example, a fish may be on the list for a quad if it lives somewhere downstream from that quad. Birds are included even if they only migrate through an area. In other words, we include all of the species we want people to consider when they do something that affects the environment.

Please read Important Information About Your Species List (below). It explains how we made the list and describes your responsibilities under the Endangered Species Act.

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be December 30, 2009.

Please contact us if your project may affect endangered or threatened species or if you have any questions about the attached list or your responsibilities under the Endangered Species Act. A list of Endangered Species Program contacts can be found at [www.fws.gov/sacramento/es/branches.htm](http://www.fws.gov/sacramento/es/branches.htm).

Endangered Species Division





**U.S. Fish & Wildlife Service**  
**Sacramento Fish & Wildlife Office**  
**Federal Endangered and Threatened Species that Occur in**  
**or may be Affected by Projects in the Counties and/or**  
**U.S.G.S. 7 1/2 Minute Quads you requested**

Document Number: 091001105404

Database Last Updated: January 29, 2009

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Quad Lists

Listed Species

Invertebrates

*Branchinecta conservatio*

Conservancy fairy shrimp (E)

*Branchinecta lynchi*

vernal pool fairy shrimp (T)

*Desmocerus californicus dimorphus*

valley elderberry longhorn beetle (T)

*Lepidurus packardi*

vernal pool tadpole shrimp (E)

Fish

*Acipenser medirostris*

green sturgeon (T) (NMFS)

*Hypomesus transpacificus*

delta smelt (T)

*Oncorhynchus mykiss*

Central Valley steelhead (T) (NMFS)

Critical habitat, Central Valley steelhead (X) (NMFS)

*Oncorhynchus tshawytscha*

Central Valley spring-run chinook salmon (T) (NMFS)

Critical Habitat, Central Valley spring-run chinook (X) (NMFS)

winter-run chinook salmon, Sacramento River (E) (NMFS)

Amphibians

*Rana aurora draytonii*

California red-legged frog (T)

Reptiles

*Thamnophis gigas*

giant garter snake (T)

Candidate Species

Birds

*Coccyzus americanus occidentalis*

Western yellow-billed cuckoo (C)

Quads Containing Listed, Proposed or Candidate Species:

YUBA CITY (544A)



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## County Lists

### Yuba County

#### Listed Species

##### Invertebrates

*Branchinecta lynchi*

Critical habitat, vernal pool fairy shrimp (X)

vernal pool fairy shrimp (T)

*Desmocerus californicus dimorphus*

valley elderberry longhorn beetle (T)

*Lepidurus packardii*

Critical habitat, vernal pool tadpole shrimp (X)

vernal pool tadpole shrimp (E)

##### Fish

*Acipenser medirostris*

green sturgeon (T) (NMFS)

*Oncorhynchus mykiss*

Central Valley steelhead (T) (NMFS)

Critical habitat, Central Valley steelhead (X) (NMFS)

*Oncorhynchus tshawytscha*

Central Valley spring-run chinook salmon (T) (NMFS)

Critical Habitat, Central Valley spring-run chinook (X) (NMFS)

winter-run chinook salmon, Sacramento River (E) (NMFS)

##### Amphibians

*Ambystoma californiense*

California tiger salamander, central population (T)

*Rana aurora draytonii*

California red-legged frog (T)

Critical habitat, California red-legged frog (X)

##### Reptiles

*Thamnophis gigas*

giant garter snake (T)

##### Plants

*Senecio layneae*

Layne's butterweed (=ragwort) (T)





## Proposed Species

### Amphibians

*Rana aurora draytonii*

Critical habitat, California red-legged frog (PX)

## Candidate Species

### Birds

*Coccyzus americanus occidentalis*

Western yellow-billed cuckoo (C)

## Key:

(E) *Endangered* - Listed as being in danger of extinction.

(T) *Threatened* - Listed as likely to become endangered within the foreseeable future.

(P) *Proposed* - Officially proposed in the Federal Register for listing as endangered or threatened.

(NMFS) Species under the Jurisdiction of the [National Oceanic & Atmospheric Administration Fisheries Service](#). Consult with them directly about these species.

*Critical Habitat* - Area essential to the conservation of a species.

(PX) *Proposed Critical Habitat* - The species is already listed. Critical habitat is being proposed for it.

(C) *Candidate* - Candidate to become a proposed species.

(V) Vacated by a court order. Not currently in effect. Being reviewed by the Service.

(X) *Critical Habitat* designated for this species

## Important Information About Your Species List

### How We Make Species Lists

We store information about endangered and threatened species lists by U.S. Geological Survey 7½ minute quads. The United States is divided into these quads, which are about the size of San Francisco.

The animals on your species list are ones that occur within, **or may be affected by** projects within, the quads covered by the list.

- Fish and other aquatic species appear on your list if they are in the same watershed as your quad or if water use in your quad might affect them.
- Amphibians will be on the list for a quad or county if pesticides applied in that area may be carried to their habitat by air currents.
- Birds are shown regardless of whether they are resident or migratory. Relevant birds on the county list should be considered regardless of whether they appear on a quad list.

### Plants

Any plants on your list are ones that have actually been observed in the area covered by the list. Plants may exist in an area without ever having been detected there. You can find out what's in the surrounding quads through the California Native Plant Society's online [Inventory of Rare and Endangered Plants](#).

### Surveying

Some of the species on your list may not be affected by your project. A trained biologist and/or botanist, familiar with the habitat requirements of the species on your list, should determine whether they or habitats suitable for them may be affected by your project. We recommend that your surveys include any proposed and candidate species on your list. See our [Protocol](#) and [Recovery Permits](#) pages.

For plant surveys, we recommend using the [Guidelines for Conducting and Reporting Botanical Inventories](#). The results of your surveys should be published in any environmental documents prepared for your project.

## Your Responsibilities Under the Endangered Species Act

All animals identified as listed above are fully protected under the Endangered Species Act of 1973, as amended. Section 9 of the Act and its implementing regulations prohibit the take of a federally listed wildlife species. Take is defined by the Act as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" any such animal.

Take may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or shelter (50 CFR §17.3).

Take incidental to an otherwise lawful activity may be authorized by one of two procedures:

- If a Federal agency is involved with the permitting, funding, or carrying out of a project that may result in take, then that agency must engage in a formal [consultation](#) with the Service.

During formal consultation, the Federal agency, the applicant and the Service work together to avoid or minimize the impact on listed species and their habitat. Such consultation would result in a biological opinion by the Service addressing the anticipated effect of the project on listed and proposed species. The opinion may authorize a limited level of incidental take.

- If no Federal agency is involved with the project, and federally listed species may be taken as part of the project, then you, the applicant, should apply for an incidental take permit. The Service may issue such a permit if you submit a satisfactory conservation plan for the species that would be affected by your project.

Should your survey determine that federally listed or proposed species occur in the area and are likely to be affected by the project, we recommend that you work with this office and the California Department of Fish and Game to develop a plan that minimizes the project's direct and indirect impacts to listed species and compensates for project-related loss of habitat. You should include the plan in any environmental documents you file.

## Critical Habitat

When a species is listed as endangered or threatened, areas of habitat considered essential to its conservation may be designated as critical habitat. These areas may require special management considerations or protection. They provide needed space for growth and normal behavior; food, water, air, light, other nutritional or physiological requirements; cover or shelter; and sites for breeding, reproduction, rearing of offspring, germination or seed dispersal.

Although critical habitat may be designated on private or State lands, activities on these lands are not restricted unless there is Federal involvement in the activities or direct harm to listed wildlife.

If any species has proposed or designated critical habitat within a quad, there will be a separate line for this on the species list. Boundary descriptions of the critical habitat may be found in the Federal Register. The information is also reprinted in the Code of Federal Regulations (50 CFR 17.95). See our [Map Room](#) page.

## Candidate Species

We recommend that you address impacts to candidate species. We put plants and animals on our candidate list when we have enough scientific information to eventually propose them for listing as threatened or endangered. By considering these species early in your planning process you may be able to avoid the problems that could develop if one of these candidates was listed before the end of your project.

## Species of Concern

The Sacramento Fish & Wildlife Office no longer maintains a list of species of concern. However, various other agencies and organizations maintain lists of at-risk species. These lists provide essential information for land management planning and conservation efforts. [More info](#)

## Wetlands

If your project will impact wetlands, riparian habitat, or other jurisdictional waters as defined by section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act, you will need to obtain a permit from the U.S. Army Corps of Engineers. Impacts to wetland habitats require site specific mitigation and monitoring. For questions regarding wetlands, please contact Mark Littlefield of this office at (916) 414-6580.

## Updates

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be December 30, 2009.

## California Department of Fish and Game

## Natural Diversity Database

## Selected Elements by Scientific Name - Portrait

CNDDDB threatened, endangered, and species of special concern for Yuba City USGS 7.5 minute quad.

Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
1 <i>Actinemys marmorata</i> western pond turtle	ARAAD02030			G3G4	S3	SC
2 <i>Agelaius tricolor</i> tricolored blackbird	ABPBXB0020			G2G3	S2	SC
3 <i>Ammodramus savannarum</i> grasshopper sparrow	ABPBXA0020			G5	S2	SC
4 <i>Asio otus</i> long-eared owl	ABNSB13010			G5	S3	SC
5 <i>Athene cunicularia</i> burrowing owl	ABNSB10010			G4	S2	SC
6 <i>Branchinecta lynchi</i> vernal pool fairy shrimp	ICBRA03030	Threatened		G3	S2S3	
7 <i>Buteo swainsoni</i> Swainson's hawk	ABNKC19070		Threatened	G5	S2	
8 <i>Cicindela hirticollis abrupta</i> Sacramento Valley tiger beetle	IICOL02106			G5TH	SH	
9 <i>Circus cyaneus</i> northern harrier	ABNKC11010			G5	S3	SC
10 <i>Clarkia biloba ssp. brandegeeeae</i> Brandegee's clarkia	PDONA05053			G4G5T3	S3	1B.2
11 <i>Coccyzus americanus occidentalis</i> western yellow-billed cuckoo	ABNRB02022	Candidate	Endangered	G5T3Q	S1	
12 <i>Desmocerus californicus dimorphus</i> valley elderberry longhorn beetle	IICOL48011	Threatened		G3T2	S2	
13 <i>Downingia pusilla</i> dwarf downingia	PDCAM060C0			G3	S3.1	2.2
14 <i>Elanus leucurus</i> white-tailed kite	ABNKC06010			G5	S3	
15 <i>Fritillaria eastwoodiae</i> Butte County fritillary	PMLIL0V060			G3Q	S3	3.2
16 <i>Great Valley Cottonwood Riparian Forest</i>	CTT61410CA			G2	S2.1	
17 <i>Great Valley Mixed Riparian Forest</i>	CTT61420CA			G2	S2.2	
18 <i>Great Valley Valley Oak Riparian Forest</i>	CTT61430CA			G1	S1.1	
19 <i>Haliaeetus leucocephalus</i> bald eagle	ABNKC10010	Delisted	Endangered	G5	S2	
20 <i>Juncus leiospermus var. ahartii</i> Ahart's dwarf rush	PMJUN011L1			G2T1	S1.2	1B.2
21 <i>Lasiurus blossevillii</i> western red bat	AMACC05060			G5	S3?	SC
22 <i>Lasiurus cinereus</i> hoary bat	AMACC05030			G5	S4?	
23 <i>Laterallus jamaicensis coturniculus</i> California black rail	ABNME03041		Threatened	G4T1	S1	
24 <i>Legenere limosa</i> legenere	PDCAM0C010			G2	S2.2	1B.1

## California Department of Fish and Game

## Natural Diversity Database

## Selected Elements by Scientific Name - Portrait

CNDDDB threatened, endangered, and species of special concern for Yuba City USGS 7.5 minute quad.

Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
25 <i>Lepidurus packardii</i> vernal pool tadpole shrimp	ICBRA10010	Endangered		G3	S2S3	
26 <i>Linderiella occidentalis</i> California linderiella	ICBRA06010			G3	S2S3	
27 <i>Lupinus dalesiae</i> Quincy lupine	PDFAB2B1A0			G3	S3.2	4.2
28 <i>Martes pennanti (pacifica) DPS</i> Pacific fisher	AMAJF01021	Candidate	unknown code...	G5	S2S3	SC
29 <i>Monardella douglasii ssp. venosa</i> veiny monardella	PDLAM18082			G5T1	S1.1	1B.1
30 <i>Myotis yumanensis</i> Yuma myotis	AMACC01020			G5	S4?	
31 <i>Northern Hardpan Vernal Pool</i>	CTT44110CA			G3	S3.1	
32 <i>Oncorhynchus tshawytscha spring-run</i> Central Valley spring-run chinook salmon ESU	AFCHA0205A	Threatened	Threatened	G5	S1	
33 <i>Packera layneae</i> Layne's ragwort	PDAST8H1V0	Threatened	Rare	G2	S2.1	1B.2
34 <i>Peltigera hydrothyria</i> aquatic felt lichen	NLLEC83010			G4	S3.2	
35 <i>Pseudobahia bahiifolia</i> Hartweg's golden sunburst	PDAST7P010	Endangered	Endangered	G2	S2.1	1B.1
36 <i>Pyrrocoma lucida</i> sticky pyrrocoma	PDASTDT0E0			G3	S3.2	1B.2
37 <i>Rana boylei</i> foothill yellow-legged frog	AAABH01050			G3	S2S3	SC
38 <i>Rana draytonii</i> California red-legged frog	AAABH01022	Threatened		G4T2T3	S2S3	SC
39 <i>Rhynchospora capitellata</i> brownish beaked-rush	PMCYP0N080			G5	S2S3	2.2
40 <i>Riparia riparia</i> bank swallow	ABPAU08010		Threatened	G5	S2S3	
41 <i>Thamnophis gigas</i> giant garter snake	ARADB36150	Threatened	Threatened	G2G3	S2S3	

## **APPENDIX D**

### **COORDINATION ACT REPORT**



# United States Department of the Interior



## FISH AND WILDLIFE SERVICE

Sacramento Fish and Wildlife Office  
2800 Cottage Way, Room W-2605  
Sacramento, California 95825-1846

Reply Refer To:

81420-2009-FA-0459-3

**APR 13 2010**

Alicia E. Kirchner  
Chief, Planning Division  
Corps of Engineers, Sacramento District  
1325 J Street  
Sacramento, California 95814

Dear Ms. Kirchner:

The Corps of Engineers has requested coordination under the Fish and Wildlife Coordination Act (FWCA) for the Yuba River Basin Investigation - Marysville Ring Levee Project. The proposed levee improvements would occur on the levees surrounding the City of Marysville, Yuba County, California. The enclosed report constitutes the Fish and Wildlife Service's FWCA report for the proposed repairs.

If you have any questions regarding this report, please contact Harry Kahler at (916) 414-6612.

Sincerely,

M. Kathleen Wood  
Assistant Field Supervisor

<J

Enclosure

cc:

Lindsay Dembosz, COE, Sacramento, CA  
April Murazzo, COE, Sacramento, CA  
Jane Rinck, COE, Sacramento, CA  
Maria Rae, NOAA Fisheries, Sacramento, CA  
Regional Manager, CDFG, Rancho Cordova, CA

**TAKE PRIDE IN AMERICA**

## **EXECUTIVE SUMMARY**

The Army Corps of Engineers (Corps), along with the State of California Central Valley Flood Protection Board and the Marysville Levee District, are proposing to increase flood protection for the City of Marysville, California. The increased flood protection would arise from the installment or deepening of slurry walls, construction of stability berms, regrading of levees, and jet grouting of levees around bridge abutments.

Reevaluation of the Yuba River Basin Flood Risk Management Project, authorized by the Water Resources Development Act (WRDA) 1999 Section 101(a)(10) and WRDA 2007, Section 3041, determined that the Marysville Ring Levee (MRL) project originally authorized in 1999 is a separate element from other Yuba River Basin projects and thus construction could continue. The present MRL Project has not changed substantially from the original project. Currently, one alternative to a No Action Plan is being considered. The impacts on fish and wildlife resources of the proposed alternative MRL Project plan are evaluated in this report.

Four specific phases of work are identified in the MRL alternative plan. Phase 1 extends 5,000 linear feet and encompasses about 46 acres. Flood control measures would include a 60- to 120-foot deep cut-off wall and restructuring of the waterside slope from 2.5:1 to 3:1. Phase 2 extends 8,700 feet and encompasses 53 acres. An open-trench cut-off wall, jet grouting and a 60-foot deep secant pile wall would be constructed. Phase 3 extends 11,100 feet, encompasses 55 acres, and involves the construction of an open-trench cut-off wall. Phase 4 extends 1,600 feet, encompasses about 17.6 acres, and involves the construction of two 7-foot stability berms. Phase 1 would begin in 2010, Phase 2 in 2012, and Phases 3 and 4 in 2013.

The impacts on fish and wildlife resources were evaluated using Habitat Evaluation Procedures developed for the original 1999 project, best professional judgment, and current mitigation guidelines for habitats which provide suitable habitat for listed threatened and endangered species, or species proposed for listing. The project would have temporary effects on annual grassland and agricultural habitat, and permanent impacts on 6.61 acres of woodland habitat. The impacts to annual grassland and agricultural habitat can be minimized by replanting all disturbed areas with native annual grasses at the completion of construction. The loss of the woodland acreage due to construction can be mitigated by developing 8.73 acres of woodland habitat at a suitable site.

The Corps completed consultation with the Fish and Wildlife Service (Service) on the effects of this project on the valley elderberry longhorn beetle and giant garter snake on April 13, 2010. The Fish and Wildlife Service's biological opinion can be found in Appendix A of this document.



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## **INTRODUCTION**

The Army Corps of Engineers (Corps) is proposing to increase flood protection for the city of Marysville, California, by installing or deepening slurry walls, constructing stability berms, regrading levees, and jet grouting levees around bridge abutments.

The Marysville Ring Levee project was proposed as part of the Yuba River Basin Flood Risk Management Project (YRBFRMP), authorized by the Water Resources Development Act (WRDA) 1999 Section 101(a)(10) and WRDA 2007, Section 3041. A series of rainstorms in January 1997 resulted in a levee failure and flooding in Olivehurst, a few miles downstream of Marysville along the Feather River (USFWS 1997). The YRBFRMP identified the Marysville Ring Levees as susceptible to seepage problems and thus below the original design standards.

The Yuba Basin General Reevaluation Report (GRR) is currently reevaluating the originally authorized YRBFRMP. Within the reevaluation, the Marysville Ring Levee was considered a separable element and could be constructed while the remainder of the GRR remains under investigation. This report evaluates the potential effects of the current design including refinements since the 1999 authorized project.

## **DESCRIPTION OF THE AREA**

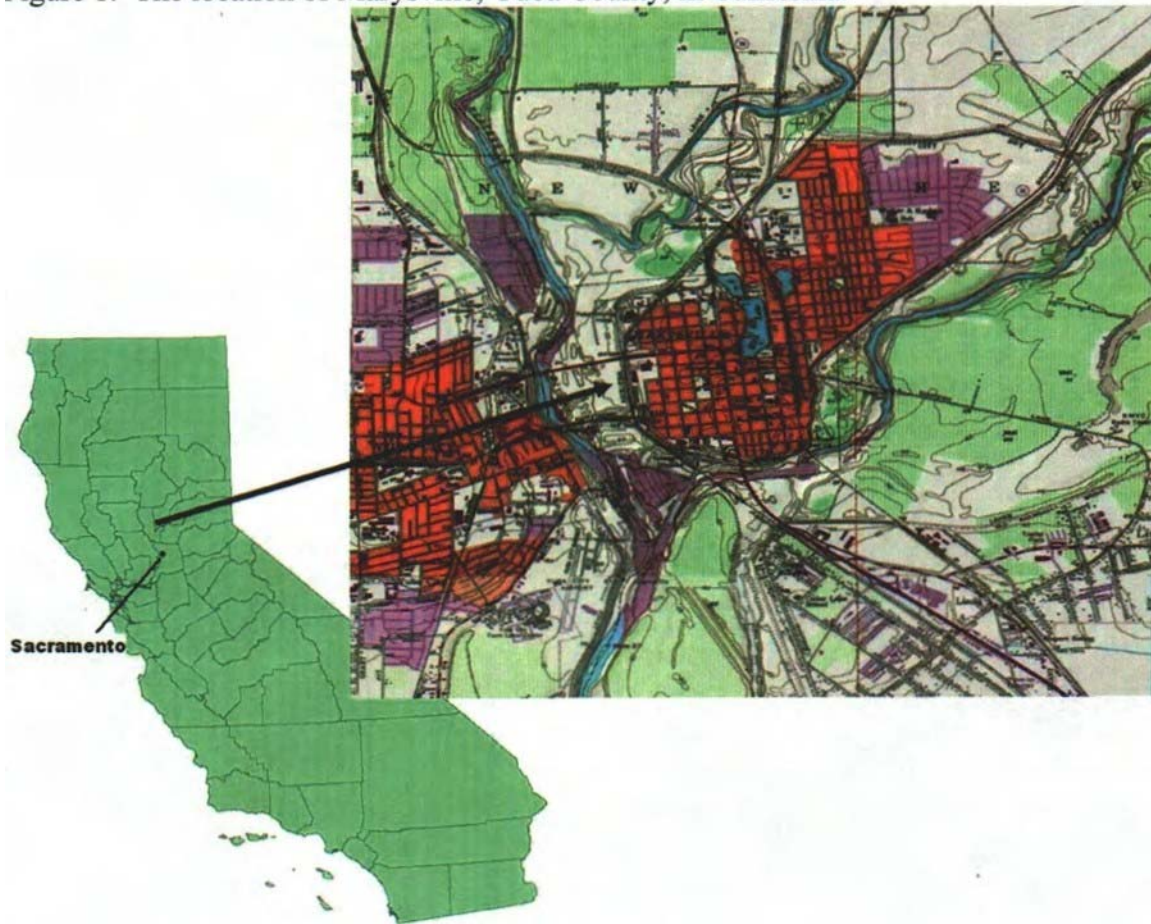
The project area is located in Marysville, the county seat of Yuba County, California, about 45 miles north of Sacramento (Figure 1). Marysville lies at the confluence of the Yuba River to the south and the Feather River to the west. The ring levees comprise a nearly 7.5-mile system that completely encircles Marysville, which is about 3.4 square miles. Marysville in 2008 had a population of about 11,700. Other than the levee system, the Marysville area is void of marked topographic features and has a mean elevation level of 63 feet above mean sea level. Bridges which cross the ring levees connect Marysville to Yuba City west of the Feather River, and to Linda and Olivehurst south of the Yuba River.

The average yearly precipitation of Marysville is 22 inches. The mean annual temperature of Marysville is 62°F, with a mean winter temperature of 45°F and a mean summer temperature of 79°F.

The Feather River drains about 370 square miles between Marysville and the Oroville Dam, which is upstream. Upstream of the Oroville Dam, the Feather River watershed contains an additional 3,600 square miles. From the north of Marysville, Jack Slough flows westward into the Feather River. Historically, the Feather River watershed upstream of the Oroville Dam has been altered in large part due to the effects of river gold mining of the late 19th century.

The Yuba River watershed is about 1,350 square miles, and about 480 square miles of the watershed are upstream of New Bullards Bar Dam. The basin is drained by the North, Middle, and South Fork Yuba Rivers, which join upstream of Englebright Reservoir, to form the mainstem Yuba River. Daguerre Point Dam, an old debris dam, is located downstream of Englebright Dam, about 6 miles upstream of Marysville. As with the

Figure 1. The location of Marysville, Yuba County, in California.



Feather River, the course of the Yuba River has been altered due to the erosion and by-products from historic placer and river gold mining.

### DESCRIPTION OF THE PROJECT

#### **Alternative 1**

No Action -Under the no action alternative, no additional Federal action would take place. The project levees in the study area would provide the design level of flood protection (65-year). There would continue to be a flood threat to lives and property due to high runoff and stress to the existing flood control system.

#### **Alternative 2**

There are four phases to the current Marysville Ring Levee Project. Phase 1 construction would begin in fall 2010, Phase 2 work would occur in 2012, and Phases 3 and 4 are scheduled for 2013.

**Phase 1–**

Phase 1 extends 5,400 linear feet along the northwest portion of the ring levee, from station 32+00 to station 86+00. The Phase 1 work would encompass about 46 acres. Flood control measures would include a 60- to 120-foot deep cut-off wall about 4,500 feet long. Restructuring of the waterside levee slope from 2.5:1 to 3:1 would require the waterside toe to be moved an additional 10 feet from the centerline of the levee. Construction would occur between August and October 2010 and would resume in July or August 2011 for completion.

The cut-off wall would be constructed with a soil-cement-bentonite (SCB) mixture. The SCB wall provides protection from lateral water movement during excavation. A cutter-soil method would be used to create the SCB wall, using a drill rig mounted on a tracked excavator. Construction of the SCB wall would require that the levee crown be temporarily degraded 4-12 feet to allow a 40-foot work surface for construction equipment.

The staging area would be west of Jack Slough Road, about 1 1/2 mile north of the levee. Construction materials, equipment, topsoil, and excess material would be stored at the staging area during the construction period. The proposed staging area is about 5 acres.

Before construction begins, the staging and project areas would be fenced off from public access using K-rails. A buffer of 12-40 feet on the landside toe and 12-50 feet on the waterside toe would be needed for equipment to work in the area. Other erosion control measures would be put in place as needed to prevent soil seepage onto adjacent properties and into waterways.

**Phase 2–**

Phase 2 extends 8,700 feet along the southern portion of the levee and would encompass 53 acres. An open-trench cut-off wall, varying between 50 and 90 feet in depth, would be constructed from station 210+00 to station 234+00, and also from 235+00 to 246+00. Jet grouting would occur under bridges following stations 234+00, 246+00, and 264+50. Additionally, a 60-foot deep secant pile wall would be constructed on the levee crown from stations 247+00 to 264+50, and also from station 266+00 to 274+00.

The open-trench cut-off wall would be excavated and filled with SCB slurry. The jet grouting at bridge locations involves borings subsequently injected with SCB and water to form a soil-cement product. The secant pile wall consists of foundation piles overlapped with reinforced concrete. Construction would occur on the waterside toe for the open-trench cut-off wall, under the three bridges for the jet grouting, and on the levee crown for the secant wall.

There are three positions for staging areas. The first area is a sand pit formerly used for concrete production, in the southeast of the project area near station 262+00. The second is a small unused portion of land between baseball fields, near station 226+00. The third area is a dirt parking area by station 236+00.

As with the Phase 1 work, Phase 2 construction would require that the levee crown be temporarily degraded 4-12 feet to allow a 40-foot wide work surface for construction equipment. All construction areas and staging areas would be fenced off to limit public access. A buffer of 10-25 feet on the landside toe and 20-100 feet on the waterside toe would be needed for equipment to work in the area. Construction is expected to begin in June to August 2012 and continue for 24-28 weeks.

### **Phase 3-**

Phase 3 extends 11,100 feet from station 296+00 to 14+00 on the eastern portion of the levee. The construction would encompass 55 acres. Open-trench cut-off walls would be constructed from stations 297+00 to 337+00 and 379+00 to 10+00. Construction of the cut-off wall would follow the methods described in the Phase 1 work.

The staging area would extend 250 feet from the waterside toe of the levee between stations 327+50 and 342+00. Temporary access ramps may be necessary and would be built between stations 320+00 and 390+00. Construction is expected to begin between June and August 2013 and continue for 20-25 weeks.

### **Phase 4-**

Phase 4 extends from station 121+00 to 137+00, between railroad trestles at Binney Junction. The construction would extend 15 feet out from the landside toe of the levee and would encompass about 17.6 acres. The construction would consist of two 7-foot tall seepage or stability berms. These berms would stabilize the levee by laterally retaining an existing railroad track and by resisting seepage uplift.

The likely staging area would be 2 acres on the landside of the site in the Binney Junction area. Construction activities would begin between June and August 2013 and continue for 12 to 16 weeks.

## **MITIGATION POLICY AND RESOURCE CATEGORY DETERMINATION**

The recommendations provided herein for the protection of fish and wildlife resources are in accordance with the Fish and Wildlife Service's (Service) Mitigation Policy as published in the Federal register (46:15; January 23, 1981).

The Mitigation Policy provides Service personnel with guidance in making recommendations to protect or conserve fish and wildlife resources. The policy helps ensure consistent and effective Service recommendations, while allowing agencies and developers to anticipate Service recommendations and plan early for mitigation needs. The intent of the policy is to ensure protection and conservation of the most important and valuable fish and wildlife resources, while allowing reasonable and balanced use of the Nation's natural resources.

Under the Mitigation Policy, resources are assigned to one of four distinct Resource Categories, each having a mitigation planning goal which is consistent with the fish and wildlife values involved. The Resource Categories cover a range of habitat values, from those considered to be unique and irreplaceable, to those believed to be much more

common and of relatively lesser value to fish and wildlife. However, the Mitigation Policy does not apply to threatened and endangered species, Service recommendations for completed federal projects or projects permitted or licensed prior to enactment of Service authorities, or Service recommendations related to the enhancement of fish and wildlife resources.

In applying the Mitigation Policy during an impact assessment, the Service first identifies each specific habitat or cover-type that may be impacted by the project. Evaluation species which utilize each habitat or cover-type are then selected for Resource Category analysis. Selection of evaluation species can be based on several rationale, as follows: (1) species known to be sensitive to specific land- and water-use actions; (2) species that play a key role in nutrient cycling or energy flow; (3) species that utilize a common environmental resource; or (4) species that are associated with Important Resource Problems, such as anadromous fish and migratory birds, as designated by the Director or Regional Directors of the Fish and Wildlife Service. (Note: Evaluation species used for Resource Category determinations may or may not be the same evaluation species used in a Habitat Evaluation Procedures application, if one is conducted.) Based on the relative importance of each specific habitat to its selected evaluation species, and the habitat's relative abundance, the appropriate Resource Category and associated mitigation planning goal are determined.

Mitigation planning goals range from "no loss of existing habitat" (i.e., resource category 1) to "minimize loss of habitat value" (i.e., Resource Category 4). The planning goal of Resource Category 2 is "no net loss of in-kind habitat value"; to achieve this goal, any unavoidable losses would need to be replaced in-kind. "In-kind replacement" means providing or managing substitute resources are physically and biologically the same or closely approximate those lost.

In addition to mitigation planning goals based on habitat values, Region 8 of the Service, which includes California, has a mitigation planning goal of no net loss of acreage for wetland habitat. This goal is applied in all impact analyses.

Three fish and/or wildlife habitats were identified in the Marysville Ring Levee Project area that had potential for impacts from the project. These are woodland, annual grassland, and agriculture. The evaluation species, resource categories, and mitigation planning goals for the habitats that are possibly impacted by the project are summarized in Table 1.

The evaluation species selected for the project area woodland habitat were passerine and raptorial birds, and small mammals. The birds were selected because of: (a) their dependence on riparian and other woody habitats for feeding, nesting, and migration, (b) their ability to represent other riparian oriented birds, (c) their importance for nonconsumptive human uses (i.e., bird watching), and (d) the Service's responsibilities for their management, under the Migratory Bird Treaty Act. Small mammals were selected because they are ground dwellers, and they have an important role as prey in the food chain for birds, reptiles, and other larger mammals.

Table 1. Evaluation species, resource categories, and mitigation planning goals for the habitats within the study area of the Marysville Ring Levee Project, California.

HABITAT	EVALUATION SPECIES	RESOURCE CATEGORY	MITIGATION GOAL
Woodland	Passerine birds Raptorial birds Small mammals	2	No net loss of in-kind habitat value or acreage.
Annual grassland	Raptorial birds	4	Minimize loss of habitat value.
Agriculture	Small mammals	4	Minimize loss of habitat value.

For this project woodland habitat is defined as woody vegetation (primarily riparian and remnant riparian stands) composed predominantly of trees and shrubs. Stands of this habitat occur along levees and agricultural drainage ditches in the project area. These stands are generally scattered with their canopy areas ranging from a few trees to hundreds of feet wide. Woodland habitat has been severely degraded in the project area and ecoregion due to overall habitat loss, fragmentation, and disturbance of existing habitat. Remaining stands of this habitat are extremely valuable to the evaluation of species and to wildlife species in general. This habitat, particularly riparian stands, supports a wide variety of plant and wildlife species whose numbers are disproportionately large relative to the area of available habitat. The diversity of species supported by riparian habitat rests on a combination of enhanced surface and groundwater availability, soil fertility, nutrient availability, vegetative layering to form a variety of microclimates, and the role in providing migration routes. Because of its high value to the evaluation species, and its relative scarcity, the Service designates the riparian habitat in the project area potentially impacted by the project as Resource Category 2. Our associated mitigation planning goal is for "no net loss of in-kind habitat value or acreage."

Raptorial birds were selected as the evaluation species for the annual grassland habitat in the project area. These species were selected because they: (a) use this habitat to hunt prey species, (b) their importance for nonconsumptive human uses (i.e., bird watching), and (c) the Service's responsibilities for their management, under the Migratory Bird Treaty Act. This habitat is generally a contiguous area of primarily herbaceous plants such as grasses (i.e., wild oats, rip-gut brome, Bermuda grass, annual and perennial rye), sedges, forbs (i.e., clover spp., vetch, star thistle, dove weed) and various weeds and has been reduced in extent due to conversion to agriculture. Generally this habitat has low-to-moderate habitat values and is fairly common regionally and statewide. Therefore, the Service designates the annual grassland habitat in the project area potentially impacted by the project as Resource Category 3. Our associated mitigation planning goal is "no net loss of habitat value while minimizing loss of in-kind habitat value."

Small mammals were selected as the evaluation species for the agricultural lands in the project area. Small mammals were selected because of their important role in the food

chain as prey species for raptors and larger mammals which forage on these lands. Typically, agricultural lands in the project area are characterized by intensive farming and are very common in the Sacramento Valley. Typically, the agricultural lands are relatively low in value compared to natural habitats. The type of crop grown and post-harvest land management practices affect the value of these lands for wildlife (crop type is usually a key factor in assigning value); therefore, the Service designates the agricultural habitat in the project area potentially impacted by the project as Resource Category 4. Our associated mitigation planning goal is "minimize any loss of habitat value."

## **BIOLOGICAL RESOURCES**

### **EXISTING CONDITIONS**

**Vegetation** -The major habitat types along the Marysville Ring Levee include annual grassland, valley foothill riparian, valley oak woodland, and agricultural lands (CDFG 1988). Dominant woody plant species along the Feather and Yuba rivers include large mature willow, cottonwood, and valley oalc, with a scrub-shrub understory of blue elderberry, blackberry, young willows and cottonwoods, and various forbs and grasses. Immediately within the ring levee are native and non-native species commonly associated with urban settings of the Central Valley. Additionally, numerous recreational fields are adjacent to the levees on both sides.

Although rip-rapped in some segments, the levee slopes are predominantly covered with annual grasses. Typically, in annual grasslands fall rains germinate seeds and development is slow until temperatures increase in the spring. Introduced grasses are the dominant plant species, including wild oats, red brome, ripgut brome, soft chess, wild barley, and foxtail fescue (CDFG 1988). Annual grasslands compose 73% of the Phase 3 project footprint, about 68% of the Phase 4 footprint, and nearly 60% of the Phase 2 and Phase 1 footprints (Table 2).

Valley foothill riparian cover in the Marysville area lines the Yuba River to the south as well as drainage areas associated with Jack Slough to the north. The riparian cover of the area is dominated by cottonwood and valley oak. Understory species include willow species, blue elderberry, poison oak, blackberry, and wild grape. There are no riparian areas directly within the project footprint.

The valley oak woodlands throughout the Marysville area vary in structure and composition. However, most of the woodlands within the project footprint are relatively open, with a scrub-shrub or an annual grassland understory. With valley oak associated species include black walnut, interior live oalc, boxelder, and blue elder. Common shrubs in the area include blue elderberry, black walnut, and blackberry. Valley oalc woodland cover varies between 2.8 – 5.4% of the total area among the four phases of the project footprint.



Table 2. Summary of total acreage impacted by the construction alternatives proposed in the Marysville Ring Levee Project.

PHASE	IMPACTED ACREAGE		
	TEMPORARY	PERMANENT	TOTAL
1	34.85	1.98	36.83
2	50.88	2.38	53.64*
3	52.61	1.54	54.15
4	16.70	0.71	17.41
Total	155.04	6.61	71.56

\* About 0.38 acre within the Phase 2 footprint will not be affected by project activities.

Agricultural lands account for about 15% of the Phase I footprint and 6% of the Phase 3 footprint. Most of the agricultural land adjacent to the Phase I footprint is irrigated row and crops, although some rice fields do occur within the Phase I area. Agricultural land in the Phase 3 area is deciduous orchard.

**Wildlife** -The Feather and Yuba River basins support many wildlife species. Significant numbers of waterfowl and shorebirds utilize the agricultural fields, seasonal wetlands, dredge ponds, and stream channels in the study area. Common wintering waterfowl species include greater white-fronted goose, Cariada goose, Ross' goose, tundra swan, pintail, mallard, gadwall, American widgeon, northern shoveler, wood duck, and green-winged and cinnamon teal.

Woodland habitat in association with herbaceous areas is utilized by a wide array of upland game, raptor, passerine, and other bird species. Common species include mourning dove, California quail, ring-necked pheasant, wild turkey, red-tailed hawk, Swainson's hawk, red-shouldered hawk, great homed owl, northern harrier, white-tailed kite, yellow-billed magpie, great blue heron, great egret, and various wrens, sparrows, swallows, and flycatchers.

Blacktail deer are permanent residents of many parts of the study area along the rivers. Furbearers inhabiting the basin include raccoon, ring-tailed cat, longtail weasel, river otter, spotted and striped skunk, gray fox, coyote, bobcat, beaver, and muskrat. Most of

these species are dependent on riparian and wetland areas. Smaller mammals include gray squirrel, cottontail, blacktailed jackrabbit, California vole, deer mouse, and house mouse.

**Fish** -The Yuba River runs from the east to the south outside the Marysville Ring Levee; the levee follows within 250 feet of the river between stations 269+00 and the confluence with the Feather River by station 236+00. Fish resources of the Feather and Yuba rivers include anadromous species such as Chinook salmon, steelhead trout, American shad, striped bass, green and white sturgeon, and Pacific lamprey.

There are at least 28 species of resident and anadromous fish in the Yuba River (CDFG 1991). The Sacramento River basin contains the most abundant stocks of fall-run Chinook salmon in the Central Valley, yet the overall numbers have decreased by more than 25% from the stocks of the early 1950s (Yoshiyama et al., 2000). Historically, the Yuba River has supported about 15% of the fall-run Chinook salmon in the Sacramento River basin. The lower 24 miles of the river, extending from its confluence with the Feather River at Marysville upstream to Englebright Dam, contains excellent spawning gravels. Presently Chinook salmon and steelhead negotiate fish ladders at Daguene Point Dam (when sufficient flows are present and the ladders are free of debris) and spawn mainly between Daguene Point Dam and Englebright Dam. However, in some years, substantial (up to 50%) spawning also occurs in the first 4 miles immediately downstream of the Daguene Point Dam. The steelhead using the Yuba River are believed to be a self-sustaining population. High water temperatures in the summer and fall seasons make juvenile steelhead vulnerable to loss.

Largemouth and smallmouth bass, Sacramento squawfish, crappie and other centrachids are common in the lower reaches of the Feather and Yuba Rivers. Other fish species present include catfish, riffle sculpin, speckled dace and Sacramento sucker (CDFG 1991).

**Endangered and Threatened Species** – The Marysville Ring levee project is located within the United States Geological Survey 7.5-minute quadrangle (quad) of Yuba City. A list of federally endangered species identified within the Yuba City quad includes Conservancy fairy shrimp, vernal pool tadpole shrimp, and winter-run Chinook salmon of the Sacramento River. The threatened species found within the Yuba City quad are: vernal pool fairy shrimp, valley elderberry longhorn beetle, green sturgeon, delta smelt, Central Valley steelhead, Central Valley spring-run Chinook salmon, California red-legged frog, and giant garter snake. The lone candidate species for the Yuba City quad is the western yellow-billed cuckoo.

The Corps completed a formal Section 7 consultation under the Endangered Species Act with the Service. Measures to minimize the effect on the valley elderberry longhorn beetle include transplanting 28 elderberry shrubs, and planting 303 elderberry seedlings along with 303 associated native seedlings. The compensation area is a 2.5-acre tract adjacent to the east bank of the Feather River. Furthermore, the Corps will restore 1.05 acres of temporarily-affected aquatic habitat and 33.7 acres of temporarily-affected

upland giant garter snake habitat according the *Guidelines for Restoration and/or Replacement of Giant Garter Snake Habitat* and the *Standard Avoidance and Minimization Measures During Construction Activities in Giant Garter Snake (I'hamnophis gigas) Habitat*. The Service's biological opinion for the consultation is in Appendix A. The California Department of Fish and Game should be contacted regarding State-listed species under the California Endangered Species Act.

#### FUTURE WITHOUT THE PROJECT

Vegetation -No significant change in woody or herbaceous vegetation is expected on the lands of the project area. Vegetation on the levees is expected to be maintained as it is currently. Annual grassland and agricultural lands (rice fields) are not expected to change significantly, although some conversion of annual grassland to either agriculture or urban development would likely occur.

Wildlife – Since only minimal changes are expected in vegetation, wildlife populations in the study area are expected to continue as now, with normal year-to-year fluctuations of individual species.

Fish – Future conditions are expected to remain about the same for each listed fish species. As with current conditions, populations would fluctuate, depending on the extent of water diversions, variations in water temperature, rainfall, pesticide use, and natural population cycles. Conditions may be improved for fish if any action items contained for anadromous fish are implemented as part of the Central Valley Project Implementation Act.

#### FUTURE WITH THE PROJECT

Vegetation – Construction of the project would result in the permanent loss of 6.61 acres of woodland habitat and temporary disturbance to the entire areas of agricultural and annual grassland habitat within the construction easement right-of-way. After construction, lands within the permanent easement right-of-way would be restored or converted to annual grassland. The area within the temporary construction easement right-of-way could be retained in annual grassland or used for agricultural purposes.

Based on the results of the Habitat Evaluation Procedures (HEP) conducted in 1997 (Appendix B) for this same area it was determined that the impacts to woodland habitat could be mitigated by developing 8.73 acres of similar habitat at a suitable site.

Wildlife – The proposed construction activities would have both permanent and temporary impacts on wildlife abundance in the immediate area of construction. The loss of woodland habitat, even though relatively small in size, would permanently reduce the carrying capacity for some wildlife species. Temporary impacts include displacement of species in the area of construction.

Fish – The work would not impact any existing aquatic habitat. No impact to the fishery in the project area is anticipated. Between levee stations 235+00 and 270+00 the project footprint is within 200 feet of the Yuba River. However, with best management practices

for erosion control in place, the work is not expected to impact fisheries resources of the Yuba River.

### DISCUSSION

The work proposed for the Marysville Ring Levee project will adversely impact an additional 6.61 acres that would otherwise be unaffected by current work plans. Using the previous HEP results, it was determined that the impact could be compensated by developing 8.73 acres of similar site (annual grassland or agricultural land).<sup>1</sup> The compensation need for each Phase of the project is summarized in Table 3. Impacts to annual grassland and agricultural habitats can be minimized by reseeding all disturbed areas with native grasses at the completion of construction.

Table 3. Summary of woodland habitat impacts and compensation needs in the Marysville Ring Levee Project.

PHASE	ALTERNATIVE 2 -ACTION PLAN		
	HABITAT	ACRES IMPACTED	COMPENSATION
1	Woodland	1.98	2.59
2	Woodland	2.38	3.16
3	Woodland	1.54	2.04
4	Woodland	0.71	0.94
	TOTAL	6.61	8.73

Mitigation for project related effects on vegetation due to the construction of Marysville Ring Levee improvements would take place at an existing Corps mitigation site along the Feather River. This site is located along the Feather River at the end of Anderson Avenue. The Marysville Ring Levee project would use excess lands that exist at this site. The specific mitigation plan and location would be coordinated with the Service. Compensating for the habitat loss shown in Table 3 is already established on the site. Figure 2 shows the location of the woodland mitigation area and the VELB conservation

<sup>1</sup>The HEP Team evaluating the current proposal reviewed the project area and determined the impact area was similar to conditions observed in 1997 as it related to the Habitat Suitability Index (HSI) variables in the HEP analysis. Therefore the compensation ratio (1.32:1.0) from the previous HEP (Page 38; Table BS), in Appendix B of this report, was applied to the impact acreage to develop the current compensation acreage.

Figure 2. Marysville Ring Levee Compensation Area at the Phase II site. Woodland acreage delineated is 8.8 acres; VELB Compensation acreage is 2.7 acres.



area. Long-term monitoring and maintenance would be accomplished by the non-Federal sponsor.

Measures to minimize total impacts to annual grassland and agricultural habitat would consist of replanting disturbed areas with native grass species such as a mixture of purple needlegrass, nodding needlegrass, blue wildrye, creeping wildrye, and California barley on the upper slope of the levee. On the lower slope of the levee a mixture of blue wildrye, Yolo slender wheatgrass, creeping wildrye, and meadow barley would be appropriate. The rate of seeding should range between 2 and 6 pounds per acre for each species. The specific rates for each species can be determined during final project planning.

### **RECOMMENDATIONS**

Based upon the evaluations described herein, the Service recommends that the Corps:

1. Avoid additional impacts to woody vegetation to the maximum extent possible by fencing all areas of woody vegetation within, and immediately adjacent, the construction right-of-way with orange construction fencing and providing written and oral instruction to all contractors not to disturb these areas.
2. Avoid and minimize potential impacts to the giant garter snake by:
  - a. confining construction activity within or near potential habitat to the period from May 1 to October 1.
  - b. providing construction personnel with worker awareness training by a Service approved biologist. This training instructs workers to recognize giant garter snakes and its habitat.
  - c. conducting a giant garter snake survey 24 hours prior to construction in potential habitat. A Service approved biologist should be onsite during any clearing or grubbing of wetland vegetation. Clearing should be confined to the minimal area necessary to facilitate construction activities. The snake survey should be repeated if a lapse in construction activity of two weeks or greater occurs.
  - d. confining movement of heavy equipment to and from the project site or between the borrow site(s) to existing roadways to minimize habitat disturbance. Equipment should stay at least 30 feet from the banks of giant garter snake aquatic habitat.
  - e. ensuring that any dewatered habitat should remain dry for at least 15 consecutive days after April 15 and prior to excavating or filling of the dewatered habitat.

- f. ensuring that if a giant garter snake is encountered during construction, activities should cease until capture and relocation have been completed by the Service-approved biologist. Any incidental take should be reported to the Service immediately by telephone at (916) 414-6600.
3. Minimize the impacts of the project on annual grassland and agricultural habitats by reseeding all disturbed areas with a mixture of native grasses as construction is completed in each reach. A mixture of purple needlegrass, nodding needlegrass, blue wildrye, creeping wildrye, California barley, Yolo slender wheatgrass, and meadow barley is recommended.
4. Compensate for the loss of 6.61 acres of woodland habitat by committing 8.73 acres of the Sacramento River Flood Control System Evaluation, Phase II mitigation site to the Marysville Ring Levee Project.
5. Contact the California Department of Fish and Game regarding possible effects of the project on State listed species.

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APPENDIX A  
ENDANGERED SPECIES CONSULTATION



# United States Department of the Interior



Sacramento Fish and Wildlife Office  
FISH AND WILDLIFE SERVICE

In Reply Refer To:  
81420-2010-O-F-0424-1

2800 Cottage Way, Room W-2605  
Sacramento, California 95825-1846

APR 13 2010

Ms. Alicia E. Kirchner  
Chief, Planning Division  
U.S. Army Corps of Engineers, Sacramento District  
1325 J Street  
Sacramento, California 95814-2922

Subject: Biological Opinion on the Proposed Marysville Ring Levee, Yuba River Basin Project, Yuba County, California

Dear Ms. Kirchner:

This letter is in response to the U.S. Army Corps of Engineers (Corps) request for formal consultation with the U.S. Fish and Wildlife Service (Service) on the proposed Marysville Ring Levee, Yuba River Basin Project (proposed project) in Yuba County, California. Your February 22, 2010, request was received in our office on February 23, 2010. The Service concurs with the Corps' determination that the proposed project may affect, is likely to adversely affect the federally-threatened valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) (beetle), and the federally-threatened giant garter snake (*Thamnophis gigas*) (snake). Although critical habitat has been designated for the beetle, none will be affected by the proposed project. No critical habitat has been designated for the snake. This document represents the Service's biological opinion on the effects of the action on the beetle and the snake and is provided pursuant to section 7(a)(2) of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act), and in accordance with the regulations governing interagency consultations (50 CFR §402).

The findings and recommendations in this biological opinion are based on: (1) the February 22, 2010, letter requesting formal consultation; (2) multiple site visits made to the proposed project area by the Service with the Corps; (3) multiple electronic mail (e-mail) and telephone conversations between the Service and the Corps; (4) the February, 2010, *Draft Marysville Ring Levee, Yuba River Basin, California, Environmental Assessment/Initial Study* by the Corps; and (5) other information available to the Service.

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**BIOLOGICAL OPINION****Consultation History**

*July 10, 2009.* Doug Weinrich and Harry Kahler (Service) attended a site visit to Marysville with Jane Rinck, Lindsay Dembosz, and April Murazzo (Corps). Potential impacts from the proposed project to beetle habitat (i.e., elderberry shrubs) and to snake habitat were discussed.

*July 24, 2009.* The Corps provided the Service via e-mail proposed project footprint maps for the entire project area. The proposed project is to be completed in 4 phases over 4 summer seasons beginning in 2010.

*July 29, 2009.* Doug Weinrich and Harry Kahler (Service) attended another site visit with Jane Rinck, Lindsey Dembosz and April Murazzo (Corps). Elderberry shrubs and stems occurring in the Phase 2 portion of the proposed project were marked with metal tags and flagging and then tallied. Locations of the shrubs were recorded using a Trimble Global Positioning System (GPS) unit.

*August 20, 2009.* Doug Weinrich and Harry Kahler (Service) and Jane Rinck, Lindsey Dembosz and April Murazzo (Corps) located (via GPS) marked and tallied additional elderberry shrubs throughout the Phase 2 and Phase 3 portions of the proposed project.

*September 10, 2009.* Doug Weinrich and Harry Kahler (Service) and Jane Rinck, Lindsay Dembosz, and April Murazzo (Corps) attended another site visit to finalize the proposed project footprint throughout all Phases of the project. Richard Dirks (Project Manager/Civil Engineer of HDR, Inc.) also attended and subsequently developed the finalized project footprint plans.

*September 17, 2009.* The Corps met with the Service at the Service's Sacramento office to discuss acreages of affected habitat types throughout the proposed project given the finalized project footprint.

*September 18, 2009.* The Corps e-mailed to the Service maps with areas of affected snake habitat noted throughout Phase 1. Acreages of upland and wetland snake habitat were measured using a Geographic Information System (GIS) software program. The Service agreed with the acreage estimates provided by the Corps.

*October 5, 2009.* The Corps e-mailed to the Service a finalized project description for all phases, given the discussions on September 10, 2009, and since that meeting.

*October 21, 2009.* Based on the finalized project footprint and description, the Corps e-mailed to the Service electronic files outlining the requisite acreages for compensation. The Service replied in agreement with the acreage totals.

*February 23, 2010.* The Service received from the Corps a request to initiate formal consultation in accordance with section 7 of the Act.

**Slurry Wall Construction.** The levee crown would be degraded down 4 to 12 feet to provide a 40 to 55 foot temporary work surface for construction equipment. A large hydraulic excavator would dig a 4 foot wide, 250 to 1,000 foot long trench along the levee. There are then two methods to constructing the slurry wall: (1) the levee material would be removed from the trench and brought to a nearby location; mixed with the soil, Portland cement and bentonite clay (SCB); and then pumped back into trench, or (2) the trench is filled with the SCB slurry to stabilize the excavation sidewalls as digging occurs; after a section of the trench is dug, the SCB slurry is backfilled into the trailing end of the trench to form the slurry wall.

**Slope Reshaping Construction.** To reshape the waterside slope, material would be added to the slope and toe. The reshaping would push the current waterside toe out 10 feet and would change the waterside slope ratio from 2.5:1 to 3:1. Conventional construction equipment such as loaders, scrapers, graders, and excavators would be used to perform the degrading, reshaping, and other earthwork. No inwater work is proposed.

**Access and Staging.** The Phase 1 access roads would include the waterside toe of the levee, E 26<sup>h</sup> Street/Jack Slough Road, Sampson Street, Triplet Way, and Highway 70. Slurry wall construction would take place on the crown of the levee and reshaping construction would take place on the waterside slope.

Staging areas totaling approximately eight acres would be located north of the levee, west of Jack Slough Road, and approximately two acres adjacent to the Marysville High School sports fields. The existing use of this area is agriculture (row crops in 2009). Construction materials, equipment, topsoil, and excess material would be temporarily stored at the staging area during the construction period. A jobsite trailer would be established in this staging area, as would the construction workers' parking area. All construction supplies would be delivered to the staging area.

**Site Preparation.** All habitat areas (woodlands, individual trees, seasonal wetlands) outside of construction areas would be fenced off prior to the start of construction to limit public access, including the staging area. Temporary construction easements would be needed for the equipment working area. The easement on the landside toe would be 25 to 40 feet, while the easement on the waterside toe would be 25 to 50 feet. Concrete K-Rails would be installed prior to construction along the waterside temporary construction easement adjacent to the irrigation drainage ditch to prevent equipment from working near the banks of the ditch. Other temporary erosion control methods would be implemented to prevent soil from running onto adjacent properties.

The slopes and crown of the levee will be cleared and grubbed of all vegetation and surface material, including the existing levee maintenance road on the crown. This would total approximately 111,400 cubic yards of removed material.

**Restoration and Cleanup.** Once the levee work is complete, all equipment and excess materials would be transported offsite via neighborhood streets and regional highways. The barren earth and levee slopes would be regraded and seeded with a native grass seed mix to promote re-vegetation and minimize soil erosion. The access ramps and staging areas would also be restored

to pre-project conditions. Finally, the work sites and staging areas would be cleaned of all rubbish, and all parts of the work area would be left in a safe and neat condition suitable to the setting of the area. The procedures for restoration and clean-up are the same for all four phases.

**Borrow and Disposal Sites.** All disposal material would be temporarily stockpiled at the staging areas or disposed of at a commercial site or facility. The amount of unsuitable soil that would be disposed of is estimated to be 18,300 cubic yards. The amount of soil imported from a borrow site is estimated to be 78,400 cubic yards. The borrow and disposal areas would be within 12 miles of the project area. The contractor would be responsible for determining the location of borrow and disposal. If a site other than a commercial site is used, appropriate NEPA/CEQA documentation would be required. The Corps will review disposal and borrow sites and proposes to reinstate section 7 consultation with the Service on the proposed project if the disposal or borrow activities may affect federally-listed species.

There are five potential haul routes proposed for all material and equipment transportation: (1) Highway 70 to Triplett Way to the levee crown, (2) Sampson Street to the levee crown, (3) Jack Slough Road to the levee crown, (4) Highway 20 to the levee crown, and (5) the agriculture access road, north of the Ring Levee, to Jack Slough Road to the levee crown.

**Construction Workers and Schedule.** An estimated 25 to 30 workers would be onsite each day during construction. These workers would access the area via regional and local roadways, and park their vehicles at the northwest corner staging area. Construction hours would be limited to the hours from 7 a.m. to 7 p.m., seven days a week. Phase I would take approximately two construction seasons to complete. Construction would occur between August through October 1, 2010 and resume in July or August 2011 through October 1, 2011.

**Operation and Maintenance.** After construction is complete, responsibility for the project would be turned over to the State of California in conjunction with the Marysville Levee Commission, the non-Federal joint sponsors for the project. This would include operation, maintenance, repair, rehabilitation, and replacement of all project features. The Marysville Levee Commission would operate and maintain the levee. Regular maintenance activities would include mowing and spraying levee slopes, controlled burns, rodent control, clearance of maintenance roads, and levee inspections.

**Federally-listed Species Habitat.** There are no elderberry shrubs within 100 feet of the Phase I construction area and therefore the species is not likely to be adversely affected by Phase I construction. There is a drainage ditch near a portion of the waterside levee toe of the Phase I levee segment. The drainage ditch in some reaches supports a dense overstory of riparian habitat while other sections have emergent wetland species, such as cattails. This drainage ditch is considered potential giant garter snake aquatic habitat. The drainage ditch will not be affected by the project; however there will be construction activity in annual grassland areas and the levee within about 20 feet of the ditch. There is a 1.05-acre rice field adjacent to the drainage ditch that is potential aquatic snake habitat. This rice field will be fallowed in 2010 to allow unrestricted access to the construction area. There is a total of 33.7 acres of uplands within 200 feet of the drainage ditch and rice field that is considered potential upland habitat for the giant garter snake. All of the activities as described above are proposed to occur within this 33.7

acres; therefore, for the purposes of this formal consultation, the Service considers all of this upland habitat as being affected by the proposed project. All work will be conducted during the active period for the giant garter snake.

Since Phase 1 will be constructed first, the level of design is further along than the design of the subsequent phases. If design changes occur in Phases 2-4 that would affect federally-listed species beyond what is considered in this biological opinion, the Corps proposes to reinitiate section 7 consultation on the proposed project.

## ***Phase 2***

**Features.** Phase 2 would extend 8,700 feet on the southern portions of the levee (station 191+00 to 278+00), encompassing 53.64 acres of total disturbed area. The proposed repair for this site involves a 50 to 90 foot deep slurry wall on the waterside slope in three locations, jet grouting under four bridges, and a 70 foot deep secant pile wall on the levee crown in two locations.

**Construction Methods.** Phase 2 construction would include installing a 50 to 90 foot deep, slurry wall and a 70 foot deep secant pile wall. The secant pile wall would be used where buildings on the landside of the levee prevent installation of a slurry wall. Jet grouting will occur at the 5th Street Bridge, Highway 70 Bridge and at two railroad bridges on the southwest and southeast corners of the levee. Conventional construction equipment such as loaders, scrapers, graders, and excavators would be used to perform the degrading, reshaping, and other earthwork. For slurry wall construction methods, please see the Slurry Wall Construction section in the Phase 1 Construction Methods.

Secant Pile Wall Construction. A Secant Pile Wall system is a structural wall constructed of drilled foundation piles with overlapping reinforced concrete members. The levee crown would be degraded 4 to 12 feet to provide a 40 to 55 foot temporary working area for construction equipment. A 3- to 4-foot diameter hole would be drilled into the earth by a drill rig. This hole may be cased with a steel pipe which can be vibrated or oscillated into the ground at the perimeter of the hole. The borehole is backfilled with portland cement concrete using a concrete pump truck. Steel reinforcing may be added to provide additional strength. This requires a large crane to place the steel in the borehole. Secant piles may be anchored with steel tieback cables. If needed, they would be installed landward of the levee, and beneath buildings within a distance of 50 to 75 feet of the wall.

Jet Grouting Construction. Jet Grouting would be used to treat the ground in locations that are inaccessible to the other open trench methods. This method uses small drill rigs to bore holes in the soil. High-pressure, rotating water jets then inject SCB and water to form a soil-cement product.

**Access and Staging.** The Phase 2 access roads would be A Street, 2nd Street, and Levee Road for the secant pile wall construction; Bizz Johnson Drive for the slurry wall construction; and the levee crown and waterside toe for all construction including jet grouting.

Staging areas totaling approximately 10 acres would be located within Riverfront Park and an approximately three acre staging area would be located at the old sand pit. Construction materials, equipment, topsoil, and excess material would be temporarily stored at the proposed staging areas during the construction period, as well as provide parking for construction workers. All construction supplies would be delivered to the staging areas.

**Site Preparation.** Prior to construction, all construction areas would be fenced off to limit access, including the staging areas. A temporary construction easement of 20 to 100 feet from the waterside toe and a temporary construction easement of 10 to 25 feet from the landside toe would be needed for the equipment working area. Temporary erosion controls would be implemented on the waterside toe of the levee to prevent soils from running onto adjacent properties and into local waterways, as well as to separate the construction easement from the private residences near the site. Similar methods would be used around the staging areas.

The slopes and crown of the levee will be cleared and grubbed of all vegetation and surface material, including the existing levee maintenance road on the crown. This would total approximately 97,200 cubic yards of removed material.

**Restoration and Cleanup.** The procedures for restoration and clean-up are the same for all four sites. See the description of Restoration and Cleanup described in the Phase 1 section for details.

**Borrow and Disposal Sites.** All disposal material would be temporarily stockpiled at the staging areas or disposed of at a commercial facility within 12 miles of the project site. The contractor would be responsible for determining and providing certification of the condition on the disposal material. The amount of soil that would be disposed of is dependent upon how much the levee is degraded. The estimated amount of non-suitable soil would be 21,300 cubic yards. The estimated amount of soil imported from a borrow site is 44,000 cubic yards.

There are three potential haul routes proposed for all material and equipment transportation: (1) Highway 20 to 3rd Street to F Street to Bizz Johnson Drive to the waterside toe or the levee crown, (2) Highway 70 to 14th Street to the levee crown or (3) Bizz Johnson Drive, and Highway 70 to 3rd Street to A Street to the levee crown or to 2nd Street to the levee crown.

**Construction Workers and Schedule.** An estimated 30 to 50 workers would be onsite each day during construction. These workers would access the area via regional and local roadways, and park their vehicles at one of the staging areas identified. Construction hours would be limited daily to the hours from 7 a.m. to 7 p.m. seven days a week. Construction would start between June and August 2012 and end September or October 2012.

**Operation and Maintenance.** The procedures for operation and maintenance are the same for all four sites. See the description of Operation and Maintenance in the Phase 1 section for details.

**Federally-listed Species Habitat.** There is no suitable habitat for the giant garter snake in the vicinity of the proposed Phase 2 repairs. Surveys for elderberry shrubs in the vicinity of the Phase 2 work revealed the presence of 54 shrubs with stems measuring 1-inch or greater at



ground level. Seventeen of these shrubs were located 100 feet or more from proposed construction activities that will not be physically disturbed. Twenty-five shrubs would be directly affected; 24 of these would be transplanted to a conservation area along the Feather River, 1 shrub was identified as not transplantable as it has grown up through a cyclone fence. Effects to the 12 remaining shrubs can be avoided by vehicles by placing fencing at least 20 feet from the dripline of each shrub.

### *Phase 3*

**Features.** Phase 3 would extend for approximately 11,100 feet along the east and northeast portion of the levee (station 0+00 to 14+00 and station 298+00 to 394+00), encompassing 54.14 acres of total disturbed area. The proposed repair for this site would be a 50 to 110 foot deep slurry wall installed through the crown of the levee. This repair would require temporary road closures on Highway 20/Browns Valley Road, Simpson Lane, and Levee Road. Rerouting Highway 20 at its intersection with Levee Road may be required for approximately 7 working days at a time, depending on the method of construction. This would be accomplished by constructing temporary access roads or creating a detour around the city using other local roads. The Corps will review locations of temporary access roads and proposes to reinstate section 7 consultation with the Service on the proposed project if construction and/or operation of these roads may affect federally-listed species.

**Construction Methods.** Phase 3 construction would consist of installing 50 to 110 foot deep slurry walls in two locations extending northeast from Ramirez Street/Simpson Lane. Conventional construction equipment such as loaders, scrapers, graders, and excavators would be used to perform the degrading, reshaping, and other earthwork. The slurry wall construction would proceed in the manner as outlined in Phase 1.

**Access and Staging.** Phase 3 access roads would be Ramirez Street/Simpson Lane to Levee Road for the southern slurry wall, Highway 20 to Levee Road for the northern slurry wall, and the waterside toe of the levee for the entire phase.

The staging areas would be approximately 13 acres and be located 250 feet out from the waterside toe of the levee, extending from stations 328+00 to 344+50 and from stations 388+00 to 394+41. During the construction period, construction materials, equipment, topsoil, and excess material would be temporarily stored at the staging areas. The staging areas would also provide parking for construction workers. All construction deliveries would be placed in the staging areas.

**Site Preparation.** Prior to construction, all construction areas would be fenced off to limit access, including the staging areas. A temporary construction easement of 12 to 40 feet and a localized lane shift of Highway 20 on the landside toe would be needed for the equipment working area. A temporary construction easement of 15 to 100 feet from the waterside toe would be needed for the equipment working area. Erosion control measures would be implemented on the landside and waterside toe of the levee to prevent soils from entering adjacent properties.

The slopes and crown of the levee will be cleared and grubbed of all vegetation and surface material, including the existing levee maintenance road on the crown. This would total approximately 78,200 cubic yards of removed material.

**Restoration and Cleanup.** The procedures for restoration and clean-up are the same for all four sites. The restoration and cleanup would proceed as outlined in the Phase 1 section.

**Borrow and Disposal Sites.** All disposal material would be temporarily stockpiled at the staging area or disposed of at a commercial facility within 12 miles of the project site. The contractor would be responsible for determining and providing certification of the condition on the disposal material. The amount of soil that would be disposed of is dependent upon how much the levee is degraded. The estimated amount of non-suitable soil would be 16,100 cubic yards. The amount of soil imported from a borrow site is 30,800 cubic yards.

There are three potential haul routes proposed: (1) Ramirez Street/Simpson Lane to Levee Road (crown of levee) for the southern slurry wall, (2) Highway 20 to Levee Road for the northern slurry wall, and (3) Levee Road between slurry wall construction sites and staging. The waterside toe of the levee would be used for access for duration of the entire phase. Construction of temporary access ramps would be necessary for equipment access from the landside slope to the crown of the levee.

**Construction Workers and Schedule.** An estimated 20 to 30 workers would be onsite each day during construction. These workers would access the area via regional and local roadways, and park their vehicles at the northeast corner staging area. Construction hours would be limited to the hours from 7 a.m. to 7 p.m., seven days a week. Construction would start between June and August 2013 and end in September or October 2013.

**Operation and Maintenance.** The procedures for operation and maintenance are the same for all four sites. See the description of Operation and Maintenance in the Phase 1 section for details.

**Federally-listed Species Habitat.** There is no suitable habitat for the snake in the vicinity of the proposed Phase 3 repairs. Surveys for elderberry shrubs in the vicinity of the Phase 3 work revealed the presence of 33 shrubs with stems measuring 1-inch or greater at ground level. Four shrubs would be directly affected and would be transplanted to a conservation area along the Feather River. The 29 remaining shrubs, more than 20 feet from construction areas, can be avoided by vehicles by placing fencing at least 10 feet from the dripline of each shrub. No elderberry shrubs exist within 100 feet of the temporary access ramps.

#### ***Phase 4***

**Features.** The proposed repair for Phase 4 would consist of the construction of two berms between the railroad trestles at Binney Junction. The construction site would extend approximately 15 feet out from the landside toe from station 121+00 to 137+00, encompassing about 17.38 acres of total disturbed area.

**Construction Methods.** Phase 4 construction would consist of two 7-foot tall seepage or stability berms. These berms would stabilize the levee by laterally retaining an existing railroad track and by resisting seepage uplift. The construction equipment required would be a loader, sheep foot roller, and small dozer.

**Access and Staging.** The Phase 4 access roads would be Highway 70 to the crown of the levee in the north, and 14th Street to the crown of the levee in the west. The staging area would be accessed by taking Highway 70 to 14th street to Ellis Lake Drive. The staging area would be located on the landside of the levee adjacent to the site and would be approximately 5 acres. Construction materials, equipment, topsoil, and excess material would be temporarily stored at the proposed staging area during the construction period. The staging area would also provide parking for construction workers. All construction deliveries will be placed in the staging area.

**Site Preparation.** Prior to construction, the staging area would be fenced off to limit access. Installation of the stability berms would require the site to be cleared and grubbed of all vegetation and surface material. This would total approximately 6,600 cubic yards of removed material. Coordination between the Corps and Union Pacific Railroad would need to occur to gain access to the entire site. A temporary access ramp for equipment and workers would need to be installed to facilitate access over the railroad tracks.

**Restoration and Cleanup.** The procedures for restoration and clean-up are the same for all four sites. See the description of Restoration and Cleanup described in the Phase 1 section for details.

**Borrow and Disposal Sites.** As with the previous Phases, all disposal material would be temporarily stockpiled at the staging area or disposed of at a commercial facility. The contractor would be responsible for determining and providing certification of the condition on the disposal material. Minimal material would be disposed of and the amount of soil imported from a borrow site would be approximately 8,500 cubic yards. The borrow and disposal areas are within 12 miles of the project area. The contractor would be responsible for determining the location of borrow and disposal. The proposed haul routes would be Highway 70 to the crown of the levee in the north or 14th Street to the crown of the levee in the west.

**Construction Workers and Schedule.** An estimated 10 to 20 workers would be onsite each day during construction. These workers would access the area via regional and local roadways, and park their vehicles at the staging area. Construction hours would be limited to the hours from 7 a.m. to 7 p.m., seven days a week. Construction activities are expected to begin between June and August 2013 and continue for approximately 12 to 16 weeks.

**Operation and Maintenance.** The procedures for operation and maintenance are the same for all four sites. See the description of Operation and Maintenance in the Phase 1 section for details.

**Federally-listed Species Habitat.** Currently there is no suitable habitat for giant garter snake or valley elderberry longhorn beetle in the vicinity of the construction area for Phase 4. This will be reconfirmed prior to construction.

## **Action Area**

The action area is defined in 50 CFR § 402.02 as, "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." For the Marysville Ring Levee project, this includes all areas subject to the direct effects associated with construction in each of 4 Phases: 36.84 acres in Phase 1; 53.64 acres in Phase 2; 54.14 acres in Phase 3; and 17.38 acres in Phase 4. The action area also includes the established disposal sites and travel pathways between these areas.

## **Conservation Measures**

The Corps has proposed the following conservation measures to avoid and minimize effects of the proposed project on the beetle and the snake. The conservation measures as proposed below are considered part of the proposed project evaluated by the Service in this biological opinion. Any change in these plans or their implementation that would trigger one of the criteria outlined in the closing statement of this opinion would require reinitiation of formal consultation with the Service.

### General conservation measures

1. A Service-approved biologist will identify boundaries of woodland habitat, individual trees and elderberry shrubs that are to be avoided and have the contractor fence the areas with orange construction fencing. Erosion control fencing will be placed at the edges of construction where the construction activities are upslope of wetlands and channels to prevent washing of sediments offsite. All fencing will be installed prior to any construction activities beginning and will be maintained throughout the construction period.
2. During construction operations, stockpiling of construction materials, portable equipment, vehicles, and supplies will be restricted to the designated construction staging areas. To eliminate an attraction to predators of listed species, all food-related trash items, such as wrappers, cans, bottles, and food scraps, will be disposed of in closed containers. Revegetation will occur on all areas temporarily disturbed during construction.
3. The number of access routes, number and size of staging areas, and the total area of the proposed project activity will be limited to the minimum necessary. Routes and boundaries will be clearly demarcated. Movement of heavy equipment to and from the project site will be restricted to established roadways to minimize habitat disturbance. Project-related vehicles will observe a 20-mile-per-hour speed limit within construction areas, except on county roads and on state and federal highways.

### Valley Elderberry Longhorn Beetle

1. A worker awareness training program for construction personnel will be conducted by a qualified biologist prior to beginning construction activities. The program will inform all construction personnel about the life history and status of the beetle, requirements to avoid damaging the elderberry plants, and the possible penalties for not complying with these requirements. Written documentation of the training by all personnel will be submitted to the Service within 30 days of its completion.
2. Pre-construction and post-construction surveys will be done of the elderberry shrubs in the project area. Pre-construction surveys are designed to detect elderberry shrubs that may have become established in the work areas since the original surveys. The post-construction survey will confirm that there was no additional damage to any of the elderberry shrubs than as described in this BO.
3. All areas to be avoided during construction activities will be fenced and flagged. In most cases, fencing will be placed at least 100 feet from the dripline of the shrub. In some cases, construction activity may be required within 100 feet of a shrub. In these cases, fencing will be placed at the greatest possible distance from the shrubs.
4. Transplant up to 28 elderberry shrubs with 110 stems between 1 and 3 inches, 21 stems between 3 and 5 inches and 14 stems greater than 5 inches at ground level, and provide additional plantings as described in Service's 1999 *Conservation Guidelines for the Valley Elderberry Longhorn Beetle* (Conservation Guidelines). See Table 1. Elderberry shrubs that require removal will be transplanted to a compensation area already established along the Feather River near the end of Anderson Road. Elderberry and associated native seedlings were established in 1996 for the Sacramento River Flood Control Project, Phase II compensation, and the site has been monitored for 10 years. Transplanting will occur during the transplantation window (approximately November through the first two weeks of February) identified in the Conservation Guidelines.
5. One additional shrub, with one stem between 1 and 3 inches and another stem greater than 5 inches at ground level, cannot be transplanted because it has grown within a chain-link fence. The compensation planting ratios outlined in the Conservation Guidelines for these stems would be doubled because the plant will be destroyed by the project. See Table 1.
6. Signs would be posted every 50 feet along the edge of the avoidance areas with the following information:

"This area is the habitat of the valley elderberry longhorn beetle, a threatened species, and must not be disturbed. This species is protected by the Endangered Species Act of 1973, as amended. Violators are subject to prosecution, fines, and imprisonment."
7. Dirt roadways and other areas of disturbed bare ground within 100 feet of elderberry shrubs will be watered at least twice a day to minimize dust emissions.

- A Service-approved biologist (monitor) will be on-site for the duration of the transplanting of the elderberry shrubs to ensure that transplanting procedures outlined in the Conservation Guidelines are followed. The monitor will have the authority to stop work until corrective measures have been completed if those procedures are not being followed.

**Table 1:** Proposed compensation ratios based on location (riparian vs. non-riparian), stem diameter of affected elderberry plants at ground level, and presence or absence of exit holes if transplanted during the dormant season.

Location	Stems (maximum diameter at ground level)	Exit Hole on Shrub (Yes or No)	Elderberry Seedling Ratio	Associated Native Plant Ratio	Number of Stems Observed	Required Elderberry Plantings	Required Associated Native Plant Plantings
Total Elderberry shrubs to be transplanted						28	
Riparian	stems 2:1" & :3,,	No	2:1	1:1	89	178	178
Riparian	stems > 3" & <5"	No	3:1	1:1	8	24	24
Riparian	stems 2:5"	No	4:1	1:1	8	32	32
Non-riparian	stems 2:1" & :3,,	No	1:1	1:1	20	20	20
Non-riparian	stems >3" & <5"	No	2:1	1:1	13	26	26
Non-riparian	Stems 2:5"	No	3:1	1:1	5	15	15
Total Elderberry shrubs that can't be transplanted (2x mitigation)						1	
Non-riparian	stems 2:1" & :3,,	No	2:1	1:1	1	2	2
Non-riparian	Stems 2:5"	No	6:1	1:1	1	6	6
					145	303	303
303/5 = 60.6 valley elderberry longhorn units or 2.50 acres							

Giant Garter Snake

- A worker awareness training program for construction personnel will be conducted by a qualified biologist prior to beginning construction activities. The program will provide workers with information on their responsibilities with regard to the snake, an overview of the life history of the snake, a description of measures to minimize potential for take of the snake, and an explanation of the possible penalties for not properly implementing

these measures. Written documentation of the training by all personnel will be submitted to the Service within 30 days of its completion.

2. All construction activity within snake habitat (i.e., upland areas within 200 feet of aquatic habitat), will be conducted between May 1 and October 1. This is the active period for the snake and direct mortality is lessened because snakes are expected to actively move and avoid danger. More danger is posed to snakes during their inactive period because they are occupying underground burrows or crevices and are more susceptible to direct effects, especially during excavation activities. If it appears that construction activity may need to extend beyond October 1, the project proponent(s) would contact the Service as soon as possible and no later than August 15 of that construction year to determine if additional measures are necessary to minimize take of the snake.
3. At least 30 days prior to initiating construction activities, the project proponents will submit the names and curriculum vitae of the biological monitor(s) for the project to the Service for review and approval.
4. Within 24 hours before beginning construction activities, areas within 200 feet of suitable aquatic habitat for giant garter snake will be surveyed by a qualified biologist. The biologist will provide the Service written documentation of the monitoring efforts within 48 hours after the survey is completed. Habitat will be re-inspected by the monitoring biologist whenever a lapse in construction activity of 2 weeks or greater occurs. The biologist will be present on-site during initial ground disturbance activities, including clearing and grubbing/stripping. The biologist will be available throughout the construction period and will conduct regular monitoring visits to ensure avoidance and minimization measures are being properly implemented.
5. The Corps will ensure the restoration of 33.7 acres of upland snake habitat temporarily affected during Phase 1 according to the *Guidelines for Restoration and/or Replacement of Giant Garter Snake Habitat* and the *Standard Avoidance and Minimization Measures During Construction Activities in Giant Garter Snake (Thamnophis gigas) Habitat*. All restoration will occur prior to October 1, 2010. The restoration of the 1.05 acres of affected aquatic snake habitat (the rice field in Phase 1) will occur by the subsequent reestablishment the following year of the rice field that had gone fallow during the Phase 1 construction period.

#### STATUS OF THE SPECIES AND ENVIRONMENTAL BASELINE

##### Valley Elderberry Longhorn Beetle

##### *Status of the Species*

##### Description

The beetle was listed as a threatened species under the Act on August 8, 1980 (45 FR 52803). Critical habitat for the species was designated and published in 50 CFR §17.95. Two areas along the American River in the Sacramento metropolitan area have been designated as critical habitat for the beetle. The proposed project is outside of the areas designated as critical habitat. An area along Putah Creek, Solano County, and the area west of Nimbus Dam along the American River Parkway, Sacramento County, are considered essential habitat, according to *The Valley Elderberry Longhorn Beetle Recovery Plan* (Service 1984).

### Life History

The elderberry shrub (*Sambucus* sp.) is the sole host plant for the valley elderberry longhorn beetle. Elderberries are locally common components of the remaining riparian forest and savannah landscapes, and to a lesser extent the mixed chaparral-foothill woodlands, of the Central Valley. The occupancy rates of the beetle are reduced in non-riparian habitats (e.g., Talley et al. 2007), indicating that riparian elderberry habitat is an important habitat type for the beetle.

Use of elderberry shrubs by the beetle, a wood borer, is rarely apparent. Frequently, the only exterior evidence of the shrub's use by the beetle is an exit hole created by the larva emerging. Observations of elderberry shrubs along the Cosumnes River and in the Folsom Lake area indicate that larval beetles can be found in elderberry stems with no apparent exit holes; the larvae either succumb prior to constructing an exit hole or are not developed sufficiently to construct one. Larvae appear to be distributed in stems which are 1.0 inch or greater in diameter at ground level and can occur in living stems. *The Valley Elderberry Longhorn Beetle Recovery Plan* (Service 1984) and Barr (1991) further describe the beetle's life history.

### Population Structure

The beetle is a specialist on elderberry plants, and tends to have small population sizes and occurs in low densities (Barr 1991; Collinge et al. 2001). It has been observed feeding upon both blue and red elderberry (Service 1984; Barr 1991) with stems greater than or equal to one inch in diameter (Barr 1991). Sightings of the beetle are rare and in most circumstances, evidence of the beetle is derived from the observation of the exit holes left when adults emerge from elderberry stems. The beetle tends to occur in areas with higher elderberry densities, but has lower exit hole densities than a closely related species, the California elderberry longhorn beetle (Collinge et al. 2001).

### Distribution and Range

When the beetle was listed in 1980, the species was known from less than ten localities along the American River, the Merced River, and Putah Creek. By the time the *Valley Elderberry Longhorn Beetle Recovery Plan* was prepared in 1984; additional occupied localities had been found along the American River and Putah Creek. As of 2005, the California Range wide distribution extends from the Sacramento River in Shasta County, southward to an area along Caliente Creek in Kern County (CNDDDB 2010). The California Natural Diversity Database (CNDDDB) contained 190 occurrences for this species in 44 drainages throughout the Central



the two areas, illustrating that elderberry shrubs likely replace themselves in these relatively undisturbed areas.

In the northern portion of the beetle's range along the Sacramento River and 13 of its tributaries (including lands in Butte, Placer, Sacramento, Shasta, Sutter, Tehama, Yolo and Yuba counties), the beetle occurs in drainages that function as distinct, relatively isolated metapopulations (Collinge et al. 2001). Half of the 14 drainages in the Sacramento Valley surveyed by Barr (1991) in 1991 and again by Collinge et al. (2001) in 1997 remained unoccupied in both studies. The beetle experienced extirpation in two drainages and neither were recolonized. Collinge et al. (2001) concluded that because of dispersal limitations, unoccupied drainages were likely to remain unoccupied and those where the resident beetle population became extirpated were not likely to be recolonized. One of the implications of their results for conservation was that there is little chance that natural populations would recover following declines (Collinge et al. 2001).

The increase in the amount of riparian habitat through restoration and compensation efforts is valuable, but remains small in comparison to estimated historic losses of the habitat. Katibah (1984) estimated that approximately 50,000 acres of existing riparian habitat has been protected in the Sacramento and San Joaquin Valley. In addition, approximately 5,000 acres of habitat has been restored for the benefit of the beetle (including planting of elderberries) and another 1,600 acres of riparian habitat has been restored however, no elderberry plantings were included (Talley et al. 2006). An undetermined amount of additional habitat has been restored as a result of compensation for projects that have undergone section 7 consultation. Despite the efforts of a number of agencies and organizations, the 5,000 acres of restoration activities is less than 1% of the estimated 890,000 acres of the historic riparian habitat lost in the Central Valley. Loss of the beetle and its habitat continues, including conversion of agricultural lands, urban development and other activities that are often unreported. The ability of restoration and enhancement of conservation sites to fully compensate for adverse effects to the beetle and its lost remnant natural habitat, is uncertain (Talley et al. 2007).

### Threats to the Species

The beetle continues to be threatened by habitat loss and fragmentation, predation by the non-native Argentine ants (*Linepithema humile*) (Holway 1998; Huxel 2000; Huxel and Hastings 1999; Huxel et al. 2001; Ward 1987), and possibly other factors such as pesticide drift, non-native plant invasion, improper burning regimes, off-road vehicle use, rip-rap bank protection projects, wood cutting, and over-grazing by livestock.

**Habitat Loss** - Habitat destruction is one of the most significant threats to the beetle. Riparian forests, the primary habitat for the beetle, have been severely depleted throughout the Central Valley over the last two centuries as a result of expansive agricultural and urban development (Huxel et al. 2001; Katibah 1984; Roberts et al. 1977; Thompson 1961). As of 1849, the rivers and larger streams of the Central Valley were largely undisturbed. They supported continuous bands of riparian woodland four to five miles in width along some major drainages, such as the lower Sacramento River, and generally about two miles wide along the lesser streams (Thompson 1961). Most of the riverine floodplains supported riparian vegetation to about the 100-year flood line (Katibah 1984).

A large human population influx occurred after 1849, however, and much of the Central Valley riparian habitat was rapidly converted to agriculture and used as a source of wood for fuel and construction to serve a wide area (Thompson 1961). The clearing of riparian forests for fuel and construction made this land available for agriculture (Thompson 1961). Natural levees bordering the rivers, once supporting vast tracts of riparian habitat, became prime agricultural land (Thompson 1961). As agriculture expanded in the Central Valley, needs for increased water supply and flood protection spurred water development and reclamation projects. Artificial levees, river channelization, dam building, water diversion, and heavy groundwater pumping further reduced riparian habitat to small, isolated fragments (Katibah 1984).

In recent decades, these riparian areas have continued to decline as a result of ongoing agricultural conversion as well as urban development and stream channelization. As of 1989, there were over 100 dams within the Central Valley drainage basin, as well as thousands of miles of water delivery canals and streambank flood control projects for irrigation, municipal and industrial water supplies, hydroelectric power, flood control, navigation, and recreation (Fraye et al. 1989). Riparian forests in the Central Valley have dwindled to discontinuous strips of widths currently measurable in yards rather than miles.

Some accounts state that the Sacramento Valley supported approximately 775,000 to 800,000 acres of riparian forest as of approximately 1848, just prior to statehood (Smith 1977; Katibah 1984). No comparable estimates are available for the San Joaquin Valley. Based on early soil maps, however, more than 921,000 acres of riparian habitat are believed to have been present throughout the Central Valley under pre-settlement conditions (Huxel et al 2001; Katibah 1984). Another source estimates that of approximately 5,000,000 acres of wetlands in the Central Valley in the 1850s, approximately 1,600,000 acres were riparian wetlands (Warner and Hendrix 1985; Frayer et al. 1989).

Based on a CDFG riparian vegetation distribution map, by 1979, there were approximately 102,000 acres of riparian vegetation remaining in the Central Valley. This represents a decline in acreage of approximately 89 percent as of 1979 (Katibah 1984). More extreme figures were given by Frayer et al. (1989), who reported that woody riparian forests in the Central Valley had declined to 34,600 acres by the mid-1980s (from 65,400 acres in 1939).

An even more recent analysis, completed by The Central Valley Historic Mapping Project, observed similar decreases in the amount of riparian habitat (Geographic Information Center 2003). Loss of riparian habitat between 1900 and 1990 in the Central Valley was about 96% in the southern portion of the Valley (Kem County to Fresno County) (16,000 acres remaining), 84% in the middle Valley (Merced County to San Joaquin County) (21,000 acres remaining) and 80% in the northern Valley (Sacramento and Solano counties to Shasta County) (96,000 acres remaining). Although these studies have differing findings in terms of the number of acres lost (most likely explained by differing methodologies), they attest to a dramatic historic loss of riparian habitat in the Central Valley.

**Habitat Fragmentation** - Destruction of riparian habitat in central California has resulted not only in a significant acreage loss, but also has resulted in beetle habitat fragmentation. Fahrig

(1997) states that habitat fragmentation is only important for habitats that have suffered greater than 80 percent loss. Riparian habitat in the Central Valley, which has experienced greater than 90 percent loss by most estimates, would meet this criterion as habitat vulnerable to effects of fragmentation. Existing data suggests that beetle populations, specifically, are affected by habitat fragmentation. Barr (1991) found that small, isolated habitat remnants were less likely to be occupied by beetles than larger patches, indicating that beetle subpopulations are extirpated from small habitat fragments. Barr (1991) and Collinge et al. (2001) consistently found beetle exit holes occurring in clumps of elderberry bushes rather than isolated bushes, suggesting that isolated shrubs do not typically provide long-term viable habitat for this species.

Habitat fragmentation can be an important factor contributing to species declines because:

(1) it divides a large population into two or more small populations that become more vulnerable to direct loss, inbreeding depression, genetic drift, and other problems associated with small populations; (2) it limits a species' potential for dispersal and colonization; and (3) it makes habitat more vulnerable to outside influences by increasing the edge:interior ratio (Primack 1998).

Small, isolated subpopulations are susceptible to extirpation from random demographic, environmental, and/or genetic events (Shaffer 1981; Lande 1988; Primack 1998). While a large area may support a single large population, the smaller subpopulations that result from habitat fragmentation may not be large enough to persist over a long time period. As a population becomes smaller, it tends to lose genetic variability through genetic drift, leading to inbreeding depression and a lack of adaptive flexibility. Smaller populations also become more vulnerable to random fluctuations in reproductive and mortality rates, and are more likely to be extirpated by random environmental factors. When a sub-population becomes extirpated, habitat fragmentation reduces the chance of recolonization from any remaining populations. The effect of habitat fragmentation likely is exacerbated by the poor dispersal abilities of the beetle (Collinge et al. 2001; Talley 2005).

Habitat fragmentation not only isolates small populations, but also increases the interface between habitat and urban or agricultural land, increasing negative edge effects such as the invasion of non-native species (Huxel et al. 2001; Huxel 2000) and pesticide contamination (Barr 1991). The above edge effect-related factors may be related to the decline of the beetle.

**Predation** - The invasive Argentine ant (*Linepithema humile*) is a potential threat to the beetle (Huxel 2000). This ant is both an aggressive competitor and predator on native fauna that is spreading throughout riparian habitats in California and displacing assemblages of native arthropods (Ward 1987; Human and Gordon 1997; Holway 1998). The Argentine ant requires moisture and it may thrive in riparian or irrigated areas. A negative association between the presence of the ant and beetle exit holes was observed along Putah Creel in 1997 (Huxel 2000). This aggressive ant could interfere with adult mating or feeding behavior, or prey on eggs and larvae (e.g., Way et al. 1992). Surveys along Putah Creek found beetle presence where Argentine ants were not present or had recently colonized, but the beetle was absent from otherwise suitable sites where Argentine ants had become well-established (Huxel 2000). Between 1998 and 2002, the number of sites infested by the Argentine ant increased by 3 along Putah Creek and the American River (30 sites total were examined) (Huxel 2000; Holyoak and

Talley 2001). The Argentine ant has been expanding its range throughout California since its introduction around 1907, especially in riparian woodlands associated with perennial streams (Holway 1998; Ward 1987). Huxel (2000) concluded that, given the potential for Argentine ants to spread with the aid of human activities such as movement of plant nursery stock and agricultural products, this species may come to infest most drainages in the Central Valley along the valley floor, where the beetle is found.

The beetle is also likely preyed upon by insectivorous birds, lizards, and European earwigs (*Forficularia auricularia*) (Klasson et al. 2005). These three predators move freely up and down elderberry stems searching for food. The European earwig is a scavenger and omnivore that was often found feeding on tethered mealworm (*Tenebrio monitor*) larvae. The earwig may be common in riparian areas and it may lay its eggs in dead elderberry shrubs. The earwig, like the Argentine ant, requires moisture and is often found in large numbers in riparian and urban areas. Earwig presence and densities tended to be highest in mitigation sites likely because of the irrigation, although this needs to be statistically tested (Klasson et al. 2005).

**Pesticide Drift** - Direct spraying with pesticides and related pesticide drift is a potentially harmful factor for the beetle. A wide range of such spraying is done to control mosquitoes, crop diseases, and undesirable plants and insects. Although there have been no studies specifically focusing on the direct and indirect effects of pesticides on the beetle, evidence suggests that the species may be adversely affected by some pesticide applications. Commonly used pesticides within the range of the beetle include insecticides, most of which are broad-spectrum and likely toxic to the beetle; herbicides, which may harm or kill its host elderberry plants; and broad-spectrum pesticides toxic to many forms of life. The greatest pesticide use occurs in the San Joaquin Valley. According to the California Department of Pesticide Regulation (CDPR) (2006), four counties in this region had the highest use: Fresno, Kern, Tulare, and San Joaquin. The peak timing of application depends on the chemical agent and other factors including the activity period of the targeted pest insects; the use of the agents may coincide with the most vulnerable period of beetle adult activity, egg-laying and initial larval exposure on the outside of elderberry stems (Talley et al. 2006). The CDPR in 1997 listed 239 pesticide active ingredients applied in proximity to locations of beetle (CDPR 2006) (same square mile per Marovich and Kishaba 1997 cited in Talley et al. 2006). Pesticide active ingredients sold in California have averaged on the order of 600 million pounds per year since about 1998 (CDPR 2006).

Pesticide use reported to the CDPR is only a fraction of the pesticides sold in California each year. About two-thirds of the active ingredients sold in a given year are not subject to use reporting, including home-use pesticide products. Recent studies of major rivers and streams documented that 96 percent of all fish, 100 percent of all surface water samples and 33 percent of major aquifers contained one or more pesticides at detectable levels (Gilliom 1999). Pesticides were identified as one of the 15 leading causes of impairment for streams included on the Clean Water Act section 303(d) lists of impaired waters. Because the beetle occurs primarily in riparian habitat, the contamination of rivers and streams likely has effects on this species and its habitat. Given the amount and scope of pesticide use, along with unreported household and other uses, and the proximity of agriculture to riparian vegetation in the Central Valley, it appears likely that pesticides are affecting the beetle and its elderberry habitat.

**Invasive Plant Species** - Invasive exotic plant species may significantly alter the habitat of the beetle. Without adequate eradication and control measures these non-native species may eliminate elderberry shrubs and other native plants. Pest plants of major importance in Central Valley riparian systems include black locust (*Robinia pseudoacacia*), giant reed (*Arundo donax*), red sesbania (*Sesbania punicea*), Himalaya blackberry (*Rubus armeniacus*), tree of heaven (*Ailanthus altissima*), Spanish broom (*Spartium junceum*), Russian olive (*Eleagnus angustifolia*), edible fig (*Ficus carica*), and Chinese tallowtree (*Sapium sebiferum*). Non-woody invasives such as ripgut brome (*Bromus diandrus*), foxtail barley (*Hordeum murinum*), Italian rye grass (*Lolium multiflorum*), and starthistle/knapweed (*Centaurea* spp.) also may impair elderberry germination or establishment, or elevate the risk of fire. Invasive plant control efforts often are limited by funding, labor, coordination with landowners, and the resilience and spread of their target plants. No rangewide assessment has been completed on the overall degree of impact of invasive plants on the beetle and its habitat. However, there are a number of local efforts to control invasive riparian plant species. For example, the American River Parkway has invasive species removal efforts by Sacramento Weed Warriors (a community stewardship project associated with the California Native Plant Society) and others, and the Cosumnes River Preserve has a group of volunteers who regularly remove exotics and restore native habitats (Talley et al. 2006).

**Other Threats** - Several other factors may threaten the beetle including fire, flooding, and overgrazing by livestock. The condition of elderberry shrubs can be adversely affected by fire, which is often common at the urban-wildland interface. Brush fires initially have a negative effect on shrub condition and, therefore, beetle larvae through direct burning and stem die-off. A year after fire, however, surviving elderberry resprout and display rapid stem growth (Crane 1989). Fires often scarify the hard elderberry seed coat leading to germination of seedlings the following season (Crane 1989). Frequent or repeated fire, however, may kill remaining shoots, root crowns and seeds, causing elderberry to be eliminated from an area for many years since recruitment by seeds is patchy and generally slow (Crane 1989). Elderberry shrubs appeared suitable for the beetle two to six years after burning, but were often uninhabited, with the presence of old, burned exit holes suggesting pre-burn occupancy and post-burn vacancy (Talley et al. 2006.). The post-fire lag in occupancy is likely the result of the limited movements of the beetle. Beetle occupancy occurred six to seven years post burn and, as in the alluvial plain of the American River Parkway, is about the same within the post-burn compared with unburned areas (Talley et al. 2007). No quantitative studies of the net effects of fire on the valley elderberry longhorn beetle have been undertaken (e.g., examining beetle and elderberry through time after burns or in areas with varying burn frequencies and magnitude).

The beetle can tolerate flooding of its riparian habitat. The animal has higher occupancy rates in riparian than non-riparian habitats, and associations between the beetle and proximity to rivers were either not observed or there was a weak positive correlation with nearness to the river (Halstead and Oldham 1990; Talley 2005; Talley et al. 2007). These findings illustrate that the beetle is not likely harmed by flooding and that higher habitat quality may be associated with rivers. In addition, if elderberry, a facultative riparian shrub, can withstand flooding, then the beetle likely will survive these events. Most floods occur during winter or early spring when the beetle is in its early life history stages, so that the effects of floods are even less likely to affect the beetle. If the shrub is exposed to prolonged flooding (i.e., anoxia) and becomes severely

stressed, then the beetle may be affected. The duration and magnitude of flooding at which elderberry stress occurs is uncertain and the levels of stress that affect the beetle are also unknown. Elderberry shrubs have adaptations that plants use to persist with flooding such as lenticels and aerenchyma, demonstrating that it is probably at least somewhat flood tolerant. Finally, if an area is flooded too frequently so that elderberry cannot survive then no beetles would be able to inhabit the area (Talley 2005).

Another potential factor in the beetle's decline is the effects of inappropriate levels of livestock grazing, which can result in destruction of entire elderberry plants and inhibition of elderberry regeneration. Cattle, sheep and goats readily forage on new elderberry growth, and goats will consume even decadent growth. Well-manicured stands of elderberries, such as occurs due to livestock grazing, have generally been shown to have a relative absence of beetles (Service 1984). The effects on the beetle of both grazing and exotic plant invasions are likely significantly exacerbated by the problem of habitat fragmentation of elderberries. Such fragmentation increases the edge:interior ratio of habitat patches, thereby facilitating the adverse effects of these outside influences.

### *Environmental Baseline*

Status of the species within the Action Area – There are no known occurrences of the beetle within the Action Area. The Action Area is fairly isolated from other populations, primarily along the Sacramento River, although a few occurrences exist along the Yuba and Feather Rivers, which run adjacent to the Action Area.

Factors Affecting the beetle within the Action Area - A number of State, local, private, and unrelated Federal actions have occurred within the Action Area affecting the environmental baseline of the species. Numerous development projects have been constructed in or near beetle habitat in the Action Area in this rapidly urbanizing area. All of the land inside the ring levee has been developed, primarily with houses and municipal facilities. Very little riparian habitat which can serve as dispersal corridors for beetles currently exists along the ring levee.

Evidence of the beetle, in the form of exit holes, has been found along the Feather River within 5 to 6 miles of the proposed project area. Elderberry shrubs with stems one inch or greater in diameter that provide suitable habitat are found in and adjacent to the action area. The Action Area contains components that can be used by the beetle for feeding, resting, mating, and other essential behaviors. Therefore, the Service believes that the valley elderberry longhorn beetle is reasonably certain to occur within the action area because of the biology and ecology of the animal, the presence of suitable habitat in and adjacent to the action area, as well as recent observations of this listed species.

### **Giant Garter Snake**

#### *Status of the Species*

Listing - The Service published a proposal to list the giant garter snake as an endangered species on December 27, 1991 (56 **FR** 67046). The Service reevaluated the status of the snake before

adopting the final rule. The snake was listed as a threatened species on October 20, 1993 (58 FR 54053).

Historical and Current Range - Giant garter snakes formerly occurred throughout the wetlands that were extensive and widely distributed in the Sacramento and San Joaquin Valley floors of California (Fitch 1940; Hansen and Brode 1980; Rossman & Stewart 1987). The historical range of the snake is thought to have extended from the vicinity of Chico, Butte County, southward to Buena Vista Lake, near Bakersfield, in Kern County (Fitch 1940; Fox 1948; Hansen and Brode 1980; Rossman and Stewart 1987). Early collecting localities of the giant garter snake coincide with the distribution of large flood basins, particularly riparian marsh or slough habitats and associated tributary streams (Hansen and Brode 1980).

Loss of habitat due to agricultural activities and flood control have extirpated the snake from the southern one third of its range in former wetlands associated with the historic Buena Vista, Tulare, and Kern lake beds (Hansen and Brode 1980; Hansen 1980). By 1971, so much wetland habitat had been reclaimed, that the CDFG classified the giant garter snake as a rare animal and conducted a series of field surveys. The results of these surveys indicate that snake populations were distributed in marsh wetlands, tributary streams, and portions of the rice production zones of the Sacramento Valley in Butte, Glenn, Colusa, Sutter, Yolo and Sacramento Counties, in the Delta region along the eastern fringes of the Sacramento-San Joaquin River Delta in Solano, Contra Costa, Sacramento, and San Joaquin Counties, and in the San Joaquin Valley in San Joaquin, Stanislaus, Merced, Mendota, and Fresno Counties (Hansen & Brode 1980; Hansen 1988).

Upon Federal listing in 1993, the Service identified 13 separate populations of giant garter snakes, with each population representing a cluster of discrete locality records (Service 1993). A population is a group of organisms that interbreed and share a gene pool. The boundaries of a population, both in space and time, are generally not discrete and, in practice, are usually defined by the researcher (Krebs 1994). The gene pool and breeding patterns of the 13 giant garter snake populations identified in the final rule remain unstudied and unknown. What was described as "13 populations" should therefore be described more accurately as sub-populations and occurrences that note observations of individuals about which much remains unknown (Service 2003). The 13 populations largely coincide with historical flood basins and tributary streams throughout the Central Valley: (1) Butte Basin, (2) Colusa Basin, (3) Sutter Basin, (4) American Basin, (5) Yolo Basin/Willow Slough, (6) Yolo Basin/Liberty Farms, (7) Sacramento Basin, (8) Badger Creek/Willow Creek, (9) Caldoni Marsh/White Slough, (10) East Stockton--Diverting Canal & Duck Creek, (11) North and South Grasslands, (12) Mendota, and (13) Butte-Tulare.

Surveys over the last 25 years suggest that sub-populations of giant garter snake in the northern parts of its range, (Butte, Colusa, and Sutter Counties) are relatively large and stable (Wylie et al. 1997; Wylie et al. 2003a). However, habitat corridors connecting sub-populations are either not present or not protected, and urban encroachment increases as a serious threat (Service 2003). Sub-populations in Yolo, Sacramento, Solano, and San Joaquin Counties are small, fragmented, and threatened by urbanization (Service 2003; Hansen 2004). Those sub-populations in the San Joaquin Valley, however, are most vulnerable having suffered near-devastating declines and

possible extirpations over the last two decades (including populations in Stanislaus, Merced, Madera and Fresno Counties) (Hansen 1988; Dickert 2002, 2003; Williams & Wunderlich 2003). These sub-populations are extremely small, distributed discontinuously in isolated patches, and therefore are highly vulnerable to extinction by random environmental, demographic, and genetic processes (Goodman 1987).

Description - The giant garter snake is one of the largest garter snake species reaching a total length of approximately 64 inches (162 centimeters). Females tend to be slightly longer and proportionately heavier than males. The weight of adult female snakes is typically 1.1-1.5 pounds (500-700 grams). Dorsal background coloration varies from brown to olive with a cream, yellow, or orange dorsal stripe and two light colored lateral stripes. Some individuals have a checkered pattern of black spots between the dorsal and lateral stripes. Background coloration and prominence of the checkered pattern and three yellow stripes are geographically and individually variable; individuals in the northern Sacramento Valley tend to be darker with more pronounced mid-dorsal and lateral stripes (Hansen 1980; Rossman et al. 1996). Ventral coloration is variable from cream to orange to olive-brown to pale blue with or without ventral markings (Hansen 1980).

Essential Habitat Components - Endemic to wetlands in the Sacramento and San Joaquin valleys, the giant garter snake inhabits marshes, sloughs, ponds, small lakes, low gradient streams, and other waterways and agricultural wetlands, such as irrigation and drainage canals, rice fields and the adjacent uplands (Service 2003). The snake feeds on small fishes, tadpoles, and frogs (Fitch 1941; Hansen and Brode 1980, Hansen 1988; Hansen and Brode 1993). Essential habitat components consist of: (1) wetlands with adequate water during the snake's active season (early-spring through mid-fall) to provide food and cover, (2) emergent, herbaceous wetland vegetation, such as cattails and bulrushes, for escape cover and foraging habitat during the active season, (3) upland habitat with grassy banks and openings in waterside vegetation for basking, and (4) higher elevation uplands for over-wintering habitat with escape cover (vegetation, burrows) and underground refugia (crevices and small mammal burrows)(Hansen 1988). Snakes are typically absent from larger rivers and other bodies of water that support introduced populations of large, predatory fish, and from wetlands with sand, gravel, or rock substrates (Hansen and Brode 1980, Hansen 1988; Rossman and Stewart 1987). Riparian woodlands do not provide suitable habitat because of excessive shade, lack of basking sites, and absence of prey populations (Hansen 1988).

Foraging Ecology - Giant garter snakes are the most aquatic garter snake species and are active foragers, feeding primarily on aquatic prey such as fish and amphibians (Fitch 1941). Historically, giant garter snake prey likely consisted of Sacramento blackfish (*Orthodon microlepidots*), thick-tailed chub (*Gila crassicauda*), and red-legged frog (*Rana aurora*) (Rossman et al. 1996; Service 2003). Because these prey species are no longer available (chub extinct, red-legged frog extirpated from the Central Valley, blackfish declining) the predominant food items are now introduced species such as carp (*Cyprinus carpio*), mosquito-fish (*Gambusia affinis*), larval and sub-adult bullfrogs (*Rana catesbiana*), and Pacific chorus frogs (*Pseudacris regilla*) (Fitch 1941, Hansen and Brode 1993; Rossman et al. 1996).



Reproductive Ecology - The giant garter snake breeding season extends through March and April, and females give birth to live young from late July through early September (Hansen and Hansen 1990). Brood size is variable, ranging from 10 to 46 individual young, with a mean of 23 individuals (Hansen and Hansen 1990). At birth, young average about 8.1 inches (20.6 centimeters) snout-to-vent length and 3-5 grams. Although growth rates are variable, young typically more than double in size by one year of age, and sexual maturity averages three years in males and five years for females (Service 1993).

Movements and Habitat Use - The giant garter snake is highly aquatic but also occupies a terrestrial niche (Service 2003). Aquatic habitat includes remnant native marshes and sloughs, restored wetlands, low gradient streams, and agricultural wetlands including rice fields and irrigation and drainage canals. Terrestrial habitat includes adjacent uplands which provide areas for basking, retreats and over-wintering. Basking takes place in tules, cattails, saltbush, and shrubs over-hanging the water, patches of floating vegetation including waterweed, on rice checks, and on grassy banks (Service 2003). The snake typically inhabits small mammal burrows and other soil and/or rock crevices during the colder months of winter (i.e., October to April) (Hansen and Brode 1993; Wylie et al. 1996). It also uses burrows as refuge from extreme heat during its active period (Wylie et al. 1997). While individuals usually remain in close proximity to wetland habitats, the Biological Resource Division of the U.S. Geological Survey (BRD) has documented snakes using burrows as much as 165 feet (50 meters) away from the marsh edge to escape extreme heat, and as far as 820 feet (250 meters) from the edge of marsh habitat for over-wintering habitat (Wylie et al. 1997; Wylie et al. 2003a). Snakes typically select burrows with sunny exposures along south and west facing slopes (Service 1993).

In studies of marked snakes in the Natomas Basin, snakes moved about 0.25 to 0.5 miles (0.4 to 0.8 kilometers) per day (Hansen and Brode 1993). Home range (area of daily activity) averages about 0.1 miles<sup>2</sup> (25 hectares) in both the Natomas Basin and Colusa NWR (Wylie 1998; Wylie et al. 2002). Total activity varies widely between individuals; however, individual snakes have been documented moving up to 5 miles (8 kilometers) over a few days in response to dewatering of habitat, and snake home range has been shown to be as large as 14.5 square miles (3744 hectares) (Wylie et al. 1997; Wylie and Martin 2004).

In agricultural areas, snakes were documented using rice fields in 19-20 percent of the observations, marsh habitat in 20-23 percent of observations, and canal and agricultural waterway habitats in 50-56 percent of the observations (Wylie 1999). In the Natomas Basin, habitat used consisted almost entirely of irrigation ditches and established rice fields (Wylie 1998). In the Colusa NWR, snakes were regularly found on or near edges of wetlands and ditches with vegetative cover (Wylie et al. 2003a). Telemetry studies also indicate that active snakes use uplands extensively; more than 31 percent of observations were in uplands (Wylie 1999). Snakes observed in uplands during the active season were consistently near vegetative cover, particularly where cover exceeded 50 percent in the area within 1.6 ft (0.5 m) of the snake (Wylie 1999).

Predators - Giant garter snakes are eaten by a variety of predators, including raccoons (*Procyon lotor*), striped skunks (*Mephitis mephitis*), opossums (*Didelphis virginiana*), bull frogs (*Rana catesbiana*), hawks (*Buteo* sp.), egrets (*Casmerodius albus*, *Egretta thula*), and great blue herons

(*Ardea herodias*) (Service 2003; Dickert 2003; Wylie et al. 2003b). Many areas supporting snakes have been documented to have abundant predators; however, predation does not seem to be a limiting factor in areas that provide abundant cover, high concentrations of prey items, and connectivity to a permanent water source (Hansen and Brode 1993; Wylie et al. 1996).

Reasons for Decline and Threats to Survival - The current distribution and abundance of the giant garter snake is much reduced from former times (Service 2003). Less than 10 percent of the historic 4.5 million acres (1.8 million hectares) of Central Valley wetlands remain, approximately 319,000 acres (129,000 hectares) (USDOI 1994), of which very little currently provides habitat suitable for the giant garter snake. Loss of habitat due to agricultural activities and flood control have extirpated the snake from the southern one-third of its range. Cattail and bulrush floodplain habitat historically typified much of the Sacramento Valley (Hinds 1952). Prior to reclamation activities beginning in the mid- to late-1800s, about 60 percent of the Sacramento Valley was subject to seasonal overflow flooding providing expansive areas of snake habitat (Hinds 1952). Valley flood wetlands are now subject to cumulative effects of upstream watershed modifications, water storage and diversion projects, as well as urban and agricultural development.

The Central Valley Project (CVP), planned by the State of California, and built and operated by the Federal Bureau of Reclamation, is the largest water management system in California. The CVP and the historic water development activities that preceded it have not only resulted in the loss of all but approximately 10 percent of wetlands, they have created an ecosystem altered to such an extent that remaining wetlands, including agriculture, depend on managed water (USDOI 1994). The historic disturbance events associated with seasonal inundation that occur naturally in dynamic riverine, riparian, and wetland ecosystems have been largely eliminated. In addition to the highly managed water regimes, implementation of CVP has resulted in conversion of native habitats to agriculture, and has facilitated urban development throughout the Central Valley (Service 2003). In 1992, Congress enacted the Central Valley Project Improvement Act (CVPIA), the principal concerns of which include pricing and management of Central Valley water and attempting to mitigate for the fish, wildlife, and associated habitat impacts of the project. CVPIA, however, has been largely ineffective, addressing primarily only the water needs of publicly-owned wetlands, which account for less than one-fourth of the wetlands in the Central Valley (Service 2003).

Ongoing maintenance of aquatic habitats for flood control and agricultural purposes eliminates or prevents the establishment of habitat characteristics required by snakes (Hansen 1988). Such practices can fragment and isolate available habitat, prevent dispersal of snakes among habitat units, and adversely affect the availability of the snake's food items (Hansen 1988; Brode and Hansen 1992). For example, tilling, grading, harvesting and mowing may kill or injure giant garter snakes (Service 2003). Biocides applied to control aquatic vegetation reduce cover for the snake and may harm prey species (Wylie et al. 1996). Rodent control threatens the snake's upland estivation habitat (Wylie et al. 1996). Restriction of suitable habitat to water canals bordered by roadways and levee tops renders snakes vulnerable to vehicular mortality (Wylie et al. 1997). Materials used in construction projects (e.g., erosion control netting) can entangle and kill snakes (Stuart et al. 2001). Livestock grazing along the edges of water sources degrades water quality and can contribute to the elimination and reduction of available quality snake

habitat (Hansen 1988). Fluctuation in rice and agricultural production affects stability and availability of habitat (Wylie and Casazza 2001).

Other land use practices also currently threaten the survival of the snake. Recreational activities, such as fishing, may disturb snakes and disrupt basking and foraging activities. Nonnative predators, including introduced predatory game fish, bullfrogs, and domestic cats, can threaten snake populations (Wylie et al. 1996; Dickert 2003; Wylie et al. 2003b). While large areas of seemingly suitable snake habitat exist in the form of duck clubs and waterfowl management areas, water management of these areas typically does not provide the summer water needed by the species. Degraded water quality continues to be a threat to the species both on and off refuges.

The Central Valley is among the most endangered ecosystems due to its fertile soils, amiable climates, easy terrains, and other factors that historically have encouraged human settlement and exploitation (Noss et al. 2003). Environmental impacts associated with urbanization include loss of biodiversity and habitat, alteration of natural fire regimes, fragmentation of habitat from road construction, and degradation due to pollutants (Service 2003). Rapidly expanding cities within the snake's range include Chico, Yuba City, the Sacramento area, Galt, Stockton, Gustine, and Los Banos.

Status with Respect to Recovery - The revised draft recovery plan for the giant garter snake subdivides its range into three proposed recovery units (Service 2003): (1) Northern Sacramento Valley Recovery Unit, (2) Southern Sacramento Valley Recovery Unit, and (3) San Joaquin Valley Recovery Unit.

The Northern Sacramento Valley Unit at the northern end of the species' range contains sub-populations in the Butte Basin, Colusa Basin, and Sutter Basin (Service 2003). Protected snake habitat is located on state refuges and refuges of the Sacramento National Wildlife Refuge (NWR) Complex in the Colusa and Sutter Basins. Suitable snake habitat is also found in low gradient streams and along waterways associated with rice farming. This northern most recovery unit is known to support relatively large, stable sub-populations of giant garter snakes (Wylie et al. 1996; Wylie et al. 2002). Habitat corridors connecting subpopulations, however, are either not present or not protected.

The Southern Sacramento Valley Unit includes sub-populations in the American Basin, Yolo Basin, and Delta Basin (Service 2003). The status of Southern Sacramento Valley sub-populations is very uncertain; each is very small, highly fragmented, isolated, and threatened by urbanization (Service 2003; Hansen 2004). The American Basin sub-population, although also threatened by urban development, receives protection from the Metro Air Park and Natomas Basin habitat conservation plans (HCP), which share a regional strategy to maintain a viable snake sub-population in the Natomas Basin.

The San Joaquin Valley Unit includes sub-populations in the San Joaquin Basin and Tulare Basin. The San Joaquin Valley Unit formerly supported large snake populations, but numbers have severely declined, and recent survey efforts indicate numbers are extremely low compared to Sacramento Valley sub-populations (Wylie 1998; Dickert 2002). Giant garter snakes

currently occur in the northern and central San Joaquin Basin within the Grassland Wetlands, in North and South Grasslands, Mendota Area, and Burrell/Lanare Area. Agricultural and flood control activities are presumed to have extirpated the snake from the Tulare Basin (Hansen 1995); however, comprehensive surveys for this area are lacking and where habitat remains, the giant garter snake may be present (Service 2003).

Since 1995, BRD has been studying life history and habitat requirements of the giant garter snake within a few of the "13 populations" identified in the listing. BRD has studied snake sub-populations at the Sacramento, Delevan, and Colusa NWRs, in the Colusa Basin Drain within the Colusa Basin, at Gilsizer Slough within the Sutter Basin, at the Badger Creek area of the Cosumnes River Preserve within the Badger Creek/Willow Creek area, and in the Natomas Basin within the American Basin, (Wylie et al. 1996, 2002, 2003a, 2004; Wylie 1998, 1999, 2003; Hansen 2003, 2004), which represent the largest extant giant garter snake sub-populations. Outside of protected areas, however, snakes are still subject to all threats identified in the final rule. The other sub-populations are distributed discontinuously in small, isolated patches, and are vulnerable to extirpation by stochastic environmental, demographic, and genetic processes (Goodman 1987).

Until recently, there were no post-1980 sightings of giant garter snakes from Stockton southward, and surveys of historic localities conducted in 1986 did not detect any snakes (Hansen 1988). Since 1995, however, surveys conducted by CDFG in cooperation with BRD around Los Banos and Volta Wildlife Area in the Grasslands, and Mendota Wildlife Area in the Mendota Area have detected snakes, but in small numbers much lower than those found in Sacramento Valley sub-populations (Wylie 1998; Dickert 2002, 2003; Williams & Wunderlich 2003). The estimated total population size for Volta Wildlife Area is 45 individuals, approximately only 3.5 snakes per kilometer. Such low numbers are suggestive of a tenuously small snake population. Also, one-third of the giant garter snakes found had lumps on their bodies suggestive of a parasitic nematode infection (Dickert 2003); further study is underway. Ten of the 31 snakes found in 2003, however, weighed less than 40 grams indicating that giant garter snakes have been breeding at Volta Wildlife Area. These results demonstrate that giant garter snakes are still extant in the northern San Joaquin Valley, but probably in extremely low numbers/densities. All sub-populations are isolated from each other with no protected dispersal corridors. Opportunities for re-colonization of small sub-populations that may become extirpated are unlikely given the isolation from larger populations and lack of dispersal corridors between them.

The revised draft recovery criteria require multiple, stable sub-populations within each of the three recovery units, with sub-populations well-connected by corridors of suitable habitat. This entails that corridors of suitable habitat between existing snake sub-populations be maintained or created to enhance sub-population interchange to counter threats to the species (Service 2003). Currently, only the Northern Sacramento Valley Recovery Unit is known to support relatively large, stable giant garter snake sub-populations. Habitat corridors connecting sub-populations, even for the Northern Sacramento Valley Recovery Unit, are either not present or not protected. Overall, the future availability of habitat in the form of canals, ditches, and flooded fields are subject to market-driven crop choices, agricultural practices, and land use, and are, thus, uncertain and unpredictable.

### *Environmental Baseline*

Status of the species within the Action Area - The proposed project is located within the American Basin snake population, in the Southern Sacramento Valley Recovery Unit (Service 2003). Fifty-nine CNDDDB (2010) locality records are known from the American Basin. These locality records include the Natomas Basin, Bear River and associated tributaries, the Middle-American Basin just north of the Natomas Cross Canal, as well as other locations within this basin.

The distribution of the snake in Yuba County is not well known. A search of the CNDDDB (2010) indicates one locality record known from Yuba County, located 3.7 miles (6 km) to the south of the proposed project site, just south of Bear River and east of SR 70. While the CNDDDB indicates that snakes are widely distributed throughout the southern part of the American Basin, few records exist for the northern part of the American Basin (CNDDDB 2010). This paucity of records, however, may reflect a lack of survey efforts rather than absence of the species.

Factors Affecting the Snake within the Action Area - A number of State, local, private, and unrelated Federal actions have occurred within the Action Area affecting the environmental baseline of the species. Numerous development projects have been constructed in or near snake habitat in the Action Area in this rapidly urbanizing area. All of the land inside the ring levee has been developed, primarily with houses and municipal facilities. Any remaining sub-populations which may exist on the outside of the ring levee that may disperse over the levees are vulnerable to secondary effects of urbanization, such as increased predation by house cats, water pollution, and increased vehicular mortality. Within the American Basin, several former localities are known to have been lost and/or depleted to the extent that continued viability is in question (Brode and Hansen 1992). The scarcity of remaining suitable habitat, flooding, stochastic processes, and continued threats of habitat loss pose a severe threat to this sub-population (Goodman 1987).

On the outside of the ring levee, ongoing agricultural activities may decrease and degrade the remaining habitat throughout the snake's extant range affecting the environmental baseline for the snake. Such activities are largely not subject to section 7 consultation. Some agriculture, such as rice farming, can provide valuable seasonal foraging and upland habitat for the snake. Although rice fields and agricultural waterways can provide habitat for the snake, agricultural activities such as waterway maintenance, weed abatement, rodent control, and discharge of contaminants into wetlands and waterways can degrade snake habitat and increase the risk of snake mortality (Service 2003). On-going maintenance of agricultural waterways can also eliminate or prevent establishment of snake habitat, eliminate food resources for the snake, and fragment existing habitat and prevent dispersal of snakes (Service 2003).

The Action Area contains components that can be used by the snake for feeding, resting, mating, and other essential behaviors. Therefore, the Service believes that the giant garter snake is reasonably certain to occur within the Action Area because of the biology and ecology of the

animal, the presence of suitable habitat in and adjacent to the action area, as well as recent observations of this listed species.

#### EFFECTS OF THE PROPOSED ACTION

##### Direct Effects

##### Valley Elderberry Longhorn Beetle

The proposed project will require the removal of 29 elderberry shrubs from Phases 2 and 3. No beetle exit holes were found on any of the shrubs affected by the project. Loss of an elderberry shrub or even a stem can affect valley elderberry longhorn beetle breeding and feeding because adult beetles rely solely on elderberry flowers and foliage for food and must lay their eggs on elderberry stems to successfully reproduce.

Transplantation of elderberry shrubs that are or could be used by beetle larvae is expected to adversely affect the beetle. Beetle larvae may be killed or the beetles' life cycle interrupted during or after the transplanting process. For example:

1. Transplanted elderberry shrubs may experience stress or become unhealthy due to changes in soil, hydrology, microclimate, or associated vegetation. This may reduce their quality as habitat for the beetle, or impair their production of habitat-quality stems in the future.
2. Elderberry shrubs may die as a result of transplantation.
3. Branches containing larvae may be cut, broken, or crushed as a result of the transplantation process.

##### Giant Garter Snake

Construction activities associated with the project may harm, harass, injure, or kill snakes. Construction activities may remove vegetative cover and basking sites, fill or crush burrows or crevices, and decrease prey base. The construction and surface modifications will disturb aquatic and upland habitats. Because snakes utilize small mammal burrows and soil crevices as retreat sites, snakes may be crushed, buried, or otherwise killed or injured from construction activities if they are present in the uplands. Snakes may be run over by construction equipment or other vehicles accessing the construction site. Snakes may also be killed or injured by becoming entangled in netting used for erosion control (Stuart et al 2001), depending on the type of netting the Corps uses. Disturbance from construction activities may also harass snakes to the point that the snakes may move into or across areas of unsuitable habitat where they may be prone to higher rates of mortality from predation and being run over by vehicles.

Phase 1 work including construction of the slurry walls and the accompanying stability berms would result in the following of 1.05 acres of giant garter snake aquatic habitat and construction activities occurring within 33.70 acres of giant garter snake upland habitat for one active season

(May 1 through October 1). The fallowing of this rice field would harm snakes, particularly neonates, by reducing the availability of prey that is small enough for young snakes to feed on. Lack of small prey would harm snakes by inhibiting growth and resulting in delayed sexual maturation of snakes, resulting in decreased births and recruitment of individuals into the population. Young snakes rely on developing sufficient body mass prior to overwintering in order to survive long periods without foraging. The temporary loss of this rice field will also result in increased susceptibility to predation, as rice fields provide cover in the form of emergent vegetation that would not be available to snakes in 2010. During the Phase 1 time period, snakes will have to move further in search of suitable aquatic habitat in the absence of this rice field and associated drainage ditch.

The effects of activities occurring in upland habitat will be minimized by the Corps' proposal to complete Phase 1 activities, including restoration of the habitat, within the snake's active period (May 1 through October 1). Snakes use of upland habitat is expected to be minimal during the active period, and if snakes are in the uplands, they are expected to move when approached by construction equipment; however it is possible that snakes could be utilizing cracks and crevices during the active period and would be undetected by preconstruction surveys. Utilization of the uplands by the snake in the Action Area for Phase 1 during the subsequent inactive period (October 1 2010 through April 30, 2011) will be minimal because the aquatic habitat will not be present during the prior active period. Snakes typically do not disperse very far into the uplands from the aquatic habitat upon either dewatering of the aquatic habitat or the onset of the inactive period. All effects are also expected to be minimized by the presence of the biological monitor during initial construction activities and pre-construction surveys.

### **Indirect Effects**

Indirect effects are caused by or result from the proposed action, are later in time, and are reasonably certain to occur. Future Federal actions that have not undergone section 7 consultation and future non-Federal activities can also be included as indirect effects of the project provided they are reasonably certain to occur and will result from the action under consideration. The Service is not aware any indirect effects that are reasonably certain to occur within the action area.

### **Interrelated and Interdependent Actions**

The Service is not aware of any actions that are interrelated or interdependent with the proposed project that may affect federally-listed species.

### **Cumulative Effects**

Cumulative effects include the effects of future State, Tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed project are not considered in this section, because they require separate consultation pursuant to section 7 of the Act.

### Valley Elderberry Longhorn Beetle

Although additional plans for specific actions in the Action Area are not known, continued levee maintenance by the Marysville Levee Commission is expected to prevent the growth of elderberry shrubs within the Action Area. Mowing and other vegetation control measures are likely to occur in areas where elderberry shrubs currently exist. These future activities will not be subject to federal jurisdiction, and are likely to result in loss or growth inhibition of riparian and other habitats where elderberry shrubs and the beetle occur. This loss of habitat negatively affects the environmental baseline and is difficult to quantify.

### Giant Garter Snake

Although additional plans for specific actions in the Action Area are not known, current and future maintenance activities by the Marysville Levee Commission are expected to negatively impact the snake. Mowing and burning could kill giant garter snakes, and spraying and rodent control could indirectly affect snakes if snakes come into contact with chemicals such as pesticides or rodenticides. We are not aware if measures are being or will be implemented to reduce these effects, such as time period restrictions or control of pesticide use.

### **Conclusion**

After reviewing the current status of the beetle, the environmental baseline for the project area, the effects of proposed project, and the cumulative effects, it is the Service's biological opinion that the project, as proposed, is not likely to jeopardize the continued existence of either the beetle or the snake. To minimize effects to the beetle, the Corps shall implement the 1999 Conservation Guidelines for transplanting and planting seedlings. Elderberry shrubs that require removal will be transplanted to an appropriate location within the project area or an alternative suitable site agreed upon by the Service. The Corps shall transplant 28 elderberry shrubs, plant 303 elderberry seedlings, and plant 303 associated native seedlings on 2.5 acres. To minimize effects to the snake, the Corps shall restore 1.05 acres of temporarily-affected aquatic habitat and 33.7 acres of temporarily-affected upland snake habitat according to the *Guidelines for Restoration and/or Replacement of Giant Garter Snake Habitat* and the *Standard Avoidance and Minimization Measures During Construction Activities in Giant Garter Snake (*Thamnophis gigas*) Habitat* (each of these documents are appended to the November 13, 1997, *Programmatic Formal Consultation for U.S. Army Corps of Engineers 404 Permitted Projects with Relatively Small Effects on the Giant Garter Snake within Butte, Colusa, Glenn, Fresno, Merced, Sacramento, San Joaquin, Solano, Stanislaus, Sutter and Yolo Counties, California*). Critical habitat for the valley elderberry longhorn beetle does not occur in the action area of the project and therefore, will not be affected. No critical habitat has been designated or proposed for the snake.

### INCIDENTAL TAKE STATEMENT

Section 9(a)(1) of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened fish and wildlife species, respectively, without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harass is defined by the Service as an



intentional or negligent act or omission which creates the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by impairing behavioral patterns including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with this Incidental Take Statement.

The measures described below are non-discretionary, and must be implemented by the Corps so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, in order for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, and/or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

### **Amount or Extent of Take**

#### Valley Elderberry Longhorn Beetle

The Service anticipates incidental take of the valley elderberry longhorn beetle will be difficult to detect or quantify. The cryptic nature of these species and their relatively small body size make the finding of a dead specimen unlikely. The species occur in habitats that make them difficult to detect. Due to the difficulty in quantifying the number of beetles that will be taken as a result of the proposed action, the Service is quantifying take incidental to the project as the number of elderberry stems one inch or greater in diameter at ground level (beetle habitat) that will become unsuitable for beetles due to direct effects as a result of the action. Therefore, the Service estimates that the take of all beetles inhabiting 29 elderberry plants containing stems 1 inch or greater in diameter at ground level (110 stems between 1-3 inches, 21 stems between 3 and 5 inches, and 14 stems 5 inches or more; see Table 1 in the text) will occur as a result of the proposed action.

#### Giant Garter Snake

The Service anticipates that incidental take of the snake also will be difficult to detect or quantify for the following reasons: giant garter snakes are cryptically colored, secretive, and known to be sensitive to human activities. Snakes may avoid detection by retreating to burrows, soil crevices, vegetation, or other cover. Individual snakes are difficult to detect unless they are observed, undisturbed, at a distance. Most close-range observations represent chance encounters that are difficult to predict. It is not possible to make an accurate estimate of the number of snakes that will be harassed, harmed or killed during construction activities (staging areas, work on canal banks, soil borrow areas, and vehicle traffic to and from borrow areas). In instances when take is

difficult to detect, the Service may estimate take in numbers of species per acre of habitat lost or affected as a result of the action. Therefore, the Service anticipates that all giant garter snakes inhabiting 1.05 acres of aquatic and 33.70 acres of adjacent upland habitat may be harassed, harmed, or killed by loss of habitat and construction activities, as a result of the project.

Upon implementation of the following reasonable and prudent measures, incidental take associated with the project on listed valley elderberry longhorn beetle and giant garter snake, in the form of harm, harassment, or mortality from habitat loss or direct mortality will become exempt from the prohibitions described under section 9 of the Act for direct impacts. In addition, incidental take in the form of harm, harassment, or mortality associated with the proposed project will be exempt from the prohibitions described under section 9 of the Act. The incidental take associated with the direct effects of the proposed levee construction is hereby exempted from prohibitions of take under section 9 of the Act.

### **Effect of the Take**

The Service has determined that this level of anticipated take is not likely to result in jeopardy to the valley elderberry longhorn beetle and giant garter snake. Critical habitat for the valley elderberry longhorn beetle does not occur in the action area of the project and therefore, will not be affected. No critical habitat has been designated or proposed for the snake.

### **Reasonable and Prudent Measures**

All necessary and appropriate measures to minimize the impacts of incidental take of the beetle and the snake resulting from implementation of this project have been incorporated into the project description of this biological opinion. Therefore, the Service believes the following Reasonable and Prudent Measure is necessary and appropriate to minimize the effect of the proposed project on the valley elderberry longhorn beetle and giant garter snake:

1. The Corps shall implement the proposed project, including the conservation measures, as described in this biological opinion.

### **Terms and Conditions**

In order to be exempt from the prohibitions of section 7 of the Act, the Corps must ensure compliance with the following terms and conditions, which implement the reasonable and prudent measures described above. The following term and condition is non-discretionary:

1. The Corps shall include full implementation and adherence to conservation measures as a condition of any permit issued for the project.

### **Reporting Requirements**

A post-construction compliance report prepared by the monitoring biologists must be submitted to the Division Chief of Endangered Species (Central Valley) at the Sacramento Fish and

Wildlife Office within thirty (30) calendar days of the completion of construction activity or within thirty (30) calendar days of any break in construction activity lasting more than thirty (30) calendar days. This report shall detail: (i) dates that groundbreaking at the project started and the project was completed; (ii) pertinent information concerning the success of the project in meeting compensation and other conservation measures; (iii) an explanation of failure to meet such measures, if any; (iv) known project effects on the giant garter snake, if any; (v) occurrences of incidental take of any these species; and (vi) other pertinent information.

The Corps must report to the Service immediately any information about take or suspected take of federally listed species not authorized in this biological opinion. The Corps must notify the Service within 24 hours of receiving such information. Notification must include the date, time, and location of the incident or of the finding of a dead or injured animal. In the case of a dead animal, the individual animal should be preserved, as appropriate, and held in a secure location until instructions are received from the Service regarding the disposition of the specimen or the Service takes custody of the specimen. The Service contact person for this is the Division Chief, Endangered Species Program at (916) 414-6600 and Daniel Crum, the Resident Agent-in Charge of the Service's Law Enforcement Division at (916) 414-6600. Any contractor or Corps employee who during routine operations and maintenance activities inadvertently kills or injures a State-listed wildlife species must immediately report the incident to their representative superintendent or biologist. This representative superintendent or biologist must then contact the California Department of Fish and Game immediately in the case of a dead or injured listed species. The California Department of Fish and Game contact for immediate assistance is Paul Hoffman, Wildlife Biologist, at (530) 934-9309.

#### CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities that can be implemented to further the purposes of the Act, such as preservation of endangered species habitat, implementation of recovery actions, or development of information and data bases.

1. It is recommended that the Corps assist in the implementation of the recovery plans for listed valley elderberry longhorn beetle and the giant garter snake.
2. The Corps should work with the Service to establish functioning preserves and banking systems to further the conservation of listed species across the population ranges.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

#### RE-INITIATION--CLOSING STATEMENT

This concludes formal consultation on the proposed Marysville Ring Levee, Yuba River Basin Project. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where

discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or, (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

Please contact Harry Kahler (916)414-6612, or Jana Affonso, Sacramento Valley Branch Chief (916)414-6645 if you have questions regarding this biological opinion.

Sincerely,

*r* Susan K. Moore  
Field Supervisor

cc:

Jane Rinck, Corps, Sacramento, CA  
Lindsay Dembosz, Corps, Sacramento, CA  
April Murazzo, Corps, Sacramento, CA

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LOCATION  
LINE  
PRINT

FIGURE

FIGURE 13

12

FIGURE 8

MARYSVILLE, CA

8

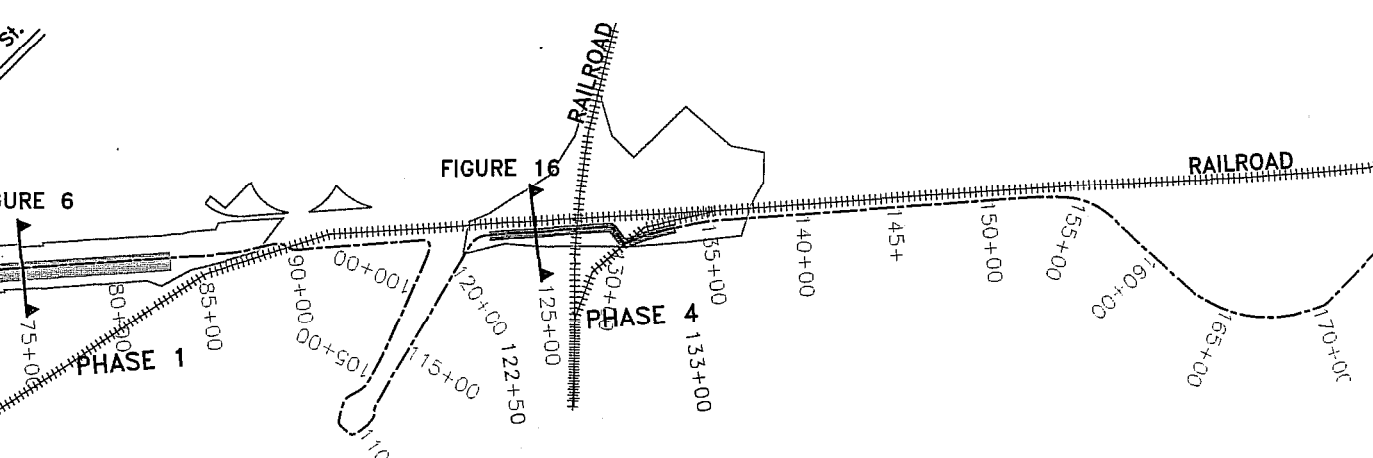
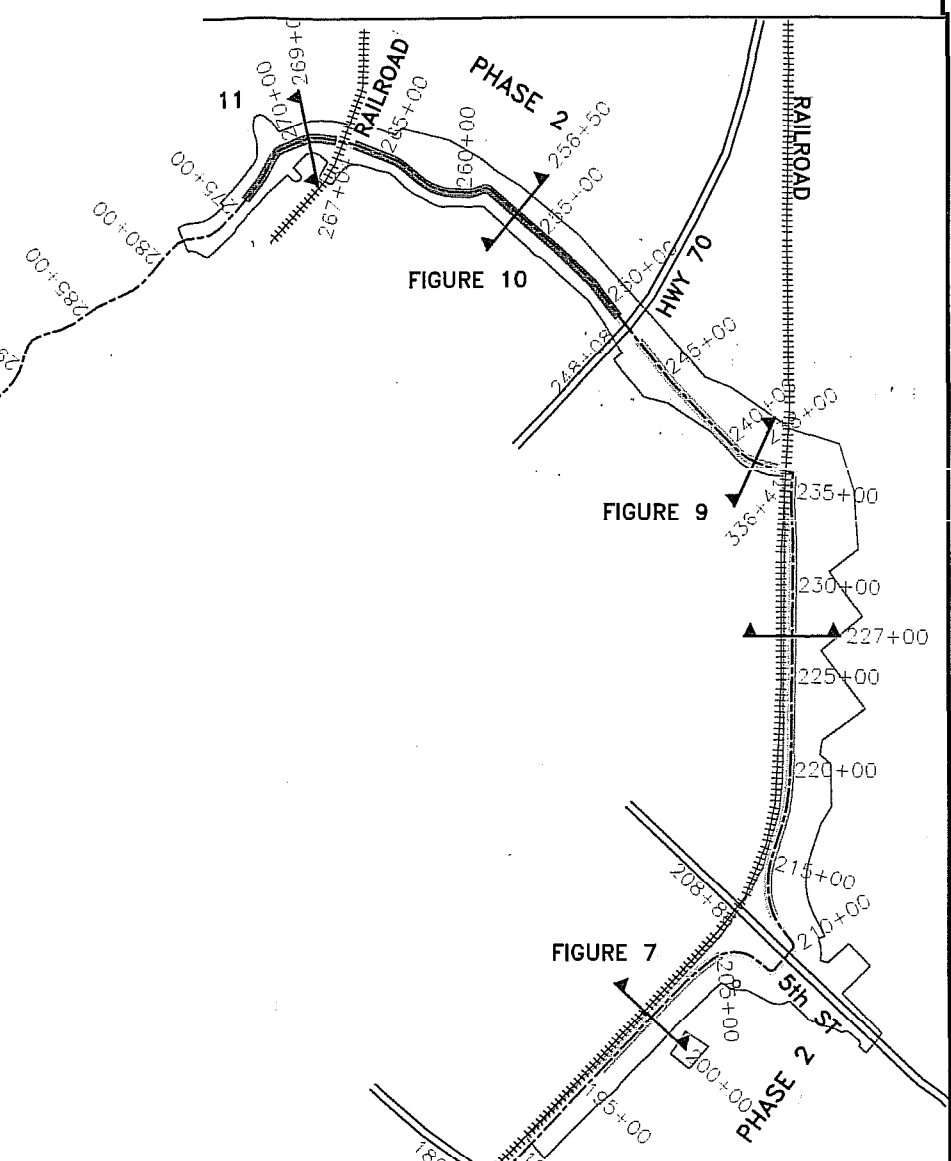
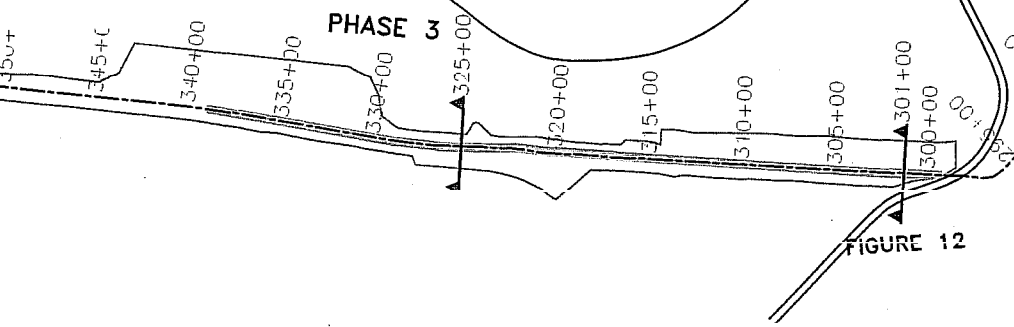
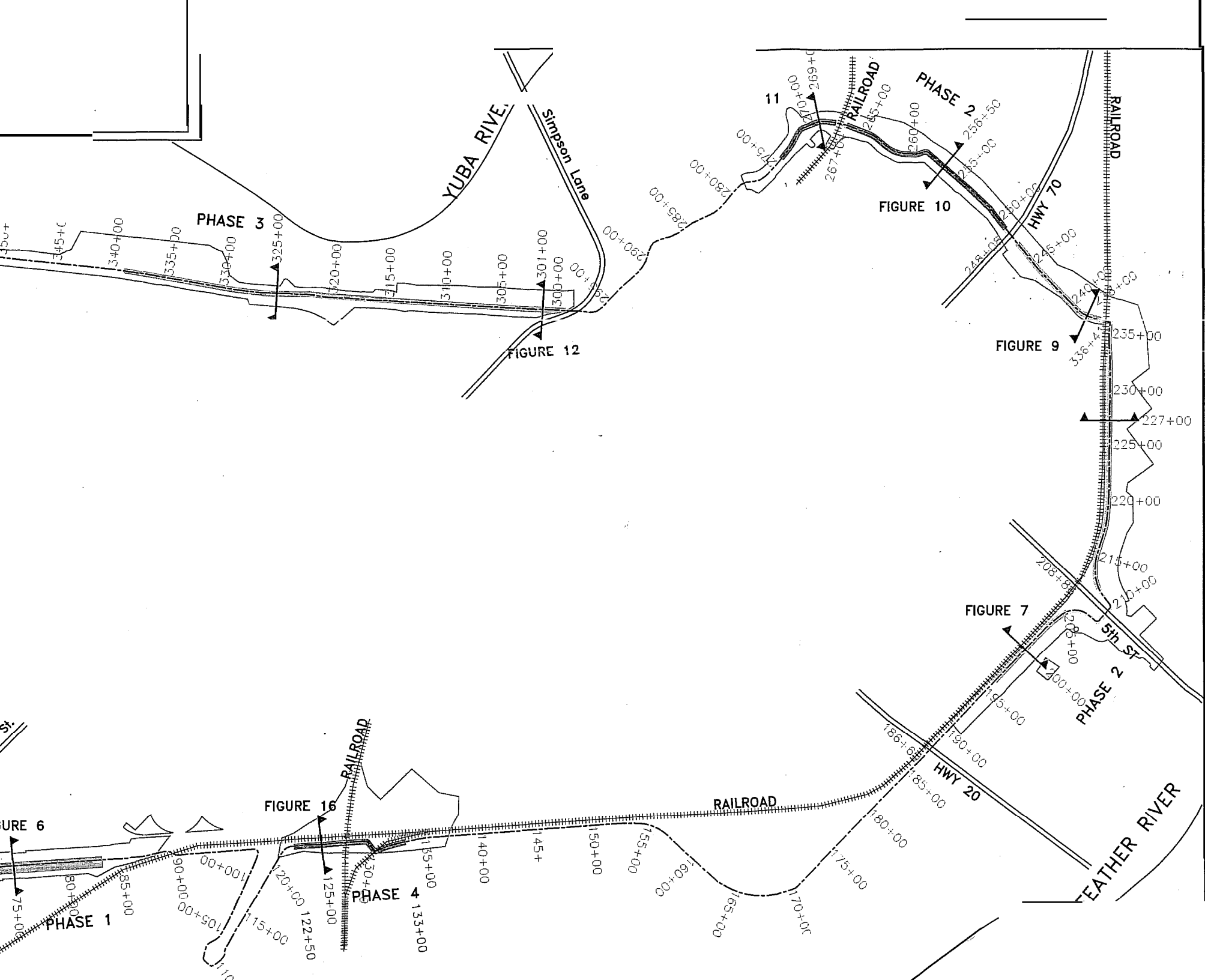


FIGURE 6

U.S. Fish & Wildlife Service  
Sacramento Fish & Wildlife Office  
Federal Endangered and Threatened Species that Occur in  
or may be Affected by Projects in the Counties and/or  
U.S.G.S. 7 1/2 Minute Quads you requested  
Document Number: 091119105530  
Database Last Updated: January 29, 2009

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Quad Lists

Listed Species

Invertebrates

- *Branchinecta conservatio*
  - Conservancy fairy shrimp (E)
- *Branchinecta lynchi*
  - vernal pool fairy shrimp (T)
- *Desmocerus californicus dimorphus*
  - valley elderberry longhorn beetle (T)
- *Lepidurus packardi*
  - vernal pool tadpole shrimp (E)

Fish

- *Acipenser medirostris*
  - green sturgeon (T) (NMFS)
- *Hypomesus transpacificus*
  - delta smelt (T)
- *Oncorhynchus mykiss*
  - Central Valley steelhead (T) (NMFS)
  - Critical habitat, Central Valley steelhead (X) (NWS)
- *Oncorhynchus tshawytscha*
  - Central Valley spring-run chinook salmon (T) (NWS)
  - Critical Habitat, Central Valley spring-run chinook (X) (NMFS)
  - winter-run chinook salmon, Sacramento River (E) (NMFS)

Amphibians

- *Rana aurora draytonii*
  - California red-legged frog (T)

Reptiles

- *Thamnophis gigas* -
  - giant garter snake (T)

Candidate Species

Birds

- *Coccyzus americanus occidentalis*
  - Western yellow-billed cuckoo (C)

Quads Containing Listed, Proposed or Candidate Species:  
YUBA CITY (544A)

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County Lists

No county species lists requested.

Key:

- (E) Endangered - Listed as being in danger of extinction.
- (T) Threatened - Listed as likely to become endangered within the foreseeable future.
- (P) Proposed - Officially proposed in the Federal Register for listing as endangered or threatened.
- (NMFS) Species under the Jurisdiction of the National Oceanic & Atmospheric Administration Fisheries Service. Consult with them directly about these species.
- Critical Habitat - Area essential to the conservation of a species.
  - o (PX) Proposed Critical Habitat - The species is already listed. Critical habitat is being proposed for it.
  - e (C) Candidate - Candidate to become a proposed species.
  - e (V) Vacated by a court order. Not currently in effect. Being reviewed by the Service.
  - e (X) Critical Habitat designated for this species

Important Information About Your Species List

How We Make Species Lists

We store information about endangered and threatened species lists by U.S. Geological Survey 7 1/2 minute quads. The United States is divided into these quads, which are about the size of San Francisco.

The animals on your species list are ones that occur within, or may be affected by projects within, the quads covered by the list.

- Fish and other aquatic species appear on your list if they are in the same watershed as your quad or if water use in your quad might affect them.
- .. Amphibians will be on the list for a quad or county if pesticides applied in that area may be carried to their habitat by air currents.
- Birds are shown regardless of whether they are resident or migratory. Relevant birds on the county list should be considered regardless of whether they appear on a quad list.

Plants

Any plants on your list are ones that have actually been observed in the area covered by the list. Plants may exist in an area without ever having been detected there. You can find out what's in the surrounding quads through the California Native Plant Society's online Inventory of Rare and Endangered Plants.

## Surveying

Some of the species on your list may not be affected by your project. A trained biologist and/or botanist, familiar with the habitat requirements of the species on your list, should determine whether they or habitats suitable for them may be affected by your project. We recommend that your surveys include any proposed and candidate species on your list.

For plant surveys, we recommend using the Guidelines for Conducting and Reporting Botanical Inventories. The results of your surveys should be published in any environmental documents prepared for your project.

## Your Responsibilities Under the Endangered Species Act

All animals identified as listed above are fully protected under the Endangered Species Act of 1973, as amended. Section 9 of the Act and its implementing regulations prohibit the take of a federally listed wildlife species. Take is defined by the Act as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" any such animal.

Take may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or shelter (50 CFR §17.3).

Take incidental to an otherwise lawful activity may be authorized by one of two procedures:

- If a Federal agency is involved with the permitting, funding, or carrying out of a project that may result in take, then that agency must engage in a formal consultation with the Service.
- During formal consultation, the Federal agency, the applicant and the Service work together to avoid or minimize the impact on listed species and their habitat. Such consultation would result in a biological opinion by the Service addressing the anticipated effect of the project on listed and proposed species. The opinion may authorize a limited level of incidental take.
- If no Federal agency is involved with the project, and federally listed species may be taken as part of the project, then you, the applicant, should apply for an incidental take permit. The Service may issue such a permit if you submit a satisfactory conservation plan for the species that would be affected by your project.
- Should your survey determine that federally listed or proposed species occur in the area and are likely to be affected by the project, we recommend that you work with this office and the California Department of Fish and Game to develop a plan that minimizes the project's direct and indirect impacts to listed species and compensates for project-related loss of habitat. You should include the plan in any environmental documents you file.

## Critical Habitat

When a species is listed as endangered or threatened, areas of habitat considered essential to its conservation may be designated as critical habitat. These areas may require special management considerations or protection. They provide needed space for growth and normal behavior; food,

water, air, light, other nutritional or physiological requirements; cover or shelter; and sites for breeding, reproduction, rearing of offspring, germination or seed dispersal.

Although critical habitat may be designated on private or State lands, activities on these lands are not restricted unless there is Federal involvement in the activities or direct harm to listed wildlife.

If any species has proposed or designated critical habitat within a quad, there will be a separate line for this on the species list. Boundary descriptions of the critical habitat may be found in the Federal Register. The information is also reprinted in the Code of Federal Regulations (50 CFR 17.95).

### Candidate Species

We recommend that you address impacts to candidate species. We put plants and animals on our candidate list when we have enough scientific information to eventually propose them for listing as threatened or endangered. By considering these species early in your planning process you may be able to avoid the problems that could develop if one of these candidates was listed before the end of your project.

### Species of Concern

The Sacramento Fish & Wildlife Office no longer maintains a list of species of concern. However, various other agencies and organizations maintain lists of at-risk species. These lists provide essential information for land management planning and conservation efforts.

### Wetlands

If your project will impact wetlands, riparian habitat, or other jurisdictional waters as defined by section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act, you will need to obtain a permit from the U.S. Army Corps of Engineers. Impacts to wetland habitats require site specific mitigation and monitoring. For questions regarding wetlands, please contact Mark Littlefield of this office at (916) 414-6580.

### Updates

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be February 17, 2010.



APPENDIX B  
HABITAT EVALUATION PROCEDURES  
AUGUST 1997

## INTRODUCTION

This application of Habitat Evaluation Procedures (HEP) is intended to quantify the anticipated impacts to fish and wildlife resources that would occur with the construction of the proposed flood control improvements for the Yuba River Basin Investigation, and to determine mitigation needs. This HEP addresses the effects of the proposed project on fish and wildlife resources and their habitat.

## PROJECT DESCRIPTION

Three alternatives were considered in detail and retained for further study. Alternative 1 (No Action) is the without project condition. Alternative 2 is the NED plan which maximizes net benefits over costs, and Alternative 3 (the locally preferred plan) provides the level of flood protection for the study area desired by the non-federal sponsors.

Alternative 1 would provide about a 65-year level of flood protection. Alternative 2 would provide between 200- and 300-year protection in the study reaches, and Alternative 3 would provide the entire study area with at least 200-year flood protection, Marysville would get a 300-year level of protection.

The construction measures used to achieve these levels of flood protection include modifying existing levees by raising, constructing landside berms and drains, modifying berms and drains, constructing berms, installing slurry walls, modifying slurry walls, and installing waterside slurry walls and wing walls with berms. For a complete description of the alternatives and the measures proposed for construction in each reach, see the accompanying Fish and Wildlife Coordination Act report.

## HEP DESCRIPTION

HEP<sup>1</sup> is an impact assessment methodology developed by the Fish and Wildlife Service (Service) and other State and Federal resource agencies which can be used to document the quality and quantity of available habitat for selected wildlife species. HEP provides information for two general types of habitat comparisons: 1) the relative value of different areas at the same point in time, and 2) the relative value of the same areas at future points in time. By combining the two types of comparisons, the impacts of proposed or anticipated land- and water-use changes on habitat can be quantified. In a similar manner, any compensation needs (in terms of acreage) for the project can also be quantified.

A HEP application is based on the assumption that habitat for selected wildlife species or communities can be described by a model which produces a Habitat Suitability Index (HSI). The HSI, a value from 0.0 to 1.0, is assumed to relate directly to the carrying capacity of the habitat being evaluated. The HSI is multiplied by the area of available habitat to obtain Habitat Units (HUs); Changes in habitat value and quantity are tracked over time at specified time periods known as target years. Those changes over the life of the project are annualized to yield Average Annual Habitat Units (AAHUs). The period of analysis is equal to the life of the

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<sup>1</sup>For further information on HEP, see ESM 100-104 which is available from the Service's Sacramento Fish and Wildlife Office.

project plus any construction period. The difference in AAHUs for various project scenarios permit comparison of alternatives. The models used in this HEP are contained in HEP Appendix B-1.

Impacts associated with each future scenario are evaluated for a number of target years. To predict changes in an HSI for each future scenario, it is necessary to make assumptions regarding baseline and future values within project impact and compensation areas. These assumptions are listed in HEP Appendix B-2. Given these assumptions, long-term losses and gains in HUs can then be estimated for each future scenario over the life of the project, then expressed as AAHU gains or losses. The liability of a HEP application includes the significance of its annual AAHUs is directly dependent on the ability of the HEP user(s) to assign a well-defined and accurate HSI to the selected evaluation species or communities. Also, the HEP user(s) must be able to identify and measure (or predict) the area of each distinct habitat that is utilized by fish and wildlife within the project impact area. Both the HSIs and the habitat acreages must also be reasonably estimable at various future points in time.

A fundamental and critical step in designing any HEP application is the setting of overall goals and objectives. In this HEP application, such goals and objectives were developed based on the overall, long-term resource management goals of the Service. The mitigation policies of the Service (see description within the body of the Fish and Wildlife Coordination Act report) were also carefully considered.

The following goals and objectives were established for the HEP used in this study:

1. The primary goal was to evaluate the impacts on fish and wildlife from the proposed flood control improvements.
2. Quantify habitat conditions before project construction.
3. Quantify habitat conditions after project construction.
4. Develop and evaluate a management alternative designed to compensate impact from the project.
5. Determine the acreage and habitat values of various habitats necessary to compensate for the impacts of the project on these habitats in the project area.

### **METHODOLOGY**

The 1980 HEP procedures were used in this application. It was conducted in August 1997. Participants in the data collection portion of the HEP were representatives from the Service (Doug Weinrich) and Corps of Engineers (Jane Rinck).

As previously stated, the purpose of using HEP is to provide a quantitative basis for identifying the habitat values which would be degraded, destroyed, and/or created by project construction.

Woodland, animal grassland, and agricultural habitats would be affected by the proposed project. The total acreage affected by location is summarized in Table B1.

Table B1. Summary of total acreage impacted by the construction alternatives proposed in the Yuba River Basin investigation, California.

REACH	ALTERNATIVE 1 (No Action)	ALTERNATIVE 2 (NED Plan)			ALTERNATIVE 3 (Locally Preferred Plan)		
	No Work	Temporary	Permanent	Total	Temporary	Permanent	Total
Reach 1 -- Yuba River	0	13.79	10.13	23.92	6.97	6.36	13.33
Reach 1 -- Feather River	0	18.56	8.10	26.66	11.05	7.73	18.78
Reach 2 -- Feather River	0	2.30	1.45	3.75	2.30	1.45	3.75
Reach 3 -- Yuba River	0	3.64	2.60	6.24	3.64	2.60	6.24
Reach 3 -- Feather River Jack slough	0	11.82	8.80	20.62	11.82	8.80	20.62
Reach 3 -- Marysville Ring levee	0	4.60	3.40	8.00	MO.	3.40	8.00
TOTALS (ac)	0	54.71	34.48	89.19	40.38	30.34	70.72

Much of the proposed Yuba River Basin Investigation work overlaps the project area of Phase II of the Sacramento River Flood Control System Evaluation which is completing its second year of construction. In order to ensure the impact analyses for the two projects are comparable, the HEP Team elected to utilize the same models and procedures used in the systems evaluation. The habitats and HSI models selected to evaluate project impacts are shown in Table B2.

Table B2. Summary of habitats and Habitat Suitability Index (HSI) model selected for use in the Yuba River Basin Investigation impact analysis.

HABITAT TYPE	PROPOSED HSI MODEL
Annual Grassland	Small Mammal Prey-Base Guild
Agriculture	Small Mammal Prey-Base Guild
Woodland	Riparian Forest Cover-Type

Consistent with the previous work completed for the Phase II System Evaluation HEP, it was decided that agricultural (primarily orchards) and annual grassland habitat impacts would not be analyzed using HEP since orchard habitat would be replaced by annual grassland habitat and disturbed annual grassland habitat would be reseeded after construction was completed. Therefore, the only habitat analyzed for impacts with the HEP is woodland. The woodland habitat impacted by the project is summarized by reach in Table B3.

Table B3. Summary of woodland habitat acreages impacted by reach in the Yuba River Basin Investigation.

ALTERNATIVE 1 - NO ACTION		
No impacts (no new work proposed)		
ALTERNATIVE 2 - NED PLAN		
LOCATION	HABITAT	ACRES IMPACTED <sup>1</sup>
Reach 1	Woodland	0.30;
Reach 2	Woodland	0.00
Reach 3	Woodland	1.93
TOTAL		2.23
ALTERNATIVE 3 - LOCALLY PREFERRED PLAN		
Reach 1	Woodland	0.30
Reach 2	Woodland	0.00
Reach 3	Woodland	1.93
TOTAL		2.23

1. The total acres affected by Alternatives 2 and 3 are different; however, the woodland habitat affected by either alternative is the same.

The Riparian Forest Cover-Type model does not attempt to portray exactly the needs of any one species, but rather it broadly portrays the needs of many species groups of the Sacramento Valley. For example, many birds, including nesting raptors such as the red-tailed hawk and Swainson's hawk, require tall trees, and thus tree height, with taller trees being more favorable; is included as a key model variable. Also, many songbirds, such as the northern oriole, require relatively dense canopies, thus canopy closure, with greater canopy closure providing greater value, is included as a model variable. Similarly, riparian birds such as herons and egrets have specific needs relating to canopy closure, stand width, and understory density, so these needs have been addressed with appropriate model variables.

When using HEP, it is necessary to determine HSIs for each evaluation species at selected target years for both with-project and without-project scenarios. Proposed mitigation areas must be treated similarly (with-management is substituted for with-project conditions): The capacity of each sample site to meet the needs of the evaluation elements within the project impact and compensation areas was determined by the HEP team through measurement of specific habitat variables. Baseline values for each of the model variables can be obtained by field sampling, map interpretation, conversation with recognized experts, and review of existing records and reports. Table B4 lists the variables contained in each model and indicates how data for each variable was collected.

Table B4. Summary of the Habitat Suitability Index (HSI) Model, the variables, and how the values were obtained in the Yuba River Basin Investigation.

HSI MODEL	HSI VARIABLE	HOW OBTAINED
RIPARIAN FOREST COVER-TYPE	V1 - Average tree height	Field measurement
	V2 - Average canopy width of stand	Field measurement
	V3 - Percent tree canopy closure	Field measurement
	V4 - Number of tree/shrub species	Field observation
	V5 - Understory vegetative density	Field measurement

At the completion of data collection, an HSI value was calculated for each evaluation element. A higher numerical rating is indicative of higher suitability for the evaluation element at the sample site. HSI measurements of the same habitat in an impact area were averaged. The HSI, when multiplied by the area of the habitat, yields HUs, a measure of the quality and quantity of the habitat. The equation used to calculate the HSIs is contained within the model (HEP Appendix B 1).

Since it is not possible to empirically determine habitat quality and quantity for future years, future HSI values were projected. This was accomplished by increasing or decreasing specific baseline Suitability Index<sup>2</sup> values for each evaluation species based on the HEP Team's best professional judgement of probable future conditions. The assumptions used to derive future HSI and acreage values for with- and without project conditions on the impact and compensation areas are contained in HEP Appendix B-2.

Given these assumptions, long-term losses and gains in HUs can be estimated for each future scenario over the life of the project; then expressed as AAHU gains or losses. Basic HEP outputs, as expressed on Form Ds are given in HEP Appendix B-3. The HEP 2.2 Accounting Software Package was used to calculate AAHUs.

<sup>2</sup>A Suitability Index is the value obtained for each variable in a HSI model.

In order to make the comparison of future with- and without-project conditions for each alternative described above, it was necessary to first develop the future without-project scenario for the habitats affected within the project area. This necessitated making several key assumptions that existing land uses and maintenance activities would not change in the future without the project. Given these conditions, a future without-project scenario was developed which included: (1) no change in the existing habitat acreages, (2) riparian habitat values will continue to develop, and (3) the existing hydrology will be maintained in the study area.

The existing woodland habitat affected in Reaches 1-3 were 0.30, 0, and 1.93 acres, respectively. Sampling was completed on woodland habitat on the Yuba River near the Caltrans yard and on the north levee upstream of Highway 70; and on Jack Slough north of Marysville and two other sites subsequently dropped from the project.

### RESULTS AND DISCUSSION

The results of the HEP analysis indicates that 1.54 Average Annual Habitat Units would be lost with construction of either Alternative 2 or 3. Compensation for this loss could be accomplished on about 2.98 acres of agricultural or annual grasslands which would be converted to woodland habitat. The compensation need for each reach is summarized in Table BS.

A component of Phase II of the Sacramento River Flood Control System Evaluation was development of a 78.5-acre compensation site to offset unavoidable impacts of that project. This site was developed during the first year of project construction. Subsequently, the work proposed in the system evaluation was reevaluated and portions of the work originally planned in the Phase II project area was deleted from the project. The Corps has proposed to use any available compensation credits, at this site to fulfill the compensation need for the Yuba River Basin Investigation work.

The HEP Team agreed that this was acceptable, provided there were sufficient credits available (a portion of the compensation site was washed away during the 1997 floods, which the Corps does not plan to replant, and some of the impacts of the levee rehabilitation work as a result of the 1997 floods was to be compensated for on this site). An analysis of the compensation currently provided by the site and prior commitments of credits on the site showed that the site still has sufficient credits to compensate for this project (HEP Appendix B-3).

Mitigation measures recommended for impacts to annual grassland and agricultural habitats consist of replanting disturbed areas with native grass species such as purple needlegrass; nodding needlegrass, blue wildrye, creeping wildrye, California barley, meadow barley, and Yolo slender wheatgrass.

Table BS. Summary of woodland habitat impacts and compensation needs in the Yuba River Basin Investigation, California.

ALTERNATIVE 1 - NO ACTION			
No impacts/compensation need (no work)			
ALTERNATIVE 2 - NED PLAN			
LOCATION	HABITAT	ACRES IMPACTED	COMPENSATION
Reach 1	Woodland	0.30	0.42
Reach 2	Woodland	0.00	0.00
Reach 3	Woodland	1.93	2.56
TOTAL		2.23	2.98
ALTERNATIVE 2 - LOCALLY PREFERRED PLAN			
LOCATION	HABITAT	ACRES IMPACTED	COMPENSATION
Reach 1	Woodland	0.30	0.42
Reach 2	Woodland	0	0
Reach 3	Woodland	1.93	2.56
TOTAL		2.23	2.98



HEP APPEN.IX B-1

HSI MODELS

HABITAT SUITABILITY INDEX MODEL

RIPARIAN FOREST COVER-TYPE,  
SACRAMENTO VALLEY

Formulated by the HEP Team for the  
Sacramento River Flood Control Evaluation, Phase II

February 1990

B10



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I.I



**BACKGROUND:** This particular model was developed for quantifying the impacts of remedial levee repair on areas with limited Riparian Forest Cover within the Sacramento River Flood Control System Evaluation, Phase II project area. This model is also used for determining the sizes of a managed wildlife area needed for replacing lost habitat values for this cover type.

Riparian Forest Cover is defined as a stand of woody vegetation composed of primarily trees greater than 20-feet-tall. The Riparian Forest cover-type model identifies and quantifies general characteristics of this cover-type which are important to a wide array of wildlife. The model does not attempt to portray exactly the needs of any one species, but rather it broadly portrays the needs of many species or species groups of the Sacramento Valley area.

For example, many birds, including nesting raptors such as red-tailed hawks and Swainson's hawks require tall trees, and thus tree height, with taller trees being more favorable, has been included as a key model variable. Also, many songbirds, such as the northern oriole, require relatively dense canopies, thus canopy closure, with greater closure providing greater value, is included as a model variable. Similarly, riparian birds such as herons and egrets have specific needs relating to canopy closure, width of stand, and density of vegetative understory, so these needs have been met as much as possible with the appropriate model variables.

The single Habitat Suitability Index (HSI) value between 0 and 1.0 which is derived using the Riparian Forest cover-type model is, therefore, not an exact measure of the habitat value to any single wildlife species. Instead, the HSI indicates the overall, broad quality of the cover-type to a broad array of the most important Sacramento Valley species. As such, the use of this single HSI value in the HEP process is assumed to provide the same results (i.e., estimates of relative impacts and compensation needs) as if the HEP were completed using a number of individual wildlife species models for the cover type.

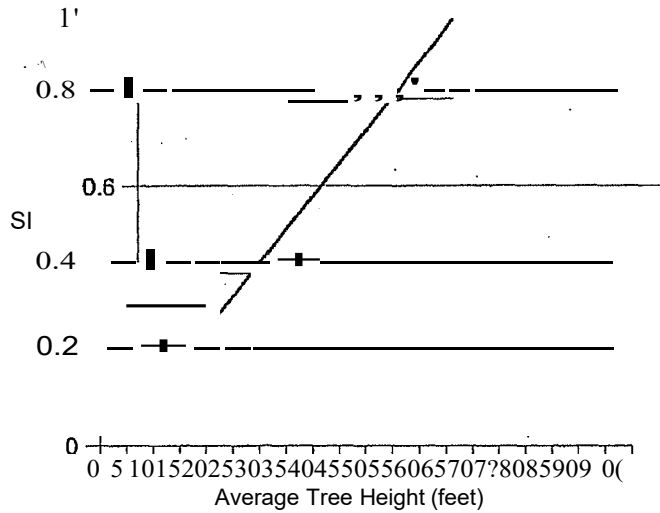
**APPLICABLE COVER-TYPES:** Riparian Forest Cover of Sacramento Valley and managed wildlife areas which may be developed as mitigation areas.

**VARIABLES:**

- V1 Average tree height.
- V2 Average canopy width of the stand.
- V3 Tree canopy closure.
- V4 Number of tree or shrub species.
- V5 Understory vegetative density.

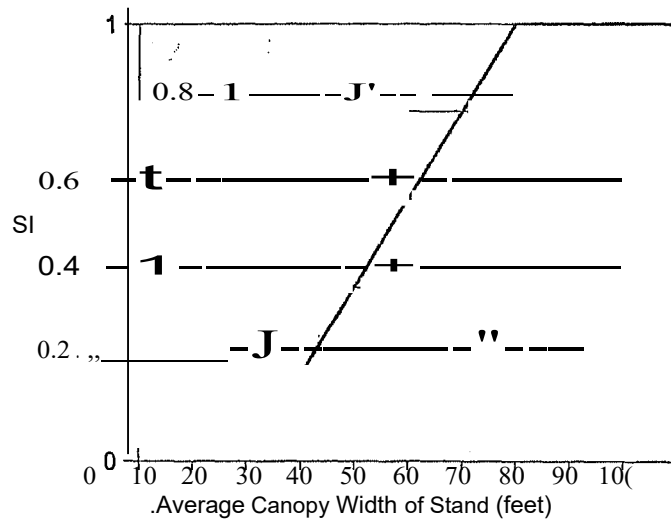
V1 -- Average tree height, Suitability Index (SI) determination.

**ASSUMPTIONS:** For most wildlife species of concern, the taller the trees, the better the habitat value: Nesting raptors in particular require relatively tall trees. A tree height, on average of about 70 feet or greater, is optimum.



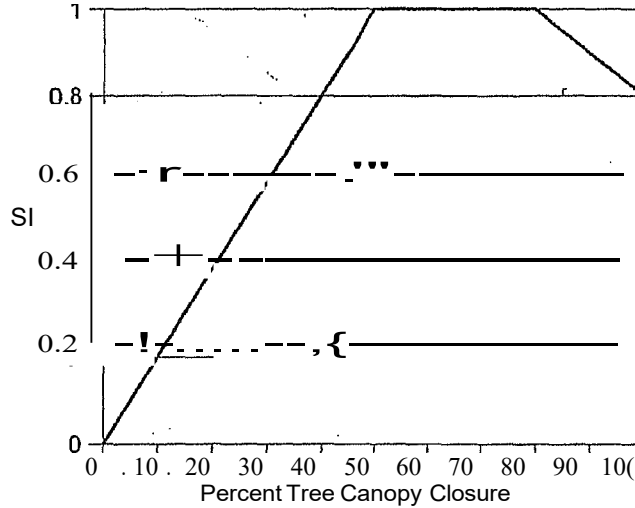
V2 -- Average canopy width of the stand, Suitability Index (SI) determination,

**ASSUMPTIONS:** Generally, the wider the stand, the better the habitat values for most key fish and wildlife. Stands less than 30-feet-wide have relatively low values; stands over 70-feet in width are best.



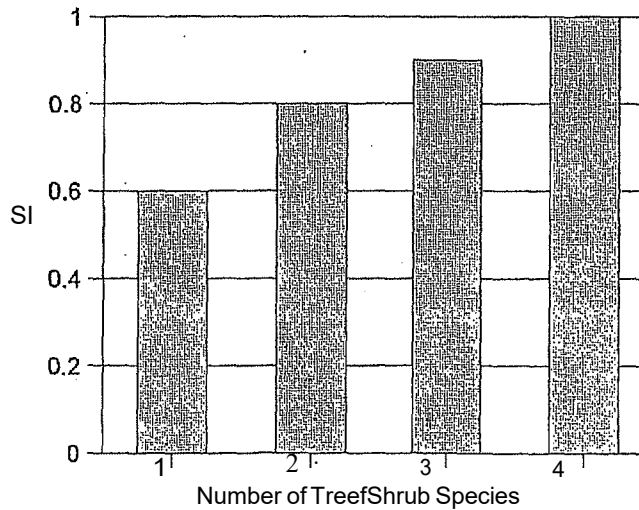
V3 -- Tree canopy closure, Suitability Index (SI) determination.

ASSUMPTIONS: In general, the greater the forest density as determined by percent of canopy closure, the greater the habitat values of the forest. However, if the stand becomes too dense, habitat values frequently decline. The optimal condition is with percent canopy closure of 50 to 80 percent.



V4 Number of tree or shrub species. Suitability Index (SI) determination.

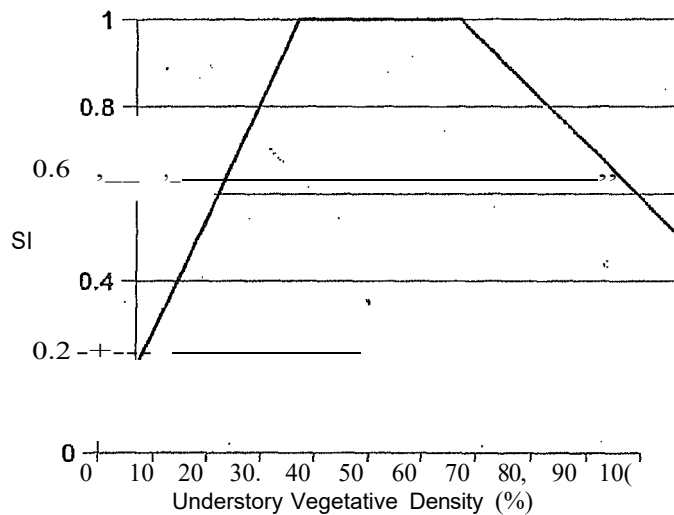
ASSUMPTIONS: Habitat diversity improves carrying capacity. Generally, the more tree and shrub species present, the more diverse the forest, and the greater the values to fish and wildlife. The optimal condition is when the forest is composed of at least four species of trees.



VS Understory vegetative density, Suitability Index (SI) determination.

canopies are relatively dense. The understory should generally have a moderate density of . . .  
 ASSUMPTIONS: The best Riparian Forest habitat occurs when both overstory and understory

vegetation at various elevations. By estimating the 14-feet above ground, and then averaging these three figures (i.e., the three estimates of percent vegetative cover), a good index of overall understory density can be derived.



HABITAT SUITABILITY INDEX (HSI): Average canopy width and understory density are believed to be slightly more important variables than the other three variables. The five variables are thus combined as follows:

$$HSI = \frac{(V1 \times V3 \times V4) + (V2 \times V5)}{2}$$

## DATA COLLECTION

### METHODOLOGY

#### Riparian Forest Cover Type

- VI Average tree height
- V2 Average canopy width
- V3 Tree canopy closure
- V4 Number of trees or shrubs
- V5 Understory vegetation density

#### Measurement Method

Sampling will be conducted on a line transect. Sample locations will be determined by pacing the number of digits selected from a random numbers table. The number of sample sites on each line will vary with the size of the area being evaluated.

- V1 Average tree height. A clinometer will be used to determine tree height. If the object being measured is 66 feet away the height can be read directly from the clinometer.
- V2 Average canopy width. A tape will be used to measure the width of the stand. The width of the stand will be measured from the outer edge of the canopy.
- V3 Tree canopy closure. A spherical densiometer will be used to record total of points intercepted overhead by vegetation. Data will be collected by sequentially observing in four directions (north, south, east, west) at the sample location.
- V4 Number of trees or shrubs. Count the number of species of tree and shrub in the stand being evaluated and record on data sheet.
- V5 Understory vegetative density. Methods used for V3 will be used for this variable at heights of 2, 6, and 14 feet from the ground. The vegetative density at 6 feet will be assumed to equal the value obtained from V3. The vegetative density at 14 feet will have to be estimated.

HEP APPENDIX B-2  
DATA ANALYSIS ASSUMPTIONS



Yuba River, Reach 1 @ Caltrans  
 Future w/o Project (PA1)

Assumptions:

- I. Existing maintenance will continue

Woodland Habitat

- V1 - Average tree height
- V2 - Average canopy width of stand
- VJ - Tree canopy closure
- V4 - Number of tree and/or shrub species
- V5 - Understory vegetative density

TYO - Baseline (measured)

VJ	24 ft	SI = .45
V2	66 ft	SI = .91
V3	69%	SI = 1.0
V4	3	SI = 0.9
VS	50%	SI = 1.0

$$HSI = \frac{(V1 \times VJ \times V4)^{1/2} + (V2 \times V5)^{1/2}}{2} = \frac{(.405^{1/2} + .91)^{1/2}}{2} = .719 + .95 = .84$$

- TYi No change from TYO
- TY2 No change from TY1
- TY52 No change from TY2

Future w/ Project (PA2)

Assumptions:

1. All woody vegetation removed
2. Future maintenance activities preclude development of woody vegetation within right-of-way
- J. Construction period is one year

TYO - Baseline (measured)

V1	24 ft	SI = .45
V2	66 ft	SI = .91
V3	69%	SI = 1.0
V4	3	SI = 0.9
VS	50%	SI = 1.0

$$HSI = \frac{(VJ \times VJ \times V4)^{1/2} + (V2 \times V5)^{1/2}}{2} = .84$$

TY1 - Construction starts

V1	0 ft	SI = 0.3
V2	0 ft	SI = 0.2
V3	0%	SI = 0
V4	0	SJ = 0
Y5	0%	SI = 0.2

$$HSI = \frac{(0.3 \times 0 \times 0)^{113}}{2} + \frac{(0.2 \times 0.2)^{112}}{2} = 0 + (.04)^{112} = .10$$

TY2 - Construction complete

V1	- No change
V2	- No change
Y3	- No change
Y4	- No change
V5	- No change

$$HSI = .10$$

TY52

V1	- No change
V2	- No change
V3	- No change
V4	- No change
V5	- No change

$$HSI = .10$$

Compensation Site  
Future w/o Project (MP1)

Assumptions:

1. 10-acre compensation site (annual grassland)
2. Develop a mixed riparian area with at least 4 different woody plant species
3. Site width is a minimum of 200 ft.
4. Construction period is one year

Woodland Habitat

- V1 - Average tree height
- V2 - Average canopy width of stand
- V3 - Tree canopy closure
- V4 - Number of tree and/or shrub species
- V5 - Understory vegetative density

TYO - Baseline (estimated)

V1	0 ft	SI = 0.3
V2	0 ft	SI = 0.2
V3	0	SI = 0
V4	0	SI = 0
V5	0	SI = 0.2

$$HSI = \frac{CVI \times V3 \times V4}{2} + \frac{(V2 \times V5)v}{2} = \frac{(0.3 \times 0 \times 0)}{2} + \frac{(.2 \times .2)v}{2} = (0) + (.04)v = .10$$

- TY1 No change from TYO
- TY2 No change from TY1
- TY52 No change from TY2

Compensation Site  
Future with Project (MP2)

TYO - Baseline (estimated)

TYi

V1	3ft (new plantings)	SI = 0.3
V2	1 ft (one tree wide)	SI = 0.2
V3	0	SI = 0
V4	4	SJ = 1
VS	10%	SI = 0.4

$$HSI = \frac{(0.3 \times 0 \times 1)w}{2} + \frac{(0.2 \times .04)v}{2} = (0)w + (.02)v = .14$$



TY2

VJ	6 ft	SI = 0.3
V2	J ft	SI = 0.2
VJ	20%	SI = 0.4
V4	4	SI = 1.0
VS	20%	SI = .7J ..

$$HSI = \frac{(0.3 \times 0.4 \times 1.0)}{2} + \frac{(0.2 \times .1J) + (.49 + J8)}{2} = .44$$

TY52

VI	43 ft	SI = 0.7
V2	200 ft	SI = 1.0
VJ	93%	SI = 0.9
V4	4	SI = 1.0
VS	91%	SI = .63

$$HSI = \frac{(0.7 \times 0.9 \times 1.0)}{2} + \frac{(.10 \times .6J)}{2} = (.63 + 6J)Y = .86 + .79 = .83$$

Feather River/Jack Slough, Reach 3  
Future w/o Project (PA1)

Assumptions:

1. Existing maintenance will continue on levee
2. Tree height will increase (trees grow)
3. Stand width will increase slightly

Woodland Habitat

- VI - Average tree height
- V2 - Average canopy width of stand
- V3 - Tree canopy closure
- V4 - Number of tree and/or shrubs
- VS - Understory vegetative density

TYO - Baseline (measured)

VI	43 ft	SJ = 0.7
V2	60 ft	SJ = 0.8
V3	93%	SJ = 0.9
V4	4	SJ = 1.0
VS	91%	SJ = .63

$$HSI = \frac{VI \times V3 \times V4}{2} + \frac{\{V2 \times VS\}^{112}}{2} = \frac{(0.7 \times 0.9 \times 1.0)^{113}}{2} + \frac{(0.8 \times .63)^{112}}{2} = \frac{f.63^{113} + f.S0^{112}}{2}$$

$$= \frac{.86 + .71}{2} = .79$$

TY1 No change from TYO

TY2 No change from TY1

TYS2

VI	43 ft	SI = 0.7
V2	80 ft	SI = 1.0
V3	93%	SI = .90
V4	4	SI = 1.0
VS	91%	SI = .63

$$HSI = \frac{(0.70 \times .90 \times 1.0)^{113}}{2} + \frac{CLO \times (.63)^{112}}{2} = \frac{(.63)}{2} + \frac{(.63)^{112}}{2} = .86 + .79 = .88$$

Future w/Project (PA2)

Assumptions:

1. All woody vegetation removed
2. Future maintenance activities preclude development of woody vegetation within right-of-way
3. Construction period is one year

TYO - Baseline (measured)

V1	43 ft	SI = 0.7
V2	60 ft	SI = 0.8
V3	93%	SI = 0.9
V4	4	SI = 1.0
V5	91%	SI = .63

$$HSI = \frac{(V1 \times V3 \times V4)^{1/2} + CV2 \times V5}{2} = \frac{(0.7 \times 0.9 \times 1.0)^{1/2} + (0.8 \times .63)}{2} = \frac{0.87 + .50}{2}$$

$$= \frac{.86 + .51}{2} = .79$$

TY1 - Construction starts

V1	0 ft	SI = 0.3
V2	0 ft	SI = 0.2
V3	0%	SI = 0
V4	0	SI = 0
V5	0%	SI = 0.2

$$HSI = \frac{(0.3 \times 0 \times 0)^{1/2} + (0.2 \times 0.2)}{2} = \frac{0 + (.04)}{2} = .02$$

TY2 - Construction complete

V1	- No change
V2	- No change
V3	- No change
V4	- No change
V5	- No change

$$HSI = .10$$

TY3

V1	- No change
V2	- No change
V3	- No change
V4	- No change
V5	- No change

$$HSI = .10$$

Compensation Site  
Future w/o Project (MP1)

Assumptions:

1. 10-acre compensation site (annual grassland)
2. Develop a mixed riparian area with at least 4 different woody plant species
3. Site width is a minimum of 200 ft
4. The construction period is one year

Woodland Habitat

- V1 - Average tree height
- V2 - Average canopy width of stand
- V3 - Tree canopy closure
- V4 - Number of tree and/or shrub species
- VS - Understory vegetative density

TYO - Baseline (estimated)

V1	0 ft	SI = 0.3
V2	0 ft	SI = 0.2
V3	0	SI = 0
V4	0	SI = 0
VS	0	SI = 0.2

$$HSI = \frac{(V1 \times V3 \times V4)^{1/3} + (V2 \times VS)^{1/2}}{2} = \frac{(0.3 \times 0 \times 0)^{1/3} + (0 \times 0.2)^{1/2}}{2} = \frac{0 + 0}{2} = 0$$

- TYi No change from TYO
- TY2 No change from TYi
- TY52 No change from TY2

Compensation Site  
Future with Project (MP2)

TYO - Baseline (estimated)

TYi

V1	3ft (new plantings)	SI = 0.3
V2	1ft (one tree wide)	SI = 0.2
V3	0	SI = 0
V4	4	SI = 0.4
V5	10%	SI = 0.4

$$HSI = \frac{(0.3 \times 0 \times 1)^{1/3} + (0.2 \times 0.4)^{1/2}}{2} = \frac{0 + 0.28}{2} = 0.14$$

TY2

V1	6 ft	SI = 0.3
V2	3 ft	SI = 0.2
V3	20%	SI = 0.4

V4 4 SI = 1.0  
 V5 20% SI = .73

$$HSI = \frac{(D.3 \times 0.4 \times 1.0)^{1/2}}{2} + \frac{(0.2 \times .73)^{1/2}}{2} = .49 + .38 = .44$$

TY52

V1 43 ft SI = 0.7  
 V2 200 ft SI = 1.0  
 V3 93% SI = 0.9  
 V4 4 SI = 1.0  
 V5 91% SI = .63

$$HSI = \frac{(0.7 \times 0.9 \times 1.0)^{1/2}}{2} + \frac{(1.0 \times .63)^{1/2}}{2} = \frac{.86}{2} + \frac{.79}{2} = .83$$

TYI - Construction starts

VI 0 ft SI = 0.3  
 V2 0 ft SI = 0.2  
 V3 0% SI = 0  
 V4 0 SI = 0  
 VS 0% SI = 0.2

$$HSI = \frac{(0.3 \times 0 \times 0)^{1/2}}{2} + \frac{(0.2 \times 0.2)^{1/2}}{2} = 0 + .04 = .10$$

TY2 - Construction complete

VI - No change  
 V2 -No change  
 V3 -No change  
 V4 -No change  
 V5 -No change

HSI = .10

TY52

V1 - No change  
 V2 -No change  
 VJ -No change  
 V4 -No change  
 VS -No change

HSI = .10



Yuba River, Reach 3  
 Future w/o Projed (PA1)

Assumptions:

1. Existing maintenance will continue on levee
2. Tree height will increase (trees grow)
3. Stand width will increase slightly

Woodland Habitat

- V1 - Average tree height
- V2 - Average canopy width of stand
- V3 - Tree canopy closure
- V4 - Number of tree and/or shrubs
- VS - Understory vegetative density

TYO - Baseline (measured)

V1	43 ft	SI = 0.7
V2	60 ft	SI = 0.8
V3	93%	SI = 0.9
V4	4	SI = 1.0
VS	91%	SI = .63

$$HSI = \frac{(.71 \times .93 \times 4)^{1.13} + (.60 \times .8 \times .63)^{1.13}}{2} + \frac{(.63 \times 1.0)^{1.13}}{2} = \frac{.86 + .71}{2} = .79$$

TY1 No change from TYO  
 TY2 No change from TYr

TYS2

V1	43 ft	SI = 0.7
V2	80 ft	SI = 1.0
V3	93%	SI = .90
V4	4	SI = 1.0
VS	91%	SI = .63

$$HSI = \frac{(.70 \times .90 \times 1.0)^{1.13} + (1.0 \times .63)^{1.13}}{2} = \frac{.63}{2} + \frac{(.63)^{1.13}}{2} = .86 + .79 = .85$$

Future w/Project (PA2)

Assumptions:

1. All woody vegetation removed
2. Future maintenance activities preclude development of woody vegetation within right-of-way
3. Construction period is one year

TYO - Baseline (measured)

VI	43 ft	SI = 0.7
V2	60 ft	SI = 0.8
V3	93%	SI = 0.9
V4	4	SI = 1.0
VS	91%	SI = .63

$$HSI = \frac{(V1 \times VJ \times V4)^{1/3} + (V2 \times VS)^{1/2}}{2} = \frac{(0.7 \times 0.9 \times 1.0)^{1/3} + (0.8 \times .63)^{1/2}}{2} = \frac{(.63 \text{ ft})^{1/3} + (.50)^{1/2}}{2}$$

$$= \frac{.86 + .71}{2} = .79$$

TY 1 - Construction starts

VI	0 ft	SI = 0.3
V2	0 ft	SI = 0.2
V3	0%	SI = 0
V4	0	SI = 0
VS	0%	SI = 0.2

$$HSI = \frac{(0.3 \times 0 \times 0)^{1/3} + (0.2 \times 0.2)^{1/2}}{2} = \frac{0 + (.04)^{1/2}}{2} = .10$$

TY2 - Construction complete

VI	- No change
V2	- No change
V3	- No change
V4	- No change
V5	• No change

HSI = .10

TY52

V I	- No change
V2	- No change
V3	- No change
V4	- No change
V5	- No change

HSI = .10

Compensation Site  
Future w/o Project (MPJ.)

Assumptions:

1. 10-acre compensation site (annual grassland)
2. Develop a mixed riparian area with at least 4 different woody plant species
3. Site width is a minimum of 200 ft.
4. The construction period is one year

Woodland Habitat

- V1 - Average tree height
- V2 - Average canopy width of stand
- VJ - Tree canopy closure
- V4 - Number of tree and/or shrub species
- V5 - Understory vegetative density

TYO - Baseline (estimated)

V1	0 ft	SI = 0.3
V2	0 ft	SI = 0.2
VJ	0	SI = 0
V4	0	SI = 0
V5	0	SI = 0.2

$$HSI = \frac{(V1 \times VJ \times V4)^{113} + 0.2 \times VS \cdot Y^n}{2} = \frac{(0.0 \times 0 \times 0)^{113} + (0.2 \times 0.2) \cdot y}{2} = \frac{(0)^{113} + (0.04)v}{2} = 0.0$$

- TY1: No change from TYO
- TY2: No change from TY1
- TY52: No change from TY2

Compensation Site  
Future with Project (MP2)

TYO - Baseline (estimated)

TY1

V1	1 ft (new plantings)	SI = 0.3
V2	1 ft (one tree wide)	SI = 0.2
VJ	0	SI = 0
V4	4	SI = 1
VS	10%	SI = 0.4

$$HSI = \frac{(0.0 \times 0 \times 1)^{113} + (0.2 \times 0.4)v}{2} = \frac{(0)^{113} + (0.08)v}{2} = 0.04$$

TY2

V1	6 ft	SI = 0.3
V2	1 ft	SI = 0.2
VJ	20%	SI = 0.4

V4 4 SI = 1.0  
 VS 20% SI = .73

$$HSI = \frac{(0.3 \times 0.4 \times 1.0)^{1/3}}{2} + \frac{(0.2 \times .73)^{1/2}}{2} = .49 + .38 = .87$$

TY52

V1 43 ft SI = 0.7  
 V2 200 ft SI = 1.0  
 V3 93% SI = 0.9  
 V4 4 SI = 1.0  
 V5 91% SJ = .63

$$HSI = \frac{(0.7 \times 0.9 \times 1.0)^{1/3}}{2} + \frac{(1.0 \times .63)^{1/2}}{2} = \frac{(.63 + .63)^{1/2}}{2} = \frac{.86 + .79}{2} = .83$$

TYI - Construction starts

V1 0 ft SI = 0.3  
 V2 0 ft SI = 0.2  
 V3 0% SI = 0  
 V4 0 SI = 0  
 V5 0% SI = 0.2

$$HSI = \frac{(0.3 \times 0 \times 0)^{1/3}}{2} + \frac{(0.2 \times 0.2)^{1/2}}{2} = 0 + \frac{.04}{2} = .02$$

TY2 - Construction complete

V1 - No change  
 V2 - No change  
 V3 - No change  
 V4 - No change  
 V5 - No change

HSI = .0

TY52

V1 - No change  
 V2 - No change  
 V3 - No change  
 V4 - No change  
 V5 - No change

HSI = .0

HEP APPENDIX B-3  
HEP OUTPUT FORM DS

Area Needed For In-Kind Compensation  
(Form H Results)

Date: 08/11/97

Study Name: YUBA RIVER, REACH 1(CALTRANS)  
 Plan Alternative: PA 2 (with project) FUTURE WITH PROJECT  
 Compared To: PA 1 (without project) FUTURE W/O PROJECT  
 Management Plan: MP 1 (with project) FUTURE WITH PROJECT  
 Compared To: MP 2 (without project) FUTURE W/O PROJECT  
 Candidate management Area Size: 10.00

Evaluation Species ID#	Plan Name	Alternative	Management Plan	Area Needed For Compensation
	RIPARIAN FOREST	-0.22	5.18	0.42

Area Needed For In-Kind Compensation  
(Form H Results)

Date: 08/21/97

Study Name: FEATHER RIVER/JACK SLOUGH, REACH 3  
 Plan Alternative: PA 2 (with project) FUTURE WITH PROJECT  
 Compared To: PA 1 (without project) FUTURE W/O PROJECT  
 Management Plan: MP 1 (with project) FUTURE WITH PROJECT  
 Compared To: MP 2 (without project) FUTURE W/O PROJECT  
 Candidate management Area Size: 10.00

Evaluation Species ID#	Plan Name	Alternative	Management Plan	Area Needed For Compensation
	RIPARIAN FOREST	-0.32	5.18	0.62

Area Needed For In-Kind Compensation  
(Form H Results)

Date: 08/25/97

Study Name: YUBA RIVER, REACH 3  
 Plan Alternative: PA 2 (with project) FUTURE WITH PROJECT  
 Compared To: PA 1 (without project) FUTURE W/O PROJECT  
 Management Plan: MP 1 (with project) FUTURE WITH PROJECT  
 Compared To: MP 2 (without project) FUTURE W/O PROJECT  
 Candidate management Area Size: 10.00

Evaluation Species ID#	Plan Name	Alternative	Management Plan	Area Needed For Compensation
	RIPARIAN FOREST	-1.00	5.18	1.94

## **APPENDIX E**

### **ENDANGERED SPECIES ACT CONSULTATION**



DEPARTMENT OF THE ARMY  
U.S. ARMY ENGINEER DISTRICT, SACRAMENTO  
CORPS OF ENGINEERS  
1325 J STREET  
SACRAMENTO, CALIFORNIA 95814-2922

Environmental Resources Branch

Ms. Susan Moore, Field Supervisor  
U.S. Fish and Wildlife Service  
2800 Cottage Way, Suite W2605  
Sacramento, California 95825-1846

Dear Ms. Moore:

This letter is to initiate formal consultation for the Federally-listed valley elderberry longhorn beetle (*Desmocerus californicus*) (VELB) and the Federally-listed giant garter snake (*Thamnophis gigas*) (GGS) under Section 7(a) of the Endangered Species Act, as amended, for the Marysville Ring Levee, Yuba River Basin Project, in Yuba County, California. The U.S. Army Corps of Engineers (Corps) is proposing to construct slurry walls, secant pile walls, jet grouting, and stability berms in order to address under- and through-seepage issues in the approximately 7.5 miles of levee surrounding the city of Marysville, California. The Marysville Ring Levee improvements are a cooperative effort between the Corps, the State of California Central Valley Flood Protection Board, and the Marysville Levee District. This effort would be divided into four phases, to be constructed over the course of five construction seasons. Construction is anticipated to begin in summer 2010.

The four phases of construction are described below. Complete construction details for each of these four phases can be found in the Marysville Ring Levee Environmental Assessment/Initial Study (Enclosure 1, pages 7 to 16, and also shown on Plate 3).

- **Phase 1.** The proposed repair for this site involves a 4,500 foot long, 60 to 120 foot deep slurry wall on the northwest levee crown and reshaping the waterside slope.
- **Phase 2.** The proposed repair for this site involves a 4,200 foot long, 50 to 90 foot deep slurry wall on the waterside slope in three locations along the southern portion of the levee. Jet grouting would occur under four bridges at their intersections with the levee. Additionally, a 70 foot deep secant pile wall would be installed on the levee crown in two locations.
- **Phase 3.** The proposed repair for this site would be a 50 to 110 foot deep slurry wall installed through the crown of the levee in two locations along the east and northeast portions of the levee: (1) a 3,400 foot long slurry wall in the northeast corner of the levee, and (2) a 4,000 foot long slurry wall extending northeast from Ramirez Street / Simpson Lane.



- **Phase 4.** The proposed repair for this site would consist of the construction of two seven foot tall seepage or stability berms between the railroad trestles at Binney Junction. These berms would stabilize the levee by laterally retaining an existing railroad track and by resisting seepage uplift.

#### Valley Elderberry Longhorn Beetle

On July 29 and August 20, 2009, Corps and U.S. Fish and Wildlife Service (USFWS) biologists surveyed the project area for elderberry shrubs. During the surveys, a total of 87 shrubs or shrub clusters were marked and recorded and stems counted per USFWS's "Conservation Guidelines for the Valley Elderberry Longhorn Beetle, July 1999". Of the 87 shrubs that were surveyed, it was determined that 28 shrubs with stems greater than one inch would likely be affected by construction in Phases 2 and 3. None of these shrubs were recorded as having exit holes. The Corps proposes that these 28 shrubs would be removed and transplanted to an existing Corps' conservation area, referenced below. The shrubs would be transplanted in accordance with the USFWS's "Conservation Guidelines for the Valley Elderberry Longhorn Beetle", dated July 1999.

The adverse effects on beetle habitat were determined, and compensation was proposed using the above referenced guidelines. Compensation for the 28 transplants would require 2.5 acres of new habitat, and consist of 303 elderberry seedlings and 303 associated native plantings. This compensation would take place on excess lands at an existing Corps mitigation site along the Feather River at the end of Anderson Avenue. The specific mitigation plan and location within the existing conservation area will be coordinated with USFWS prior to initiation of project construction.

In addition to the above proposed compensation, the following measures taken from the USFWS Conservation Guidelines, would be incorporated into the project to minimize further take to the VELB:

- A minimum setback of 100 feet from the dripline of all elderberry shrubs would be established, if possible. If the 100-foot minimum buffer zone is not possible, the next maximum distance allowable would be established. This area would be fenced, flagged, and maintained during construction. A biological monitor would provide instruction on establishing the buffer zones for the shrubs.
- Environmental awareness training would be conducted for all construction representatives and contractor personnel before they begin work. The training would include status, the need to avoid adversely affecting the elderberry shrub, avoidance areas and measures taken by the workers during construction, and contact information.

- Dust suppression measures would be used.
- Signs would be posted ever 50' along the edge of the avoidance area with the following information:  

"This area is the habitat of the valley elderberry longhorn beetle, a threatened species, and must not be disturbed. This species is protected by the Endangered Species Act of 1973, as amended. Violators are subject to prosecution, fines, and imprisonment."

Giant Garter Snake

Suitable habitat for GGS exists in Phases 1 and 3 of the Marysville Ring Levee project area within 50 feet of the levee toe. These habitats include the rice fields adjacent to both Phases. In addition, GGS could use the irrigation ditches and canals as a means to disperse throughout the project area. The banks of the rice fields, adjacent roads, and the levee provide additional basking habitat and refugia for the GGS.

Table 1 summarizes potential impacts to GGS habitat as a result of the proposed project.

**Table 1. Impacts to Giant Garter Snake Habitat.**

<b>Project Impact Area</b>	<b>Habitat Type</b>	<b>Area of Impact (acres) / Impact Type</b>
Phases 1 & 3	Rice field	1.05 / Temporary
	Drainage ditches / irrigation canals	-- / Not affected
	Upland	33.70 / Temporary
<b>Total temporary Impacts to giant garter snake upland habitat</b>		<b>33.70</b>

Because the total temporary impacted habitat area for the Marysville Ring Levee project is greater than 20 acres, this project does not qualify for inclusion in the *Programmatic Formal Consultation for US Army Corps of Engineers 404 Permitted Projects with Relatively Small Effects on the Giant Garter Snake within Butte, Colusa, Glenn, Fresno, Merced, Sacramento, San Joaquin, Solano, Stanislaus, Sutter and Yolo Counties, California* (Programmatic Agreement). The Corps proposes to implement the following measures from Appendix C of the Programmatic Agreement, *Standard Avoidance and Minimization Measures During Construction Activities in Giant Garter Snake (J'hamnophis gigas) Habitat*.

- 24-hours prior to construction activities, the project area will be surveyed for GGS.

- Exclusion fencing will be installed along the edge of the canal to prevent GGS from entering the area. The fencing should be at least 18 inches high and be able to completely block the snakes from entering the project area. The fence should be securely fastened to posts keeping the fence erect and the bottom of the fence should be buried into the ground. The fence should be checked/maintained daily to ensure that snakes don't enter into the project area.
- Construction personnel will receive USFWS-approved worker environmental awareness training to ensure that workers recognize GGS and their habitat.
- All vehicles on the levee road will maintain a speed limit of no greater than 15 miles per hour.
- Any dewatered habitat should remain dry for at least 15 consecutive days after April 15 and prior to excavating or filling of the dewatered habitat.
- 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.
- Report any snake sightings and any incidental take to the Service immediately by telephone at (916) 414-6600.
- After the completion of construction activities, remove any temporary fill and construction debris, and restore disturbed areas to pre-project conditions.

Furthermore, the Corps proposes to conduct post-construction restoration efforts on all affected GGS habitat. The restoration will be conducted via Appendix A of the Programmatic Agreement, *Guidelines for Restoration and/or Replacement of Giant Garter Snake Habitat*. The restored habitat will be monitored for one year following implementation. Monitoring reports documenting the restoration effort will be submitted to the service: (1) upon completion of the restoration implementation; and (2) one year from restoration implementation.

In addition, while the Corps anticipates all construction efforts to be completed by the close of the GGS active season window of October 1, the Corps requests permission to conduct soil erosion control activities after the close of the GGS season from October 1 to November 1 during the Phase 1 construction seasons in 2010 and 2011.

The Corps believes that with the implementation of all of the above proposed avoidance and minimization measures, including compensation for VELB habitat and restoration of the affected GGS habitat, the proposed Marysville Ring Levee improvements may affect, but are not

likely to adversely affect the VELB or GGS. Please let us know as soon as possible if you concur with the proposed extension. If you need any additional information, please contact Ms. Jane Rinck, Environmental Manager, at (916) 557-6715 or by e-mail: Jane.L.Rinck@usace.army.mil. Thank you for your attention to this matter.

Sincerely,



*C/* <sup>7</sup> Francis C. Piccola  
Chief, Planning Division

Enclosure

Copies Furnished:

Mr. Harry Kahler, U.S. Fish and Wildlife Service, 2800 Cottage Way, Sacramento, CA 95825

Mr. Doug Weimich, U.S. Fish and Wildlife Service, 2800 Cottage Way, Sacramento, CA 95825



# United States Department of the Interior



Sacramento Fish and Wildlife Office  
FISH AND WILDLIFE SERVICE

In Reply Refer To:  
81420-2010-F-0424-1

2800 Cottage Way, Room W-2605  
Sacramento, California 95825-1846

APR 13 2010

Ms. Alicia E. Kirchner  
Chief, Planning Division  
U.S. Army Corps of Engineers, Sacramento District  
1325 J Street  
Sacramento, California 95814-2922

Subject: Biological Opinion on the Proposed Marysville Ring Levee, Yuba River Basin Project, Yuba County, California

Dear Ms. Kirchner:

This letter is in response to the U.S. Army Corps of Engineers (Corps) request for formal consultation with the U.S. Fish and Wildlife Service (Service) on the proposed Marysville Ring Levee, Yuba River Basin Project (proposed project) in Yuba County, California. Your February 22, 2010, request was received in our office on February 23, 2010. The Service concurs with the Corps' determination that the proposed project may affect, is likely to adversely affect the federally-threatened valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) (beetle), and the federally-threatened giant garter snake (*Thamnophis gigas*) (snake). Although critical habitat has been designated for the beetle, none will be affected by the proposed project. No critical habitat has been designated for the snake. This document represents the Service's biological opinion on the effects of the action on the beetle and the snake and is provided pursuant to section 7(a)(2) of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act), and in accordance with the regulations governing interagency consultations (50 CFR §402).

The findings and recommendations in this biological opinion are based on: (1) the February 22, 2010, letter requesting formal consultation; (2) multiple site visits made to the proposed project area by the Service with the Corps; (3) multiple electronic mail (e-mail) and telephone conversations between the Service and the Corps; (4) the February, 2010, *Draft Marysville Ring Levee, Yuba River Basin, California, Environmental Assessment/Initial Study* by the Corps; and (5) other information available to the Service.

INAME . . . JF'''A

**BIOLOGICAL OPINION****Consultation History**

*July 10, 2009.* Doug Weinrich and Harry Kahler (Service) attended a site visit to Marysville with Jane Rinck, Lindsay Dembosz, and April Murazzo (Corps). Potential impacts from the proposed project to beetle habitat (i.e., elderberry shrubs) and to snake habitat were discussed.

*July 24, 2009.* The Corps provided the Service via e-mail proposed project footprint maps for the entire project area. The proposed project is to be completed in 4 phases over 4 summer seasons beginning in 2010.

*July 29, 2009.* Doug Weinrich and Harry Kahler (Service) attended another site visit with Jane Rinck, Lindsey Dembosz and April Murazzo (Corps). Elderberry shrubs and stems occurring in the Phase 2 portion of the proposed project were marked with metal tags and flagging and then tallied. Locations of the shrubs were recorded using a Trimble Global Positioning System (GPS) unit.

*August 20, 2009.* Doug Weinrich and Harry Kahler (Service) and Jane Rinck, Lindsey Dembosz and April Murazzo (Corps) located (via GPS) marked and tallied additional elderberry shrubs throughout the Phase 2 and Phase 3 portions of the proposed project.

*September 10, 2009.* Doug Weinrich and Harry Kahler (Service) and Jane Rinck, Lindsay Dembosz, and April Murazzo (Corps) attended another site visit to finalize the proposed project footprint throughout all Phases of the project. Richard Dirks (Project Manager/Civil Engineer of HDR, Inc.) also attended and subsequently developed the finalized project footprint plans.

*September 17, 2009.* The Corps met with the Service at the Service's Sacramento office to discuss acreages of affected habitat types throughout the proposed project given the finalized project footprint.

*September 18, 2009.* The Corps e-mailed to the Service maps with areas of affected snake habitat noted throughout Phase 1. Acreages of upland and wetland snake habitat were measured using a Geographic Information System (GIS) software program. The Service agreed with the acreage estimates provided by the Corps.

*October 5, 2009.* The Corps e-mailed to the Service a finalized project description for all phases, given the discussions on September 10, 2009, and since that meeting.

*October 21, 2009.* Based on the finalized project footprint and description, the Corps e-mailed to the Service electronic files outlining the requisite acreages for compensation. The Service replied in agreement with the acreage totals.

*February 23, 2010.* The Service received from the Corps a request to initiate formal consultation in accordance with section 7 of the Act.

*March 9, 2010.* Doug Weinrich and Harry Kahler (Service) and Jane Rinck, Lindsay Dembosz, April Murazzo, and Sid Jones (Corps) visited potential compensation sites for the proposed project at the Sacramento River Flood Control System Evaluation, Phase II (Marysville-Yuba City Area) compensation site. The site is approximately 8 miles downstream of Marysville along the Feather River in Yuba County, California.

### Proposed Project Description

The Yuba River Basin project was authorized by Congress in 1999 and included modifications to 6.1 miles of levee along the Yuba River, 10 miles of levee along the Feather River, and 5 miles of the Marysville Ring Levee. As part of the Yuba River Basin Investigation's geotechnical analysis, numerous levee deficiencies were identified around the Marysville Ring Levee. These investigations resulted in the proposed modification of 5 miles of the Marysville Ring Levee.

These modifications included the construction of slurry walls and stability berms. Additional studies during the detailed design phase resulted in updated and improved information indicating significant geotechnical concerns including levee under-seepage and through-seepage throughout the project area. Therefore, the Yuba River Basin project was not implemented. Currently, the Corps has initiated the General Reevaluation Report (GRR) to further study and address these problems along the Yuba and Feather rivers.

Although the Marysville Ring Levee was one of the original elements identified for improvement in the 1999 congressionally-authorized Yuba River Basin project, the Marysville Ring Levee portion was approved by the Corps in 2008 to be a separable element from the Yuba River Basin Investigation GRR. The Marysville Ring Levee design modifications to address under-seepage and through-seepage were not significantly modified from the 1999 authorized project, and is hydraulically separate from the rest of the Yuba River Basin project.

The proposed project is located in the southwestern portion of Yuba County (Appendix 1). The proposed project is part of an overall plan to enhance flood protection throughout the Yuba River Basin by addressing under-seepage and through-seepage of the levees that ring Marysville.

### *Phase 1*

**Features.** Phase 1 extends for approximately 5,000 linear feet, from stations 32+00 to 86+00 along the northwestern portion of the levee, encompassing 36.84 acres of total disturbed area. The proposed repair for this site involves construction of a 60 to 120 foot deep slurry wall on the levee crown and reshaping the waterside slope. East (E) 26th Street/Jack Slough Road would be closed for 14 days and the private driveway that meets the north end of Sampson Street would be temporarily rerouted during this time. Utility poles currently crossing the levee would be relocated by PG&E prior to construction. PG&E will secure any environmental compliance required for this effort.

**Construction Methods.** Phase 1 construction would include installing a 60 to 120 foot deep, 5,000 foot long slurry wall and reshaping the waterside slope.



**Slurry Wall Construction.** The levee crown would be degraded down 4 to 12 feet to provide a 40 to 55 foot temporary work surface for construction equipment. A large hydraulic excavator would dig a 4 foot wide, 250 to 1,000 foot long trench along the levee. There are then two methods to constructing the slurry wall: (1) the levee material would be removed from the trench and brought to a nearby location; mixed with the soil, Portland cement and bentonite clay (SCB); and then pumped back into trench, or (2) the trench is filled with the SCB slurry to stabilize the excavation sidewalls as digging occurs; after a section of the trench is dug, the SCB slurry is backfilled into the trailing end of the trench to form the slurry wall.

**Slope Reshaping Construction.** To reshape the waterside slope, material would be added to the slope and toe. The reshaping would push the current waterside toe out 10 feet and would change the waterside slope ratio from 2.5:1 to 3:1. Conventional construction equipment such as loaders, scrapers, graders, and excavators would be used to perform the degrading, reshaping, and other earthwork. No inwater work is proposed.

**Access and Staging.** The Phase 1 access roads would include the waterside toe of the levee, E 26<sup>h</sup> Street/Jack Slough Road, Sampson Street, Triplet Way, and Highway 70. Slurry wall construction would take place on the crown of the levee and reshaping construction would take place on the waterside slope.

Staging areas totaling approximately eight acres would be located north of the levee, west of Jack Slough Road, and approximately two acres adjacent to the Marysville High School sports fields. The existing use of this area is agriculture (row crops in 2009). Construction materials, equipment, topsoil, and excess material would be temporarily stored at the staging area during the construction period. A jobsite trailer would be established in this staging area, as would the construction workers' parking area. All construction supplies would be delivered to the staging area.

**Site Preparation.** All habitat areas (woodlands, individual trees, seasonal wetlands) outside of construction areas would be fenced off prior to the start of construction to limit public access, including the staging area. Temporary construction easements would be needed for the equipment working area. The easement on the landside toe would be 25 to 40 feet, while the easement on the waterside toe would be 25 to 50 feet. Concrete K-Rails would be installed prior to construction along the waterside temporary construction easement adjacent to the irrigation drainage ditch to prevent equipment from working near the banks of the ditch. Other temporary erosion control methods would be implemented to prevent soil from running onto adjacent properties.

The slopes and crown of the levee will be cleared and grubbed of all vegetation and surface material, including the existing levee maintenance road on the crown. This would total approximately 111,400 cubic yards of removed material.

**Restoration and Cleanup.** Once the levee work is complete, all equipment and excess materials would be transported offsite via neighborhood streets and regional highways. The barren earth and levee slopes would be regraded and seeded with a native grass seed mix to promote re-vegetation and minimize soil erosion. The access ramps and staging areas would also be restored

to pre-project conditions. Finally, the work sites and staging areas would be cleaned of all rubbish, and all parts of the work area would be left in a safe and neat condition suitable to the setting of the area. The procedures for restoration and clean-up are the same for all four phases.

**Borrow and Disposal Sites.** All disposal material would be temporarily stockpiled at the staging areas or disposed of at a commercial site or facility. The amount of unsuitable soil that would be disposed of is estimated to be 18,300 cubic yards. The amount of soil imported from a borrow site is estimated to be 78,400 cubic yards. The borrow and disposal areas would be within 12 miles of the project area. The contractor would be responsible for determining the location of borrow and disposal. If a site other than a commercial site is used, appropriate NEPA/CEQA documentation would be required. The Corps will review disposal and borrow sites and proposes to reinstate section 7 consultation with the Service on the proposed project if the disposal or borrow activities may affect federally-listed species.

There are five potential haul routes proposed for all material and equipment transportation: (1) Highway 70 to Triplett Way to the levee crown, (2) Sampson Street to the levee crown, (3) Jack Slough Road to the levee crown, (4) Highway 20 to the levee crown, and (5) the agriculture access road, north of the Ring Levee, to Jack Slough Road to the levee crown.

**Construction Workers and Schedule.** An estimated 25 to 30 workers would be onsite each day during construction. These workers would access the area via regional and local roadways, and park their vehicles at the northwest corner staging area. Construction hours would be limited to the hours from 7 a.m. to 7 p.m., seven days a week. Phase I would take approximately two construction seasons to complete. Construction would occur between August through October 1, 2010 and resume in July or August 2011 through October 1, 2011.

**Operation and Maintenance.** After construction is complete, responsibility for the project would be turned over to the State of California in conjunction with the Marysville Levee Commission, the non-Federal joint sponsors for the project. This would include operation, maintenance, repair, rehabilitation, and replacement of all project features. The Marysville Levee Commission would operate and maintain the levee. Regular maintenance activities would include mowing and spraying levee slopes, controlled burns, rodent control, clearance of maintenance roads, and levee inspections.

**Federally-listed Species Habitat.** There are no elderberry shrubs within 100 feet of the Phase I construction area and therefore the species is not likely to be adversely affected by Phase I construction. There is a drainage ditch near a portion of the waterside levee toe of the Phase I levee segment. The drainage ditch in some reaches supports a dense overstory of riparian habitat while other sections have emergent wetland species, such as cattails. This drainage ditch is considered potential giant garter snake aquatic habitat. The drainage ditch will not be affected by the project; however there will be construction activity in annual grassland areas and the levee within about 20 feet of the ditch. There is a 1.05-acre rice field adjacent to the drainage ditch that is potential aquatic snake habitat. This rice field will be fallowed in 2010 to allow unrestricted access to the construction area. There is a total of 33.7 acres of uplands within 200 feet of the drainage ditch and rice field that is considered potential upland habitat for the giant garter snake. All of the activities as described above are proposed to occur within this 33.7

acres; therefore, for the purposes of this formal consultation, the Service considers all of this upland habitat as being affected by the proposed project. All work will be conducted during the active period for the giant garter snake.

Since Phase 1 will be constructed first, the level of design is further along than the design of the subsequent phases. If design changes occur in Phases 2-4 that would affect federally-listed species beyond what is considered in this biological opinion, the Corps proposes to reinitiate section 7 consultation on the proposed project.

## ***Phase 2***

**Features.** Phase 2 would extend 8,700 feet on the southern portions of the levee (station 191+00 to 278+00), encompassing 53.64 acres of total disturbed area. The proposed repair for this site involves a 50 to 90 foot deep slurry wall on the waterside slope in three locations, jet grouting under four bridges, and a 70 foot deep secant pile wall on the levee crown in two locations.

**Construction Methods.** Phase 2 construction would include installing a 50 to 90 foot deep, slurry wall and a 70 foot deep secant pile wall. The secant pile wall would be used where buildings on the landside of the levee prevent installation of a slurry wall. Jet grouting will occur at the 5th Street Bridge, Highway 70 Bridge and at two railroad bridges on the southwest and southeast corners of the levee. Conventional construction equipment such as loaders, scrapers, graders, and excavators would be used to perform the degrading, reshaping, and other earthwork. For slurry wall construction methods, please see the Slurry Wall Construction section in the Phase 1 Construction Methods.

Secant Pile Wall Construction. A Secant Pile Wall system is a structural wall constructed of drilled foundation piles with overlapping reinforced concrete members. The levee crown would be degraded 4 to 12 feet to provide a 40 to 55 foot temporary working area for construction equipment. A 3- to 4-foot diameter hole would be drilled into the earth by a drill rig. This hole may be cased with a steel pipe which can be vibrated or oscillated into the ground at the perimeter of the hole. The borehole is backfilled with portland cement concrete using a concrete pump truck. Steel reinforcing may be added to provide additional strength. This requires a large crane to place the steel in the borehole. Secant piles may be anchored with steel tieback cables. If needed, they would be installed landward of the levee, and beneath buildings within a distance of 50 to 75 feet of the wall.

Jet Grouting Construction. Jet Grouting would be used to treat the ground in locations that are inaccessible to the other open trench methods. This method uses small drill rigs to bore holes in the soil. High-pressure, rotating water jets then inject SCB and water to form a soil-cement product.

**Access and Staging.** The Phase 2 access roads would be A Street, 2nd Street, and Levee Road for the secant pile wall construction; Bizz Johnson Drive for the slurry wall construction; and the levee crown and waterside toe for all construction including jet grouting.

Staging areas totaling approximately 10 acres would be located within Riverfront Park and an approximately three acre staging area would be located at the old sand pit. Construction materials, equipment, topsoil, and excess material would be temporarily stored at the proposed staging areas during the construction period, as well as provide parking for construction workers. All construction supplies would be delivered to the staging areas.

**Site Preparation.** Prior to construction, all construction areas would be fenced off to limit access, including the staging areas. A temporary construction easement of 20 to 100 feet from the waterside toe and a temporary construction easement of 10 to 25 feet from the landside toe would be needed for the equipment working area. Temporary erosion controls would be implemented on the waterside toe of the levee to prevent soils from running onto adjacent properties and into local waterways, as well as to separate the construction easement from the private residences near the site. Similar methods would be used around the staging areas.

The slopes and crown of the levee will be cleared and grubbed of all vegetation and surface material, including the existing levee maintenance road on the crown. This would total approximately 97,200 cubic yards of removed material.

**Restoration and Cleanup.** The procedures for restoration and clean-up are the same for all four sites. See the description of Restoration and Cleanup described in the Phase 1 section for details.

**Borrow and Disposal Sites.** All disposal material would be temporarily stockpiled at the staging areas or disposed of at a commercial facility within 12 miles of the project site. The contractor would be responsible for determining and providing certification of the condition on the disposal material. The amount of soil that would be disposed of is dependent upon how much the levee is degraded. The estimated amount of non-suitable soil would be 21,300 cubic yards. The estimated amount of soil imported from a borrow site is 44,000 cubic yards.

There are three potential haul routes proposed for all material and equipment transportation: (1) Highway 20 to 3rd Street to F Street to Bizz Johnson Drive to the waterside toe or the levee crown, (2) Highway 70 to 14th Street to the levee crown or (3) Bizz Johnson Drive, and Highway 70 to 3rd Street to A Street to the levee crown or to 2nd Street to the levee crown.

**Construction Workers and Schedule.** An estimated 30 to 50 workers would be onsite each day during construction. These workers would access the area via regional and local roadways, and park their vehicles at one of the staging areas identified. Construction hours would be limited daily to the hours from 7 a.m. to 7 p.m. seven days a week. Construction would start between June and August 2012 and end September or October 2012.

**Operation and Maintenance.** The procedures for operation and maintenance are the same for all four sites. See the description of Operation and Maintenance in the Phase 1 section for details.

**Federally-listed Species Habitat.** There is no suitable habitat for the giant garter snake in the vicinity of the proposed Phase 2 repairs. Surveys for elderberry shrubs in the vicinity of the Phase 2 work revealed the presence of 54 shrubs with stems measuring 1-inch or greater at

ground level. Seventeen of these shrubs were located 100 feet or more from proposed construction activities that will not be physically disturbed. Twenty-five shrubs would be directly affected; 24 of these would be transplanted to a conservation area along the Feather River, 1 shrub was identified as not transplantable as it has grown up through a cyclone fence. Effects to the 12 remaining shrubs can be avoided by vehicles by placing fencing at least 20 feet from the dripline of each shrub.

### *Phase 3*

**Features.** Phase 3 would extend for approximately 11,100 feet along the east and northeast portion of the levee (station 0+00 to 14+00 and station 298+00 to 394+00), encompassing 54.14 acres of total disturbed area. The proposed repair for this site would be a 50 to 110 foot deep slurry wall installed through the crown of the levee. This repair would require temporary road closures on Highway 20/Browns Valley Road, Simpson Lane, and Levee Road. Rerouting Highway 20 at its intersection with Levee Road may be required for approximately 7 working days at a time, depending on the method of construction. This would be accomplished by constructing temporary access roads or creating a detour around the city using other local roads. The Corps will review locations of temporary access roads and proposes to reinitiate section 7 consultation with the Service on the proposed project if construction and/or operation of these roads may affect federally-listed species.

**Construction Methods.** Phase 3 construction would consist of installing 50 to 110 foot deep slurry walls in two locations extending northeast from Ramirez Street/Simpson Lane. Conventional construction equipment such as loaders, scrapers, graders, and excavators would be used to perform the degrading, reshaping, and other earthwork. The slurry wall construction would proceed in the manner as outlined in Phase 1.

**Access and Staging.** Phase 3 access roads would be Ramirez Street/Simpson Lane to Levee Road for the southern slurry wall, Highway 20 to Levee Road for the northern slurry wall, and the waterside toe of the levee for the entire phase.

The staging areas would be approximately 13 acres and be located 250 feet out from the waterside toe of the levee, extending from stations 328+00 to 344+50 and from stations 388+00 to 394+41. During the construction period, construction materials, equipment, topsoil, and excess material would be temporarily stored at the staging areas. The staging areas would also provide parking for construction workers. All construction deliveries would be placed in the staging areas.

**Site Preparation.** Prior to construction, all construction areas would be fenced off to limit access, including the staging areas. A temporary construction easement of 12 to 40 feet and a localized lane shift of Highway 20 on the landside toe would be needed for the equipment working area. A temporary construction easement of 15 to 100 feet from the waterside toe would be needed for the equipment working area. Erosion control measures would be implemented on the landside and waterside toe of the levee to prevent soils from entering adjacent properties.

The slopes and crown of the levee will be cleared and grubbed of all vegetation and surface material, including the existing levee maintenance road on the crown. This would total approximately 78,200 cubic yards of removed material.

**Restoration and Cleanup.** The procedures for restoration and clean-up are the same for all four sites. The restoration and cleanup would proceed as outlined in the Phase 1 section.

**Borrow and Disposal Sites.** All disposal material would be temporarily stockpiled at the staging area or disposed of at a commercial facility within 12 miles of the project site. The contractor would be responsible for determining and providing certification of the condition on the disposal material. The amount of soil that would be disposed of is dependent upon how much the levee is degraded. The estimated amount of non-suitable soil would be 16,100 cubic yards. The amount of soil imported from a borrow site is 30,800 cubic yards.

There are three potential haul routes proposed: (1) Ramirez Street/Simpson Lane to Levee Road (crown of levee) for the southern slurry wall, (2) Highway 20 to Levee Road for the northern slurry wall, and (3) Levee Road between slurry wall construction sites and staging. The waterside toe of the levee would be used for access for duration of the entire phase. Construction of temporary access ramps would be necessary for equipment access from the landside slope to the crown of the levee.

**Construction Workers and Schedule.** An estimated 20 to 30 workers would be onsite each day during construction. These workers would access the area via regional and local roadways, and park their vehicles at the northeast corner staging area. Construction hours would be limited to the hours from 7 a.m. to 7 p.m., seven days a week. Construction would start between June and August 2013 and end in September or October 2013.

**Operation and Maintenance.** The procedures for operation and maintenance are the same for all four sites. See the description of Operation and Maintenance in the Phase 1 section for details.

**Federally-listed Species Habitat.** There is no suitable habitat for the snake in the vicinity of the proposed Phase 3 repairs. Surveys for elderberry shrubs in the vicinity of the Phase 3 work revealed the presence of 33 shrubs with stems measuring 1-inch or greater at ground level. Four shrubs would be directly affected and would be transplanted to a conservation area along the Feather River. The 29 remaining shrubs, more than 20 feet from construction areas, can be avoided by vehicles by placing fencing at least 10 feet from the dripline of each shrub. No elderberry shrubs exist within 100 feet of the temporary access ramps.

#### ***Phase 4***

**Features.** The proposed repair for Phase 4 would consist of the construction of two berms between the railroad trestles at Binney Junction. The construction site would extend approximately 15 feet out from the landside toe from station 121+00 to 137+00, encompassing about 17.38 acres of total disturbed area.

**Construction Methods.** Phase 4 construction would consist of two 7-foot tall seepage or stability berms. These berms would stabilize the levee by laterally retaining an existing railroad track and by resisting seepage uplift. The construction equipment required would be a loader, sheep foot roller, and small dozer.

**Access and Staging.** The Phase 4 access roads would be Highway 70 to the crown of the levee in the north, and 14th Street to the crown of the levee in the west. The staging area would be accessed by taking Highway 70 to 14th street to Ellis Lake Drive. The staging area would be located on the landside of the levee adjacent to the site and would be approximately 5 acres. Construction materials, equipment, topsoil, and excess material would be temporarily stored at the proposed staging area during the construction period. The staging area would also provide parking for construction workers. All construction deliveries will be placed in the staging area.

**Site Preparation.** Prior to construction, the staging area would be fenced off to limit access. Installation of the stability berms would require the site to be cleared and grubbed of all vegetation and surface material. This would total approximately 6,600 cubic yards of removed material. Coordination between the Corps and Union Pacific Railroad would need to occur to gain access to the entire site. A temporary access ramp for equipment and workers would need to be installed to facilitate access over the railroad tracks.

**Restoration and Cleanup.** The procedures for restoration and clean-up are the same for all four sites. See the description of Restoration and Cleanup described in the Phase 1 section for details.

**Borrow and Disposal Sites.** As with the previous Phases, all disposal material would be temporarily stockpiled at the staging area or disposed of at a commercial facility. The contractor would be responsible for determining and providing certification of the condition on the disposal material. Minimal material would be disposed of and the amount of soil imported from a borrow site would be approximately 8,500 cubic yards. The borrow and disposal areas are within 12 miles of the project area. The contractor would be responsible for determining the location of borrow and disposal. The proposed haul routes would be Highway 70 to the crown of the levee in the north or 14th Street to the crown of the levee in the west.

**Construction Workers and Schedule.** An estimated 10 to 20 workers would be onsite each day during construction. These workers would access the area via regional and local roadways, and park their vehicles at the staging area. Construction hours would be limited to the hours from 7 a.m. to 7 p.m., seven days a week. Construction activities are expected to begin between June and August 2013 and continue for approximately 12 to 16 weeks.

**Operation and Maintenance.** The procedures for operation and maintenance are the same for all four sites. See the description of Operation and Maintenance in the Phase 1 section for details.

**Federally-listed Species Habitat.** Currently there is no suitable habitat for giant garter snake or valley elderberry longhorn beetle in the vicinity of the construction area for Phase 4. This will be reconfirmed prior to construction.

## **Action Area**

The action area is defined in 50 CFR § 402.02 as, "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." For the Marysville Ring Levee project, this includes all areas subject to the direct effects associated with construction in each of 4 Phases: 36.84 acres in Phase 1; 53.64 acres in Phase 2; 54.14 acres in Phase 3; and 17.38 acres in Phase 4. The action area also includes the established disposal sites and travel pathways between these areas.

## **Conservation Measures**

The Corps has proposed the following conservation measures to avoid and minimize effects of the proposed project on the beetle and the snake. The conservation measures as proposed below are considered part of the proposed project evaluated by the Service in this biological opinion. Any change in these plans or their implementation that would trigger one of the criteria outlined in the closing statement of this opinion would require reinitiation of formal consultation with the Service.

### General conservation measures

1. A Service-approved biologist will identify boundaries of woodland habitat, individual trees and elderberry shrubs that are to be avoided and have the contractor fence the areas with orange construction fencing. Erosion control fencing will be placed at the edges of construction where the construction activities are upslope of wetlands and channels to prevent washing of sediments offsite. All fencing will be installed prior to any construction activities beginning and will be maintained throughout the construction period.
2. During construction operations, stockpiling of construction materials, portable equipment, vehicles, and supplies will be restricted to the designated construction staging areas. To eliminate an attraction to predators of listed species, all food-related trash items, such as wrappers, cans, bottles, and food scraps, will be disposed of in closed containers. Revegetation will occur on all areas temporarily disturbed during construction.
3. The number of access routes, number and size of staging areas, and the total area of the proposed project activity will be limited to the minimum necessary. Routes and boundaries will be clearly demarcated. Movement of heavy equipment to and from the project site will be restricted to established roadways to minimize habitat disturbance. Project-related vehicles will observe a 20-mile-per-hour speed limit within construction areas, except on county roads and on state and federal highways.

### Valley Elderberry Longhorn Beetle



1. A worker awareness training program for construction personnel will be conducted by a qualified biologist prior to beginning construction activities. The program will inform all construction personnel about the life history and status of the beetle, requirements to avoid damaging the elderberry plants, and the possible penalties for not complying with these requirements. Written documentation of the training by all personnel will be submitted to the Service within 30 days of its completion.
2. Pre-construction and post-construction surveys will be done of the elderberry shrubs in the project area. Pre-construction surveys are designed to detect elderberry shrubs that may have become established in the work areas since the original surveys. The post-construction survey will confirm that there was no additional damage to any of the elderberry shrubs than as described in this BO.
3. All areas to be avoided during construction activities will be fenced and flagged. In most cases, fencing will be placed at least 100 feet from the dripline of the shrub. In some cases, construction activity may be required within 100 feet of a shrub. In these cases, fencing will be placed at the greatest possible distance from the shrubs.
4. Transplant up to 28 elderberry shrubs with 110 stems between 1 and 3 inches, 21 stems between 3 and 5 inches and 14 stems greater than 5 inches at ground level, and provide additional plantings as described in Service's 1999 *Conservation Guidelines for the Valley Elderberry Longhorn Beetle* (Conservation Guidelines). See Table 1. Elderberry shrubs that require removal will be transplanted to a compensation area already established along the Feather River near the end of Anderson Road. Elderberry and associated native seedlings were established in 1996 for the Sacramento River Flood Control Project, Phase II compensation, and the site has been monitored for 10 years. Transplanting will occur during the transplantation window (approximately November through the first two weeks of February) identified in the Conservation Guidelines.
5. One additional shrub, with one stem between 1 and 3 inches and another stem greater than 5 inches at ground level, cannot be transplanted because it has grown within a chain-link fence. The compensation planting ratios outlined in the Conservation Guidelines for these stems would be doubled because the plant will be destroyed by the project. See Table 1.
6. Signs would be posted every 50 feet along the edge of the avoidance areas with the following information:

"This area is the habitat of the valley elderberry longhorn beetle, a threatened species, and must not be disturbed. This species is protected by the Endangered Species Act of 1973, as amended. Violators are subject to prosecution, fines, and imprisonment."
7. Dirt roadways and other areas of disturbed bare ground within 100 feet of elderberry shrubs will be watered at least twice a day to minimize dust emissions.

8. A Service-approved biologist (monitor) will be on-site for the duration of the transplanting of the elderberry shrubs to ensure that transplanting procedures outlined in the Conservation Guidelines are followed. The monitor will have the authority to stop work until corrective measures have been completed if those procedures are not being followed.

**Table 1:** Proposed compensation ratios based on location (riparian vs. non-riparian), stem diameter of affected elderberry plants at ground level, and presence or absence of exit holes if transplanted during the dormant season.

Location	Stems (maximum diameter at ground level)	Exit Hole on Shrub (Yes or No)	Elderberry Seedling Ratio	Associated Native Plant Ratio	Number of Stems Observed	Required Elderberry Plantings	Required Associated Native Plant Plantings
Total Elderberry shrubs to be transplanted						28	
Riparian	stems 2:1" & :3,,	No	2:1	1:1	89	178	178
Riparian	stems > 3" & <5"	No	3:1	1:1	8	24	24
Riparian	stems 2:5"	No	4:1	1:1	8	32	32
Non-riparian	stems 2:1" & :3,,	No	1:1	1:1	20	20	20
Non-riparian	stems >3" & <5"	No	2:1	1:1	13	26	26
Non-riparian	Stems 2:5"	No	3:1	1:1	5	15	15
Total Elderberry shrubs that can't be transplanted (2x mitigation)						1	
Non-riparian	stems 2:1" & :3,,	No	2:1	1:1	1	2	2
Non-riparian	Stems 2:5"	No	6:1	1:1	1	6	6
					145	303	303
303/5 = 60.6 valley elderberry longhorn units or 2.50 acres							

Giant Garter Snake

1. A worker awareness training program for construction personnel will be conducted by a qualified biologist prior to beginning construction activities. The program will provide workers with information on their responsibilities with regard to the snake, an overview of the life history of the snake, a description of measures to minimize potential for take of the snake, and an explanation of the possible penalties for not properly implementing

these measures. Written documentation of the training by all personnel will be submitted to the Service within 30 days of its completion.

2. All construction activity within snake habitat (i.e., upland areas within 200 feet of aquatic habitat), will be conducted between May 1 and October 1. This is the active period for the snake and direct mortality is lessened because snakes are expected to actively move and avoid danger. More danger is posed to snakes during their inactive period because they are occupying underground burrows or crevices and are more susceptible to direct effects, especially during excavation activities. If it appears that construction activity may need to extend beyond October 1, the project proponent(s) would contact the Service as soon as possible and no later than August 15 of that construction year to determine if additional measures are necessary to minimize take of the snake.
3. At least 30 days prior to initiating construction activities, the project proponents will submit the names and curriculum vitae of the biological monitor(s) for the project to the Service for review and approval.
4. Within 24 hours before beginning construction activities, areas within 200 feet of suitable aquatic habitat for giant garter snake will be surveyed by a qualified biologist. The biologist will provide the Service written documentation of the monitoring efforts within 48 hours after the survey is completed. Habitat will be re-inspected by the monitoring biologist whenever a lapse in construction activity of 2 weeks or greater occurs. The biologist will be present on-site during initial ground disturbance activities, including clearing and grubbing/stripping. The biologist will be available throughout the construction period and will conduct regular monitoring visits to ensure avoidance and minimization measures are being properly implemented.
5. The Corps will ensure the restoration of 33.7 acres of upland snake habitat temporarily affected during Phase 1 according to the *Guidelines for Restoration and/or Replacement of Giant Garter Snake Habitat* and the *Standard Avoidance and Minimization Measures During Construction Activities in Giant Garter Snake (Thamnophis gigas) Habitat*. All restoration will occur prior to October 1, 2010. The restoration of the 1.05 acres of affected aquatic snake habitat (the rice field in Phase 1) will occur by the subsequent reestablishment the following year of the rice field that had gone fallow during the Phase 1 construction period.

#### STATUS OF THE SPECIES AND ENVIRONMENTAL BASELINE

##### Valley Elderberry Longhorn Beetle

##### *Status of the Species*

##### Description

The beetle was listed as a threatened species under the Act on August 8, 1980 (45 FR 52803). Critical habitat for the species was designated and published in 50 CFR §17.95. Two areas along the American River in the Sacramento metropolitan area have been designated as critical habitat for the beetle. The proposed project is outside of the areas designated as critical habitat. An area along Putah Creek, Solano County, and the area west of Nimbus Dam along the American River Parkway, Sacramento County, are considered essential habitat, according to *The Valley Elderberry Longhorn Beetle Recovery Plan* (Service 1984).

### Life History

The elderberry shrub (*Sambucus* sp.) is the sole host plant for the valley elderberry longhorn beetle. Elderberries are locally common components of the remaining riparian forest and savannah landscapes, and to a lesser extent the mixed chaparral-foothill woodlands, of the Central Valley. The occupancy rates of the beetle are reduced in non-riparian habitats (e.g., Talley et al. 2007), indicating that riparian elderberry habitat is an important habitat type for the beetle.

Use of elderberry shrubs by the beetle, a wood borer, is rarely apparent. Frequently, the only exterior evidence of the shrub's use by the beetle is an exit hole created by the larva emerging. Observations of elderberry shrubs along the Cosumnes River and in the Folsom Lake area indicate that larval beetles can be found in elderberry stems with no apparent exit holes; the larvae either succumb prior to constructing an exit hole or are not developed sufficiently to construct one. Larvae appear to be distributed in stems which are 1.0 inch or greater in diameter at ground level and can occur in living stems. *The Valley Elderberry Longhorn Beetle Recovery Plan* (Service 1984) and Barr (1991) further describe the beetle's life history.

### Population Structure

The beetle is a specialist on elderberry plants, and tends to have small population sizes and occurs in low densities (Barr 1991; Collinge et al. 2001). It has been observed feeding upon both blue and red elderberry (Service 1984; Barr 1991) with stems greater than or equal to one inch in diameter (Barr 1991). Sightings of the beetle are rare and in most circumstances, evidence of the beetle is derived from the observation of the exit holes left when adults emerge from elderberry stems. The beetle tends to occur in areas with higher elderberry densities, but has lower exit hole densities than a closely related species, the California elderberry longhorn beetle (Collinge et al. 2001).

### Distribution and Range

When the beetle was listed in 1980, the species was known from less than ten localities along the American River, the Merced River, and Putah Creek. By the time the *Valley Elderberry Longhorn Beetle Recovery Plan* was prepared in 1984; additional occupied localities had been found along the American River and Putah Creek. As of 2005, the California Range wide distribution extends from the Sacramento River in Shasta County, southward to an area along Caliente Creek in Kern County (CNDDDB 2010). The California Natural Diversity Database (CNDDDB) contained 190 occurrences for this species in 44 drainages throughout the Central

the two areas, illustrating that elderberry shrubs likely replace themselves in these relatively undisturbed areas.

In the northern portion of the beetle's range along the Sacramento River and 13 of its tributaries (including lands in Butte, Placer, Sacramento, Shasta, Sutter, Tehama, Yolo and Yuba counties), the beetle occurs in drainages that function as distinct, relatively isolated metapopulations (Collinge et al. 2001). Half of the 14 drainages in the Sacramento Valley surveyed by Barr (1991) in 1991 and again by Collinge et al. (2001) in 1997 remained unoccupied in both studies. The beetle experienced extirpation in two drainages and neither were recolonized. Collinge et al. (2001) concluded that because of dispersal limitations, unoccupied drainages were likely to remain unoccupied and those where the resident beetle population became extirpated were not likely to be recolonized. One of the implications of their results for conservation was that there is little chance that natural populations would recover following declines (Collinge et al. 2001).

The increase in the amount of riparian habitat through restoration and compensation efforts is valuable, but remains small in comparison to estimated historic losses of the habitat. Katibah (1984) estimated that approximately 50,000 acres of existing riparian habitat has been protected in the Sacramento and San Joaquin Valley. In addition, approximately 5,000 acres of habitat has been restored for the benefit of the beetle (including planting of elderberries) and another 1,600 acres of riparian habitat has been restored however, no elderberry plantings were included (Talley et al. 2006). An undetermined amount of additional habitat has been restored as a result of compensation for projects that have undergone section 7 consultation. Despite the efforts of a number of agencies and organizations, the 5,000 acres of restoration activities is less than 1% of the estimated 890,000 acres of the historic riparian habitat lost in the Central Valley. Loss of the beetle and its habitat continues, including conversion of agricultural lands, urban development and other activities that are often unreported. The ability of restoration and enhancement of conservation sites to fully compensate for adverse effects to the beetle and its lost remnant natural habitat, is uncertain (Talley et al. 2007).

### Threats to the Species

The beetle continues to be threatened by habitat loss and fragmentation, predation by the non-native Argentine ants (*Linepithema humile*) (Holway 1998; Huxel 2000; Huxel and Hastings 1999; Huxel et al. 2001; Ward 1987), and possibly other factors such as pesticide drift, non-native plant invasion, improper burning regimes, off-road vehicle use, rip-rap bank protection projects, wood cutting, and over-grazing by livestock.

**Habitat Loss** - Habitat destruction is one of the most significant threats to the beetle. Riparian forests, the primary habitat for the beetle, have been severely depleted throughout the Central Valley over the last two centuries as a result of expansive agricultural and urban development (Huxel et al. 2001; Katibah 1984; Roberts et al. 1977; Thompson 1961). As of 1849, the rivers and larger streams of the Central Valley were largely undisturbed. They supported continuous bands of riparian woodland four to five miles in width along some major drainages, such as the lower Sacramento River, and generally about two miles wide along the lesser streams (Thompson 1961). Most of the riverine floodplains supported riparian vegetation to about the 100-year flood line (Katibah 1984).

A large human population influx occurred after 1849, however, and much of the Central Valley riparian habitat was rapidly converted to agriculture and used as a source of wood for fuel and construction to serve a wide area (Thompson 1961). The clearing of riparian forests for fuel and construction made this land available for agriculture (Thompson 1961). Natural levees bordering the rivers, once supporting vast tracts of riparian habitat, became prime agricultural land (Thompson 1961). As agriculture expanded in the Central Valley, needs for increased water supply and flood protection spurred water development and reclamation projects. Artificial levees, river channelization, dam building, water diversion, and heavy groundwater pumping further reduced riparian habitat to small, isolated fragments (Katibah 1984).

In recent decades, these riparian areas have continued to decline as a result of ongoing agricultural conversion as well as urban development and stream channelization. As of 1989, there were over 100 dams within the Central Valley drainage basin, as well as thousands of miles of water delivery canals and streambank flood control projects for irrigation, municipal and industrial water supplies, hydroelectric power, flood control, navigation, and recreation (Fraye et al. 1989). Riparian forests in the Central Valley have dwindled to discontinuous strips of widths currently measurable in yards rather than miles.

Some accounts state that the Sacramento Valley supported approximately 775,000 to 800,000 acres of riparian forest as of approximately 1848, just prior to statehood (Smith 1977; Katibah 1984). No comparable estimates are available for the San Joaquin Valley. Based on early soil maps, however, more than 921,000 acres of riparian habitat are believed to have been present throughout the Central Valley under pre-settlement conditions (Huxel et al 2001; Katibah 1984). Another source estimates that of approximately 5,000,000 acres of wetlands in the Central Valley in the 1850s, approximately 1,600,000 acres were riparian wetlands (Warner and Hendrix 1985; Frayer et al. 1989).

Based on a CDFG riparian vegetation distribution map, by 1979, there were approximately 102,000 acres of riparian vegetation remaining in the Central Valley. This represents a decline in acreage of approximately 89 percent as of 1979 (Katibah 1984). More extreme figures were given by Frayer et al. (1989), who reported that woody riparian forests in the Central Valley had declined to 34,600 acres by the mid-1980s (from 65,400 acres in 1939).

An even more recent analysis, completed by The Central Valley Historic Mapping Project, observed similar decreases in the amount of riparian habitat (Geographic Information Center 2003). Loss of riparian habitat between 1900 and 1990 in the Central Valley was about 96% in the southern portion of the Valley (Kem County to Fresno County) (16,000 acres remaining), 84% in the middle Valley (Merced County to San Joaquin County) (21,000 acres remaining) and 80% in the northern Valley (Sacramento and Solano counties to Shasta County) (96,000 acres remaining). Although these studies have differing findings in terms of the number of acres lost (most likely explained by differing methodologies), they attest to a dramatic historic loss of riparian habitat in the Central Valley.

**Habitat Fragmentation** - Destruction of riparian habitat in central California has resulted not only in a significant acreage loss, but also has resulted in beetle habitat fragmentation. Fahrig

(1997) states that habitat fragmentation is only important for habitats that have suffered greater than 80 percent loss. Riparian habitat in the Central Valley, which has experienced greater than 90 percent loss by most estimates, would meet this criterion as habitat vulnerable to effects of fragmentation. Existing data suggests that beetle populations, specifically, are affected by habitat fragmentation. Barr (1991) found that small, isolated habitat remnants were less likely to be occupied by beetles than larger patches, indicating that beetle subpopulations are extirpated from small habitat fragments. Barr (1991) and Collinge et al. (2001) consistently found beetle exit holes occurring in clumps of elderberry bushes rather than isolated bushes, suggesting that isolated shrubs do not typically provide long-term viable habitat for this species.

Habitat fragmentation can be an important factor contributing to species declines because: (1) it divides a large population into two or more small populations that become more vulnerable to direct loss, inbreeding depression, genetic drift, and other problems associated with small populations; (2) it limits a species' potential for dispersal and colonization; and (3) it makes habitat more vulnerable to outside influences by increasing the edge:interior ratio (Primack 1998).

Small, isolated subpopulations are susceptible to extirpation from random demographic, environmental, and/or genetic events (Shaffer 1981; Lande 1988; Primack 1998). While a large area may support a single large population, the smaller subpopulations that result from habitat fragmentation may not be large enough to persist over a long time period. As a population becomes smaller, it tends to lose genetic variability through genetic drift, leading to inbreeding depression and a lack of adaptive flexibility. Smaller populations also become more vulnerable to random fluctuations in reproductive and mortality rates, and are more likely to be extirpated by random environmental factors. When a sub-population becomes extirpated, habitat fragmentation reduces the chance of recolonization from any remaining populations. The effect of habitat fragmentation likely is exacerbated by the poor dispersal abilities of the beetle (Collinge et al. 2001; Talley 2005).

Habitat fragmentation not only isolates small populations, but also increases the interface between habitat and urban or agricultural land, increasing negative edge effects such as the invasion of non-native species (Huxel et al. 2001; Huxel 2000) and pesticide contamination (Barr 1991). The above edge effect-related factors may be related to the decline of the beetle.

**Predation** - The invasive Argentine ant (*Linepithema humile*) is a potential threat to the beetle (Huxel 2000). This ant is both an aggressive competitor and predator on native fauna that is spreading throughout riparian habitats in California and displacing assemblages of native arthropods (Ward 1987; Human and Gordon 1997; Holway 1998). The Argentine ant requires moisture and it may thrive in riparian or irrigated areas. A negative association between the presence of the ant and beetle exit holes was observed along Putah Creel in 1997 (Huxel 2000). This aggressive ant could interfere with adult mating or feeding behavior, or prey on eggs and larvae (e.g., Way et al. 1992). Surveys along Putah Creek found beetle presence where Argentine ants were not present or had recently colonized, but the beetle was absent from otherwise suitable sites where Argentine ants had become well-established (Huxel 2000). Between 1998 and 2002, the number of sites infested by the Argentine ant increased by 3 along Putah Creek and the American River (30 sites total were examined) (Huxel 2000; Holyoak and

Talley 2001). The Argentine ant has been expanding its range throughout California since its introduction around 1907, especially in riparian woodlands associated with perennial streams (Holway 1998; Ward 1987). Huxel (2000) concluded that, given the potential for Argentine ants to spread with the aid of human activities such as movement of plant nursery stock and agricultural products, this species may come to infest most drainages in the Central Valley along the valley floor, where the beetle is found.

The beetle is also likely preyed upon by insectivorous birds, lizards, and European earwigs (*Forficularia auricularia*) (Klasson et al. 2005). These three predators move freely up and down elderberry stems searching for food. The European earwig is a scavenger and omnivore that was often found feeding on tethered mealworm (*Tenebrio monitor*) larvae. The earwig may be common in riparian areas and it may lay its eggs in dead elderberry shrubs. The earwig, like the Argentine ant, requires moisture and is often found in large numbers in riparian and urban areas. Earwig presence and densities tended to be highest in mitigation sites likely because of the irrigation, although this needs to be statistically tested (Klasson et al. 2005).

**Pesticide Drift** - Direct spraying with pesticides and related pesticide drift is a potentially harmful factor for the beetle. A wide range of such spraying is done to control mosquitoes, crop diseases, and undesirable plants and insects. Although there have been no studies specifically focusing on the direct and indirect effects of pesticides on the beetle, evidence suggests that the species may be adversely affected by some pesticide applications. Commonly used pesticides within the range of the beetle include insecticides, most of which are broad-spectrum and likely toxic to the beetle; herbicides, which may harm or kill its host elderberry plants; and broad-spectrum pesticides toxic to many forms of life. The greatest pesticide use occurs in the San Joaquin Valley. According to the California Department of Pesticide Regulation (CDPR) (2006), four counties in this region had the highest use: Fresno, Kern, Tulare, and San Joaquin. The peak timing of application depends on the chemical agent and other factors including the activity period of the targeted pest insects; the use of the agents may coincide with the most vulnerable period of beetle adult activity, egg-laying and initial larval exposure on the outside of elderberry stems (Talley et al. 2006). The CDPR in 1997 listed 239 pesticide active ingredients applied in proximity to locations of beetle (CDPR 2006) (same square mile per Marovich and Kishaba 1997 cited in Talley et al. 2006). Pesticide active ingredients sold in California have averaged on the order of 600 million pounds per year since about 1998 (CDPR 2006).

Pesticide use reported to the CDPR is only a fraction of the pesticides sold in California each year. About two-thirds of the active ingredients sold in a given year are not subject to use reporting, including home-use pesticide products. Recent studies of major rivers and streams documented that 96 percent of all fish, 100 percent of all surface water samples and 33 percent of major aquifers contained one or more pesticides at detectable levels (Gilliom 1999). Pesticides were identified as one of the 15 leading causes of impairment for streams included on the Clean Water Act section 303(d) lists of impaired waters. Because the beetle occurs primarily in riparian habitat, the contamination of rivers and streams likely has effects on this species and its habitat. Given the amount and scope of pesticide use, along with unreported household and other uses, and the proximity of agriculture to riparian vegetation in the Central Valley, it appears likely that pesticides are affecting the beetle and its elderberry habitat.



**Invasive Plant Species** - Invasive exotic plant species may significantly alter the habitat of the beetle. Without adequate eradication and control measures these non-native species may eliminate elderberry shrubs and other native plants. Pest plants of major importance in Central Valley riparian systems include black locust (*Robinia pseudoacacia*), giant reed (*Arundo donax*), red sesbania (*Sesbania punicea*), Himalaya blackberry (*Rubus armeniacus*), tree of heaven (*Ailanthus altissima*), Spanish broom (*Spartium junceum*), Russian olive (*Eleagnus angustifolia*), edible fig (*Ficus carica*), and Chinese tallowtree (*Sapium sebiferum*). Non-woody invasives such as ripgut brome (*Bromus diandrus*), foxtail barley (*Hordeum murinum*), Italian rye grass (*Lolium multiflorum*), and starthistle/knapweed (*Centaurea* spp.) also may impair elderberry germination or establishment, or elevate the risk of fire. Invasive plant control efforts often are limited by funding, labor, coordination with landowners, and the resilience and spread of their target plants. No rangewide assessment has been completed on the overall degree of impact of invasive plants on the beetle and its habitat. However, there are a number of local efforts to control invasive riparian plant species. For example, the American River Parkway has invasive species removal efforts by Sacramento Weed Warriors (a community stewardship project associated with the California Native Plant Society) and others, and the Cosumnes River Preserve has a group of volunteers who regularly remove exotics and restore native habitats (Talley et al. 2006).

**Other Threats** - Several other factors may threaten the beetle including fire, flooding, and overgrazing by livestock. The condition of elderberry shrubs can be adversely affected by fire, which is often common at the urban-wildland interface. Brush fires initially have a negative effect on shrub condition and, therefore, beetle larvae through direct burning and stem die-off. A year after fire, however, surviving elderberry resprout and display rapid stem growth (Crane 1989). Fires often scarify the hard elderberry seed coat leading to germination of seedlings the following season (Crane 1989). Frequent or repeated fire, however, may kill remaining shoots, root crowns and seeds, causing elderberry to be eliminated from an area for many years since recruitment by seeds is patchy and generally slow (Crane 1989). Elderberry shrubs appeared suitable for the beetle two to six years after burning, but were often uninhabited, with the presence of old, burned exit holes suggesting pre-burn occupancy and post-burn vacancy (Talley et al. 2006.). The post-fire lag in occupancy is likely the result of the limited movements of the beetle. Beetle occupancy occurred six to seven years post burn and, as in the alluvial plain of the American River Parkway, is about the same within the post-burn compared with unburned areas (Talley et al. 2007). No quantitative studies of the net effects of fire on the valley elderberry longhorn beetle have been undertaken (e.g., examining beetle and elderberry through time after burns or in areas with varying burn frequencies and magnitude).

The beetle can tolerate flooding of its riparian habitat. The animal has higher occupancy rates in riparian than non-riparian habitats, and associations between the beetle and proximity to rivers were either not observed or there was a weak positive correlation with nearness to the river (Halstead and Oldham 1990; Talley 2005; Talley et al. 2007). These findings illustrate that the beetle is not likely harmed by flooding and that higher habitat quality may be associated with rivers. In addition, if elderberry, a facultative riparian shrub, can withstand flooding, then the beetle likely will survive these events. Most floods occur during winter or early spring when the beetle is in its early life history stages, so that the effects of floods are even less likely to affect the beetle. If the shrub is exposed to prolonged flooding (i.e., anoxia) and becomes severely

stressed, then the beetle may be affected. The duration and magnitude of flooding at which elderberry stress occurs is uncertain and the levels of stress that affect the beetle are also unknown. Elderberry shrubs have adaptations that plants use to persist with flooding such as lenticels and aerenchyma, demonstrating that it is probably at least somewhat flood tolerant. Finally, if an area is flooded too frequently so that elderberry cannot survive then no beetles would be able to inhabit the area (Talley 2005).

Another potential factor in the beetle's decline is the effects of inappropriate levels of livestock grazing, which can result in destruction of entire elderberry plants and inhibition of elderberry regeneration. Cattle, sheep and goats readily forage on new elderberry growth, and goats will consume even decadent growth. Well-manicured stands of elderberries, such as occurs due to livestock grazing, have generally been shown to have a relative absence of beetles (Service 1984). The effects on the beetle of both grazing and exotic plant invasions are likely significantly exacerbated by the problem of habitat fragmentation of elderberries. Such fragmentation increases the edge:interior ratio of habitat patches, thereby facilitating the adverse effects of these outside influences.

### *Environmental Baseline*

Status of the species within the Action Area – There are no known occurrences of the beetle within the Action Area. The Action Area is fairly isolated from other populations, primarily along the Sacramento River, although a few occurrences exist along the Yuba and Feather Rivers, which run adjacent to the Action Area.

Factors Affecting the beetle within the Action Area - A number of State, local, private, and unrelated Federal actions have occurred within the Action Area affecting the environmental baseline of the species. Numerous development projects have been constructed in or near beetle habitat in the Action Area in this rapidly urbanizing area. All of the land inside the ring levee has been developed, primarily with houses and municipal facilities. Very little riparian habitat which can serve as dispersal corridors for beetles currently exists along the ring levee.

Evidence of the beetle, in the form of exit holes, has been found along the Feather River within 5 to 6 miles of the proposed project area. Elderberry shrubs with stems one inch or greater in diameter that provide suitable habitat are found in and adjacent to the action area. The Action Area contains components that can be used by the beetle for feeding, resting, mating, and other essential behaviors. Therefore, the Service believes that the valley elderberry longhorn beetle is reasonably certain to occur within the action area because of the biology and ecology of the animal, the presence of suitable habitat in and adjacent to the action area, as well as recent observations of this listed species.

### **Giant Garter Snake**

#### *Status of the Species*

Listing - The Service published a proposal to list the giant garter snake as an endangered species on December 27, 1991 (56 **FR** 67046). The Service reevaluated the status of the snake before

adopting the final rule. The snake was listed as a threatened species on October 20, 1993 (58 FR 54053).

Historical and Current Range - Giant garter snakes formerly occurred throughout the wetlands that were extensive and widely distributed in the Sacramento and San Joaquin Valley floors of California (Fitch 1940; Hansen and Brode 1980; Rossman & Stewart 1987). The historical range of the snake is thought to have extended from the vicinity of Chico, Butte County, southward to Buena Vista Lake, near Bakersfield, in Kern County (Fitch 1940; Fox 1948; Hansen and Brode 1980; Rossman and Stewart 1987). Early collecting localities of the giant garter snake coincide with the distribution of large flood basins, particularly riparian marsh or slough habitats and associated tributary streams (Hansen and Brode 1980).

Loss of habitat due to agricultural activities and flood control have extirpated the snake from the southern one third of its range in former wetlands associated with the historic Buena Vista, Tulare, and Kern lake beds (Hansen and Brode 1980; Hansen 1980). By 1971, so much wetland habitat had been reclaimed, that the CDFG classified the giant garter snake as a rare animal and conducted a series of field surveys. The results of these surveys indicate that snake populations were distributed in marsh wetlands, tributary streams, and portions of the rice production zones of the Sacramento Valley in Butte, Glenn, Colusa, Sutter, Yolo and Sacramento Counties, in the Delta region along the eastern fringes of the Sacramento-San Joaquin River Delta in Solano, Contra Costa, Sacramento, and San Joaquin Counties, and in the San Joaquin Valley in San Joaquin, Stanislaus, Merced, Mendota, and Fresno Counties (Hansen & Brode 1980; Hansen 1988).

Upon Federal listing in 1993, the Service identified 13 separate populations of giant garter snakes, with each population representing a cluster of discrete locality records (Service 1993). A population is a group of organisms that interbreed and share a gene pool. The boundaries of a population, both in space and time, are generally not discrete and, in practice, are usually defined by the researcher (Krebs 1994). The gene pool and breeding patterns of the 13 giant garter snake populations identified in the final rule remain unstudied and unknown. What was described as "13 populations" should therefore be described more accurately as sub-populations and occurrences that note observations of individuals about which much remains unknown (Service 2003). The 13 populations largely coincide with historical flood basins and tributary streams throughout the Central Valley: (1) Butte Basin, (2) Colusa Basin, (3) Sutter Basin, (4) American Basin, (5) Yolo Basin/Willow Slough, (6) Yolo Basin/Liberty Farms, (7) Sacramento Basin, (8) Badger Creek/Willow Creek, (9) Caldoni Marsh/White Slough, (10) East Stockton--Diverting Canal & Duck Creek, (11) North and South Grasslands, (12) Mendota, and (13) Butte-Tulare.

Surveys over the last 25 years suggest that sub-populations of giant garter snake in the northern parts of its range, (Butte, Colusa, and Sutter Counties) are relatively large and stable (Wylie et al. 1997; Wylie et al. 2003a). However, habitat corridors connecting sub-populations are either not present or not protected, and urban encroachment increases as a serious threat (Service 2003). Sub-populations in Yolo, Sacramento, Solano, and San Joaquin Counties are small, fragmented, and threatened by urbanization (Service 2003; Hansen 2004). Those sub-populations in the San Joaquin Valley, however, are most vulnerable having suffered near-devastating declines and

possible extirpations over the last two decades (including populations in Stanislaus, Merced, Madera and Fresno Counties) (Hansen 1988; Dickert 2002, 2003; Williams & Wunderlich 2003). These sub-populations are extremely small, distributed discontinuously in isolated patches, and therefore are highly vulnerable to extinction by random environmental, demographic, and genetic processes (Goodman 1987).

Description - The giant garter snake is one of the largest garter snake species reaching a total length of approximately 64 inches (162 centimeters). Females tend to be slightly longer and proportionately heavier than males. The weight of adult female snakes is typically 1.1-1.5 pounds (500-700 grams). Dorsal background coloration varies from brown to olive with a cream, yellow, or orange dorsal stripe and two light colored lateral stripes. Some individuals have a checkered pattern of black spots between the dorsal and lateral stripes. Background coloration and prominence of the checkered pattern and three yellow stripes are geographically and individually variable; individuals in the northern Sacramento Valley tend to be darker with more pronounced mid-dorsal and lateral stripes (Hansen 1980; Rossman et al. 1996). Ventral coloration is variable from cream to orange to olive-brown to pale blue with or without ventral markings (Hansen 1980).

Essential Habitat Components - Endemic to wetlands in the Sacramento and San Joaquin valleys, the giant garter snake inhabits marshes, sloughs, ponds, small lakes, low gradient streams, and other waterways and agricultural wetlands, such as irrigation and drainage canals, rice fields and the adjacent uplands (Service 2003). The snake feeds on small fishes, tadpoles, and frogs (Fitch 1941; Hansen and Brode 1980, Hansen 1988; Hansen and Brode 1993). Essential habitat components consist of: (1) wetlands with adequate water during the snake's active season (early-spring through mid-fall) to provide food and cover, (2) emergent, herbaceous wetland vegetation, such as cattails and bulrushes, for escape cover and foraging habitat during the active season, (3) upland habitat with grassy banks and openings in waterside vegetation for basking, and (4) higher elevation uplands for over-wintering habitat with escape cover (vegetation, burrows) and underground refugia (crevices and small mammal burrows)(Hansen 1988). Snakes are typically absent from larger rivers and other bodies of water that support introduced populations of large, predatory fish, and from wetlands with sand, gravel, or rock substrates (Hansen and Brode 1980, Hansen 1988; Rossman and Stewart 1987). Riparian woodlands do not provide suitable habitat because of excessive shade, lack of basking sites, and absence of prey populations (Hansen 1988).

Foraging Ecology - Giant garter snakes are the most aquatic garter snake species and are active foragers, feeding primarily on aquatic prey such as fish and amphibians (Fitch 1941). Historically, giant garter snake prey likely consisted of Sacramento blackfish (*Orthodon microlepidots*), thick-tailed chub (*Gila crassicauda*), and red-legged frog (*Rana aurora*) (Rossman et al. 1996; Service 2003). Because these prey species are no longer available (chub extinct, red-legged frog extirpated from the Central Valley, blackfish declining) the predominant food items are now introduced species such as carp (*Cyprinus carpio*), mosquito-fish (*Gambusia affinis*), larval and sub-adult bullfrogs (*Rana catesbiana*), and Pacific chorus frogs (*Pseudacris regilla*) (Fitch 1941, Hansen and Brode 1993; Rossman et al. 1996).

Reproductive Ecology - The giant garter snake breeding season extends through March and April, and females give birth to live young from late July through early September (Hansen and Hansen 1990). Brood size is variable, ranging from 10 to 46 individual young, with a mean of 23 individuals (Hansen and Hansen 1990). At birth, young average about 8.1 inches (20.6 centimeters) snout-to-vent length and 3-5 grams. Although growth rates are variable, young typically more than double in size by one year of age, and sexual maturity averages three years in males and five years for females (Service 1993).

Movements and Habitat Use - The giant garter snake is highly aquatic but also occupies a terrestrial niche (Service 2003). Aquatic habitat includes remnant native marshes and sloughs, restored wetlands, low gradient streams, and agricultural wetlands including rice fields and irrigation and drainage canals. Terrestrial habitat includes adjacent uplands which provide areas for basking, retreats and over-wintering. Basking takes place in tules, cattails, saltbush, and shrubs over-hanging the water, patches of floating vegetation including waterweed, on rice checks, and on grassy banks (Service 2003). The snake typically inhabits small mammal burrows and other soil and/or rock crevices during the colder months of winter (i.e., October to April) (Hansen and Brode 1993; Wylie et al. 1996). It also uses burrows as refuge from extreme heat during its active period (Wylie et al. 1997). While individuals usually remain in close proximity to wetland habitats, the Biological Resource Division of the U.S. Geological Survey (BRD) has documented snakes using burrows as much as 165 feet (50 meters) away from the marsh edge to escape extreme heat, and as far as 820 feet (250 meters) from the edge of marsh habitat for over-wintering habitat (Wylie et al. 1997; Wylie et al. 2003a). Snakes typically select burrows with sunny exposures along south and west facing slopes (Service 1993).

In studies of marked snakes in the Natomas Basin, snakes moved about 0.25 to 0.5 miles (0.4 to 0.8 kilometers) per day (Hansen and Brode 1993). Home range (area of daily activity) averages about 0.1 miles<sup>2</sup> (25 hectares) in both the Natomas Basin and Colusa NWR (Wylie 1998; Wylie et al. 2002). Total activity varies widely between individuals; however, individual snakes have been documented moving up to 5 miles (8 kilometers) over a few days in response to dewatering of habitat, and snake home range has been shown to be as large as 14.5 square miles (3744 hectares) (Wylie et al. 1997; Wylie and Martin 2004).

In agricultural areas, snakes were documented using rice fields in 19-20 percent of the observations, marsh habitat in 20-23 percent of observations, and canal and agricultural waterway habitats in 50-56 percent of the observations (Wylie 1999). In the Natomas Basin, habitat used consisted almost entirely of irrigation ditches and established rice fields (Wylie 1998). In the Colusa NWR, snakes were regularly found on or near edges of wetlands and ditches with vegetative cover (Wylie et al. 2003a). Telemetry studies also indicate that active snakes use uplands extensively; more than 31 percent of observations were in uplands (Wylie 1999). Snakes observed in uplands during the active season were consistently near vegetative cover, particularly where cover exceeded 50 percent in the area within 1.6 ft (0.5 m) of the snake (Wylie 1999).

Predators - Giant garter snakes are eaten by a variety of predators, including raccoons (*Procyon lotor*), striped skunks (*Mephitis mephitis*), opossums (*Didelphis virginiana*), bullfrogs (*Rana catesbiana*), hawks (*Buteo* sp.), egrets (*Casmerodius albus*, *Egretta thula*), and great blue herons

(*Ardea herodias*) (Service 2003; Dickert 2003; Wylie et al. 2003b). Many areas supporting snakes have been documented to have abundant predators; however, predation does not seem to be a limiting factor in areas that provide abundant cover, high concentrations of prey items, and connectivity to a permanent water source (Hansen and Brode 1993; Wylie et al. 1996).

Reasons for Decline and Threats to Survival - The current distribution and abundance of the giant garter snake is much reduced from former times (Service 2003). Less than 10 percent of the historic 4.5 million acres (1.8 million hectares) of Central Valley wetlands remain, approximately 319,000 acres (129,000 hectares) (USDOI 1994), of which very little currently provides habitat suitable for the giant garter snake. Loss of habitat due to agricultural activities and flood control have extirpated the snake from the southern one-third of its range. Cattail and bulrush floodplain habitat historically typified much of the Sacramento Valley (Hinds 1952). Prior to reclamation activities beginning in the mid- to late-1800s, about 60 percent of the Sacramento Valley was subject to seasonal overflow flooding providing expansive areas of snake habitat (Hinds 1952). Valley flood wetlands are now subject to cumulative effects of upstream watershed modifications, water storage and diversion projects, as well as urban and agricultural development.

The Central Valley Project (CVP), planned by the State of California, and built and operated by the Federal Bureau of Reclamation, is the largest water management system in California. The CVP and the historic water development activities that preceded it have not only resulted in the loss of all but approximately 10 percent of wetlands, they have created an ecosystem altered to such an extent that remaining wetlands, including agriculture, depend on managed water (USDOI 1994). The historic disturbance events associated with seasonal inundation that occur naturally in dynamic riverine, riparian, and wetland ecosystems have been largely eliminated. In addition to the highly managed water regimes, implementation of CVP has resulted in conversion of native habitats to agriculture, and has facilitated urban development throughout the Central Valley (Service 2003). In 1992, Congress enacted the Central Valley Project Improvement Act (CVPIA), the principal concerns of which include pricing and management of Central Valley water and attempting to mitigate for the fish, wildlife, and associated habitat impacts of the project. CVPIA, however, has been largely ineffective, addressing primarily only the water needs of publicly-owned wetlands, which account for less than one-fourth of the wetlands in the Central Valley (Service 2003).

Ongoing maintenance of aquatic habitats for flood control and agricultural purposes eliminates or prevents the establishment of habitat characteristics required by snakes (Hansen 1988). Such practices can fragment and isolate available habitat, prevent dispersal of snakes among habitat units, and adversely affect the availability of the snake's food items (Hansen 1988; Brode and Hansen 1992). For example, tilling, grading, harvesting and mowing may kill or injure giant garter snakes (Service 2003). Biocides applied to control aquatic vegetation reduce cover for the snake and may harm prey species (Wylie et al. 1996). Rodent control threatens the snake's upland estivation habitat (Wylie et al. 1996). Restriction of suitable habitat to water canals bordered by roadways and levee tops renders snakes vulnerable to vehicular mortality (Wylie et al. 1997). Materials used in construction projects (e.g., erosion control netting) can entangle and kill snakes (Stuart et al. 2001). Livestock grazing along the edges of water sources degrades water quality and can contribute to the elimination and reduction of available quality snake

habitat (Hansen 1988). Fluctuation in rice and agricultural production affects stability and availability of habitat (Wylie and Casazza 2001).

Other land use practices also currently threaten the survival of the snake. Recreational activities, such as fishing, may disturb snakes and disrupt basking and foraging activities. Nonnative predators, including introduced predatory game fish, bullfrogs, and domestic cats, can threaten snake populations (Wylie et al. 1996; Dickert 2003; Wylie et al. 2003b). While large areas of seemingly suitable snake habitat exist in the form of duck clubs and waterfowl management areas, water management of these areas typically does not provide the summer water needed by the species. Degraded water quality continues to be a threat to the species both on and off refuges.

The Central Valley is among the most endangered ecosystems due to its fertile soils, amiable climates, easy terrains, and other factors that historically have encouraged human settlement and exploitation (Noss et al. 2003). Environmental impacts associated with urbanization include loss of biodiversity and habitat, alteration of natural fire regimes, fragmentation of habitat from road construction, and degradation due to pollutants (Service 2003). Rapidly expanding cities within the snake's range include Chico, Yuba City, the Sacramento area, Galt, Stockton, Gustine, and Los Banos.

Status with Respect to Recovery - The revised draft recovery plan for the giant garter snake subdivides its range into three proposed recovery units (Service 2003): (1) Northern Sacramento Valley Recovery Unit, (2) Southern Sacramento Valley Recovery Unit, and (3) San Joaquin Valley Recovery Unit.

The Northern Sacramento Valley Unit at the northern end of the species' range contains sub-populations in the Butte Basin, Colusa Basin, and Sutter Basin (Service 2003). Protected snake habitat is located on state refuges and refuges of the Sacramento National Wildlife Refuge (NWR) Complex in the Colusa and Sutter Basins. Suitable snake habitat is also found in low gradient streams and along waterways associated with rice farming. This northern most recovery unit is known to support relatively large, stable sub-populations of giant garter snakes (Wylie et al. 1996; Wylie et al. 2002). Habitat corridors connecting subpopulations, however, are either not present or not protected.

The Southern Sacramento Valley Unit includes sub-populations in the American Basin, Yolo Basin, and Delta Basin (Service 2003). The status of Southern Sacramento Valley sub-populations is very uncertain; each is very small, highly fragmented, isolated, and threatened by urbanization (Service 2003; Hansen 2004). The American Basin sub-population, although also threatened by urban development, receives protection from the Metro Air Park and Natomas Basin habitat conservation plans (HCP), which share a regional strategy to maintain a viable snake sub-population in the Natomas Basin.

The San Joaquin Valley Unit includes sub-populations in the San Joaquin Basin and Tulare Basin. The San Joaquin Valley Unit formerly supported large snake populations, but numbers have severely declined, and recent survey efforts indicate numbers are extremely low compared to Sacramento Valley sub-populations (Wylie 1998; Dickert 2002). Giant garter snakes

currently occur in the northern and central San Joaquin Basin within the Grassland Wetlands, in North and South Grasslands, Mendota Area, and Burrell/Lanare Area. Agricultural and flood control activities are presumed to have extirpated the snake from the Tulare Basin (Hansen 1995); however, comprehensive surveys for this area are lacking and where habitat remains, the giant garter snake may be present (Service 2003).

Since 1995, BRD has been studying life history and habitat requirements of the giant garter snake within a few of the "13 populations" identified in the listing. BRD has studied snake sub-populations at the Sacramento, Delevan, and Colusa NWRs, in the Colusa Basin Drain within the Colusa Basin, at Gilsizer Slough within the Sutter Basin, at the Badger Creek area of the Cosumnes River Preserve within the Badger Creek/Willow Creek area, and in the Natomas Basin within the American Basin, (Wylie et al. 1996, 2002, 2003a, 2004; Wylie 1998, 1999, 2003; Hansen 2003, 2004), which represent the largest extant giant garter snake sub-populations. Outside of protected areas, however, snakes are still subject to all threats identified in the final rule. The other sub-populations are distributed discontinuously in small, isolated patches, and are vulnerable to extirpation by stochastic environmental, demographic, and genetic processes (Goodman 1987).

Until recently, there were no post-1980 sightings of giant garter snakes from Stockton southward, and surveys of historic localities conducted in 1986 did not detect any snakes (Hansen 1988). Since 1995, however, surveys conducted by CDFG in cooperation with BRD around Los Banos and Volta Wildlife Area in the Grasslands, and Mendota Wildlife Area in the Mendota Area have detected snakes, but in small numbers much lower than those found in Sacramento Valley sub-populations (Wylie 1998; Dickert 2002, 2003; Williams & Wunderlich 2003). The estimated total population size for Volta Wildlife Area is 45 individuals, approximately only 3.5 snakes per kilometer. Such low numbers are suggestive of a tenuously small snake population. Also, one-third of the giant garter snakes found had lumps on their bodies suggestive of a parasitic nematode infection (Dickert 2003); further study is underway. Ten of the 31 snakes found in 2003, however, weighed less than 40 grams indicating that giant garter snakes have been breeding at Volta Wildlife Area. These results demonstrate that giant garter snakes are still extant in the northern San Joaquin Valley, but probably in extremely low numbers/densities. All sub-populations are isolated from each other with no protected dispersal corridors. Opportunities for re-colonization of small sub-populations that may become extirpated are unlikely given the isolation from larger populations and lack of dispersal corridors between them.

The revised draft recovery criteria require multiple, stable sub-populations within each of the three recovery units, with sub-populations well-connected by corridors of suitable habitat. This entails that corridors of suitable habitat between existing snake sub-populations be maintained or created to enhance sub-population interchange to counter threats to the species (Service 2003). Currently, only the Northern Sacramento Valley Recovery Unit is known to support relatively large, stable giant garter snake sub-populations. Habitat corridors connecting sub-populations, even for the Northern Sacramento Valley Recovery Unit, are either not present or not protected. Overall, the future availability of habitat in the form of canals, ditches, and flooded fields are subject to market-driven crop choices, agricultural practices, and land use, and are, thus, uncertain and unpredictable.



### *Environmental Baseline*

Status of the species within the Action Area - The proposed project is located within the American Basin snake population, in the Southern Sacramento Valley Recovery Unit (Service 2003). Fifty-nine CNDDDB (2010) locality records are known from the American Basin. These locality records include the Natomas Basin, Bear River and associated tributaries, the Middle-American Basin just north of the Natomas Cross Canal, as well as other locations within this basin.

The distribution of the snake in Yuba County is not well known. A search of the CNDDDB (2010) indicates one locality record known from Yuba County, located 3.7 miles (6 km) to the south of the proposed project site, just south of Bear River and east of SR 70. While the CNDDDB indicates that snakes are widely distributed throughout the southern part of the American Basin, few records exist for the northern part of the American Basin (CNDDDB 2010). This paucity of records, however, may reflect a lack of survey efforts rather than absence of the species.

Factors Affecting the Snake within the Action Area - A number of State, local, private, and unrelated Federal actions have occurred within the Action Area affecting the environmental baseline of the species. Numerous development projects have been constructed in or near snake habitat in the Action Area in this rapidly urbanizing area. All of the land inside the ring levee has been developed, primarily with houses and municipal facilities. Any remaining sub-populations which may exist on the outside of the ring levee that may disperse over the levees are vulnerable to secondary effects of urbanization, such as increased predation by house cats, water pollution, and increased vehicular mortality. Within the American Basin, several former localities are known to have been lost and/or depleted to the extent that continued viability is in question (Brode and Hansen 1992). The scarcity of remaining suitable habitat, flooding, stochastic processes, and continued threats of habitat loss pose a severe threat to this sub-population (Goodman 1987).

On the outside of the ring levee, ongoing agricultural activities may decrease and degrade the remaining habitat throughout the snake's extant range affecting the environmental baseline for the snake. Such activities are largely not subject to section 7 consultation. Some agriculture, such as rice farming, can provide valuable seasonal foraging and upland habitat for the snake. Although rice fields and agricultural waterways can provide habitat for the snake, agricultural activities such as waterway maintenance, weed abatement, rodent control, and discharge of contaminants into wetlands and waterways can degrade snake habitat and increase the risk of snake mortality (Service 2003). On-going maintenance of agricultural waterways can also eliminate or prevent establishment of snake habitat, eliminate food resources for the snake, and fragment existing habitat and prevent dispersal of snakes (Service 2003).

The Action Area contains components that can be used by the snake for feeding, resting, mating, and other essential behaviors. Therefore, the Service believes that the giant garter snake is reasonably certain to occur within the Action Area because of the biology and ecology of the

animal, the presence of suitable habitat in and adjacent to the action area, as well as recent observations of this listed species.

#### EFFECTS OF THE PROPOSED ACTION

##### Direct Effects

##### Valley Elderberry Longhorn Beetle

The proposed project will require the removal of 29 elderberry shrubs from Phases 2 and 3. No beetle exit holes were found on any of the shrubs affected by the project. Loss of an elderberry shrub or even a stem can affect valley elderberry longhorn beetle breeding and feeding because adult beetles rely solely on elderberry flowers and foliage for food and must lay their eggs on elderberry stems to successfully reproduce.

Transplantation of elderberry shrubs that are or could be used by beetle larvae is expected to adversely affect the beetle. Beetle larvae may be killed or the beetles' life cycle interrupted during or after the transplanting process. For example:

1. Transplanted elderberry shrubs may experience stress or become unhealthy due to changes in soil, hydrology, microclimate, or associated vegetation. This may reduce their quality as habitat for the beetle, or impair their production of habitat-quality stems in the future.
2. Elderberry shrubs may die as a result of transplantation.
3. Branches containing larvae may be cut, broken, or crushed as a result of the transplantation process.

##### Giant Garter Snake

Construction activities associated with the project may harm, harass, injure, or kill snakes. Construction activities may remove vegetative cover and basking sites, fill or crush burrows or crevices, and decrease prey base. The construction and surface modifications will disturb aquatic and upland habitats. Because snakes utilize small mammal burrows and soil crevices as retreat sites, snakes may be crushed, buried, or otherwise killed or injured from construction activities if they are present in the uplands. Snakes may be run over by construction equipment or other vehicles accessing the construction site. Snakes may also be killed or injured by becoming entangled in netting used for erosion control (Stuart et al 2001), depending on the type of netting the Corps uses. Disturbance from construction activities may also harass snakes to the point that the snakes may move into or across areas of unsuitable habitat where they may be prone to higher rates of mortality from predation and being run over by vehicles.

Phase 1 work including construction of the slurry walls and the accompanying stability berms would result in the following of 1.05 acres of giant garter snake aquatic habitat and construction activities occurring within 33.70 acres of giant garter snake upland habitat for one active season

(May 1 through October 1). The fallowing of this rice field would harm snakes, particularly neonates, by reducing the availability of prey that is small enough for young snakes to feed on. Lack of small prey would harm snakes by inhibiting growth and resulting in delayed sexual maturation of snakes, resulting in decreased births and recruitment of individuals into the population. Young snakes rely on developing sufficient body mass prior to overwintering in order to survive long periods without foraging. The temporary loss of this rice field will also result in increased susceptibility to predation, as rice fields provide cover in the form of emergent vegetation that would not be available to snakes in 2010. During the Phase 1 time period, snakes will have to move further in search of suitable aquatic habitat in the absence of this rice field and associated drainage ditch.

The effects of activities occurring in upland habitat will be minimized by the Corps' proposal to complete Phase 1 activities, including restoration of the habitat, within the snake's active period (May 1 through October 1). Snakes use of upland habitat is expected to be minimal during the active period, and if snakes are in the uplands, they are expected to move when approached by construction equipment; however it is possible that snakes could be utilizing cracks and crevices during the active period and would be undetected by preconstruction surveys. Utilization of the uplands by the snake in the Action Area for Phase 1 during the subsequent inactive period (October 1 2010 through April 30, 2011) will be minimal because the aquatic habitat will not be present during the prior active period. Snakes typically do not disperse very far into the uplands from the aquatic habitat upon either dewatering of the aquatic habitat or the onset of the inactive period. All effects are also expected to be minimized by the presence of the biological monitor during initial construction activities and pre-construction surveys.

### **Indirect Effects**

Indirect effects are caused by or result from the proposed action, are later in time, and are reasonably certain to occur. Future Federal actions that have not undergone section 7 consultation and future non-Federal activities can also be included as indirect effects of the project provided they are reasonably certain to occur and will result from the action under consideration. The Service is not aware any indirect effects that are reasonably certain to occur within the action area.

### **Interrelated and Interdependent Actions**

The Service is not aware of any actions that are interrelated or interdependent with the proposed project that may affect federally-listed species.

### **Cumulative Effects**

Cumulative effects include the effects of future State, Tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed project are not considered in this section, because they require separate consultation pursuant to section 7 of the Act.

Valley Elderberry Longhorn Beetle

Although additional plans for specific actions in the Action Area are not known, continued levee maintenance by the Marysville Levee Commission is expected to prevent the growth of elderberry shrubs within the Action Area. Mowing and other vegetation control measures are likely to occur in areas where elderberry shrubs currently exist. These future activities will not be subject to federal jurisdiction, and are likely to result in loss or growth inhibition of riparian and other habitats where elderberry shrubs and the beetle occur. This loss of habitat negatively affects the environmental baseline and is difficult to quantify.

### Giant Garter Snake

Although additional plans for specific actions in the Action Area are not known, current and future maintenance activities by the Marysville Levee Commission are expected to negatively impact the snake. Mowing and burning could kill giant garter snakes, and spraying and rodent control could indirectly affect snakes if snakes come into contact with chemicals such as pesticides or rodenticides. We are not aware if measures are being or will be implemented to reduce these effects, such as time period restrictions or control of pesticide use.

### **Conclusion**

After reviewing the current status of the beetle, the environmental baseline for the project area, the effects of proposed project, and the cumulative effects, it is the Service's biological opinion that the project, as proposed, is not likely to jeopardize the continued existence of either the beetle or the snake. To minimize effects to the beetle, the Corps shall implement the 1999 Conservation Guidelines for transplanting and planting seedlings. Elderberry shrubs that require removal will be transplanted to an appropriate location within the project area or an alternative suitable site agreed upon by the Service. The Corps shall transplant 28 elderberry shrubs, plant 303 elderberry seedlings, and plant 303 associated native seedlings on 2.5 acres. To minimize effects to the snake, the Corps shall restore 1.05 acres of temporarily-affected aquatic habitat and 33.7 acres of temporarily-affected upland snake habitat according to the *Guidelines for Restoration and/or Replacement of Giant Garter Snake Habitat* and the *Standard Avoidance and Minimization Measures During Construction Activities in Giant Garter Snake (*Thamnophis gigas*) Habitat* (each of these documents are appended to the November 13, 1997, *Programmatic Formal Consultation for U.S. Army Corps of Engineers 404 Permitted Projects with Relatively Small Effects on the Giant Garter Snake within Butte, Colusa, Glenn, Fresno, Merced, Sacramento, San Joaquin, Solano, Stanislaus, Sutter and Yolo Counties, California*). Critical habitat for the valley elderberry longhorn beetle does not occur in the action area of the project and therefore, will not be affected. No critical habitat has been designated or proposed for the snake.

### INCIDENTAL TAKE STATEMENT

Section 9(a)(1) of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened fish and wildlife species, respectively, without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harass is defined by the Service as an

intentional or negligent act or omission which creates the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by impairing behavioral patterns including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with this Incidental Take Statement.

The measures described below are non-discretionary, and must be implemented by the Corps so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, in order for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, and/or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

### **Amount or Extent of Take**

#### Valley Elderberry Longhorn Beetle

The Service anticipates incidental take of the valley elderberry longhorn beetle will be difficult to detect or quantify. The cryptic nature of these species and their relatively small body size make the finding of a dead specimen unlikely. The species occur in habitats that make them difficult to detect. Due to the difficulty in quantifying the number of beetles that will be taken as a result of the proposed action, the Service is quantifying take incidental to the project as the number of elderberry stems one inch or greater in diameter at ground level (beetle habitat) that will become unsuitable for beetles due to direct effects as a result of the action. Therefore, the Service estimates that the take of all beetles inhabiting 29 elderberry plants containing stems 1 inch or greater in diameter at ground level (110 stems between 1-3 inches, 21 stems between 3 and 5 inches, and 14 stems 5 inches or more; see Table 1 in the text) will occur as a result of the proposed action.

#### Giant Garter Snake

The Service anticipates that incidental take of the snake also will be difficult to detect or quantify for the following reasons: giant garter snakes are cryptically colored, secretive, and known to be sensitive to human activities. Snakes may avoid detection by retreating to burrows, soil crevices, vegetation, or other cover. Individual snakes are difficult to detect unless they are observed, undisturbed, at a distance. Most close-range observations represent chance encounters that are difficult to predict. It is not possible to make an accurate estimate of the number of snakes that will be harassed, harmed or killed during construction activities (staging areas, work on canal banks, soil borrow areas, and vehicle traffic to and from borrow areas). In instances when take is

difficult to detect, the Service may estimate take in numbers of species per acre of habitat lost or affected as a result of the action. Therefore, the Service anticipates that all giant garter snakes inhabiting 1.05 acres of aquatic and 33.70 acres of adjacent upland habitat may be harassed, harmed, or killed by loss of habitat and construction activities, as a result of the project.

Upon implementation of the following reasonable and prudent measures, incidental take associated with the project on listed valley elderberry longhorn beetle and giant garter snake, in the form of harm, harassment, or mortality from habitat loss or direct mortality will become exempt from the prohibitions described under section 9 of the Act for direct impacts. In addition, incidental take in the form of harm, harassment, or mortality associated with the proposed project will be exempt from the prohibitions described under section 9 of the Act. The incidental take associated with the direct effects of the proposed levee construction is hereby exempted from prohibitions of take under section 9 of the Act.

### **Effect of the Take**

The Service has determined that this level of anticipated take is not likely to result in jeopardy to the valley elderberry longhorn beetle and giant garter snake. Critical habitat for the valley elderberry longhorn beetle does not occur in the action area of the project and therefore, will not be affected. No critical habitat has been designated or proposed for the snake.

### **Reasonable and Prudent Measures**

All necessary and appropriate measures to minimize the impacts of incidental take of the beetle and the snake resulting from implementation of this project have been incorporated into the project description of this biological opinion. Therefore, the Service believes the following Reasonable and Prudent Measure is necessary and appropriate to minimize the effect of the proposed project on the valley elderberry longhorn beetle and giant garter snake:

1. The Corps shall implement the proposed project, including the conservation measures, as described in this biological opinion.

### **Terms and Conditions**

In order to be exempt from the prohibitions of section 7 of the Act, the Corps must ensure compliance with the following terms and conditions, which implement the reasonable and prudent measures described above. The following term and condition is non-discretionary:

1. The Corps shall include full implementation and adherence to conservation measures as a condition of any permit issued for the project.

### **Reporting Requirements**

A post-construction compliance report prepared by the monitoring biologists must be submitted to the Division Chief of Endangered Species (Central Valley) at the Sacramento Fish and

Wildlife Office within thirty (30) calendar days of the completion of construction activity or within thirty (30) calendar days of any break in construction activity lasting more than thirty (30) calendar days. This report shall detail: (i) dates that groundbreaking at the project started and the project was completed; (ii) pertinent information concerning the success of the project in meeting compensation and other conservation measures; (iii) an explanation of failure to meet such measures, if any; (iv) known project effects on the giant garter snake, if any; (v) occurrences of incidental take of any these species; and (vi) other pertinent information.

The Corps must report to the Service immediately any information about take or suspected take of federally listed species not authorized in this biological opinion. The Corps must notify the Service within 24 hours of receiving such information. Notification must include the date, time, and location of the incident or of the finding of a dead or injured animal. In the case of a dead animal, the individual animal should be preserved, as appropriate, and held in a secure location until instructions are received from the Service regarding the disposition of the specimen or the Service takes custody of the specimen. The Service contact person for this is the Division Chief, Endangered Species Program at (916) 414-6600 and Daniel Crum, the Resident Agent-in Charge of the Service's Law Enforcement Division at (916) 414-6600. Any contractor or Corps employee who during routine operations and maintenance activities inadvertently kills or injures a State-listed wildlife species must immediately report the incident to their representative superintendent or biologist. This representative superintendent or biologist must then contact the California Department of Fish and Game immediately in the case of a dead or injured listed species. The California Department of Fish and Game contact for immediate assistance is Paul Hoffman, Wildlife Biologist, at (530) 934-9309.

#### CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities that can be implemented to further the purposes of the Act, such as preservation of endangered species habitat, implementation of recovery actions, or development of information and data bases.

1. It is recommended that the Corps assist in the implementation of the recovery plans for listed valley elderberry longhorn beetle and the giant garter snake.
2. The Corps should work with the Service to establish functioning preserves and banking systems to further the conservation of listed species across the population ranges.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

#### RE-INITIATION--CLOSING STATEMENT

This concludes formal consultation on the proposed Marysville Ring Levee, Yuba River Basin Project. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where

discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or, (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

Please contact Harry Kahler (916)414-6612, or Jana Affonso, Sacramento Valley Branch Chief (916)414-6645 if you have questions regarding this biological opinion.

Sincerely,



*r* Susan K. Moore  
Field Supervisor

cc:

Jane Rinck, Corps, Sacramento, CA  
Lindsay Dembosz, Corps, Sacramento, CA  
April Murazzo, Corps, Sacramento, CA



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LOCATION  
LINE  
PRINT

FIGURE

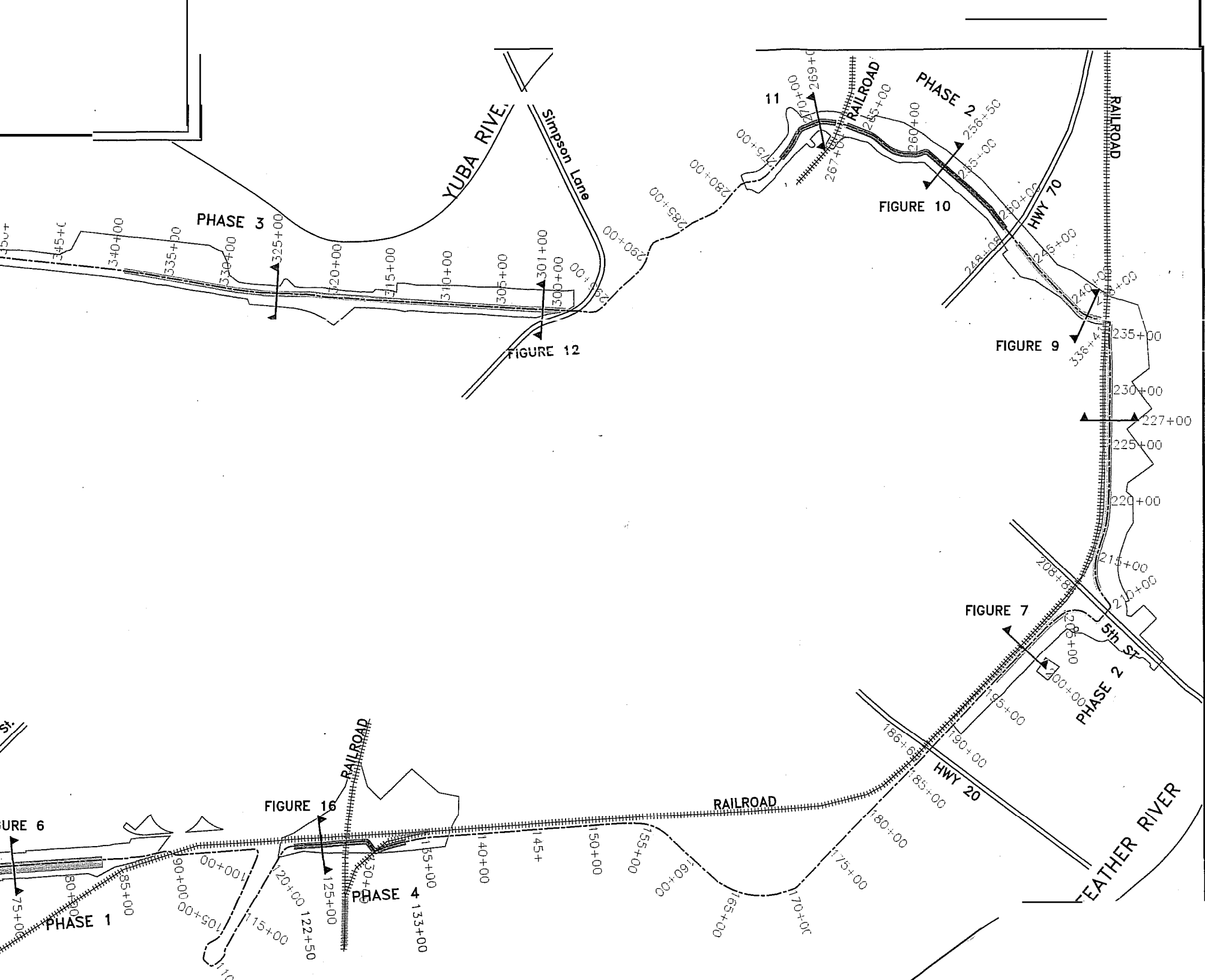
FIGURE 13

12

FIGURE 8

MARYSVILLE, CA

8





**APPENDIX F**

**CULTURAL RESOURCES**



**DEPARTMENT OF THE ARMY**  
U.S. ARMY ENGINEER DISTRICT, SACRAMENTO  
CORPS OF ENGINEER  
1325 J STREET  
SACRAMENTO, CALIFORNIA 95814-2922

Environmental Resources Branch

Mr. Calvin Rose, Chairperson  
Strawberry Valley Rancheria  
P.O. Box 667  
Marysville, CA 95901

**SEP 7.1 20D9**

Dear Mr. Rose:

In accordance with Section 106 of the National Historic Preservation Act of 1966, as amended, we are writing to inform you of the proposed Marysville Ring Levee (MRL) Project in Yuba County, California. The area of potential effects for the MRL Project is located around the city of Marysville and is highlighted in red on the Yuba City, California, 7.5-minute U.S.G.S. topographic map (Enclosure 1). The Corps is the lead Federal agency, and the State of California Central Valley Flood Protection Board and the Marysville Levee Commission are the local sponsors for the project.

The city of Marysville is proposing to construct several slurry walls along sections of the ring levee in order to reinforce the levee and provide protection to the town from future flood events. The project will also include jet grouting and the construction of a secant pile wall at the southernmost portion of the levee as well as the construction of two berms between the railroad tressels at Binney Junction.

A record search, completed on August 4, 2009, indicates that there are two cultural resources located within the project area dating to the historic era. The Bok Kai Temple is a Chinese temple just north of the southern edge of the levee that has been included on the National Register of Historic Places. The second resource is known as Bridge #24 which crosses the Feather River at 5th Street, and is currently unevaluated. Other resources located adjacent to but not directly in the project area include both Marysville Cemeteries, located outside the ring levee near the northeastern corner, and a house located near the Bok Kai Temple. No prehistoric resources have been located within or adjacent to the project area.

The level of effort to identify traditional resources within the study area will be consistent with 36 CFR 800.4(b)(1). We contacted the Native American Heritage Commission, who provided your name as being potentially interested in our project area. We are sensitive to traditional cultural properties and sacred sites, and make every effort to avoid them. Please let us know if you have knowledge of locations of archeological sites, or areas of traditional cultural value or concern. Correspondence may be sent to Ms. Melissa Montag, (CESPK-PD-RC), U.S. Army Corps of Engineers, Sacramento District, 1325 J Street, Sacramento, California 95814-2922.

-2-

We also request that you reply within 30 days of receipt of this letter. If you have any questions or would like additional information, please contact Ms. Montag, at (916)557-7907 or by email at: [Melissa.L.Montag@usace.army.mil](mailto:Melissa.L.Montag@usace.army.mil).

Sincerely,

Francis C. Piccola  
Chief, Planning Division

Enclosure



**DEPARTMENT OF THE ARMY**  
U.S. ARMY ENGINEER DISTRICT, SACRAMENTO  
CORPS OF ENGINEER  
1325 J STREET  
SACRAMENTO, CALIFORNIA 95814-2922

Environmental Resources Branch

Ms. Jessica Tavares, Chairperson  
United Auburn Indian Community of the Auburn Ranchetia  
10720 Indian Hill Road  
Auburn, CA 95603

**SEP 21 2009**

Dear Ms. Travares:

In accordance with Section 106 of the National Historic Preservation Act of 1966, as amended, we are writing to inform you of the proposed Marysville Ring Levee (MRL) Project in Yuba County, California. The area of potential effects for the MRL Project is located around the city of Marysville and is highlighted in red on the Yuba City, California, 7.5-minute U.S.G.S. topographic map (Enclosure 1). The Corps is the lead Federal agency, and the State of California Central Valley Flood Protection Board and the Marysville Levee Commission are the local sponsors for the project.

The city of Marysville is proposing to construct several slurry walls along sections of the ring levee in order to reinforce the levee and provide protection to the town from future flood events. The project will also include jet grouting and the construction of a secant pile wall at the southernmost portion of the levee as well as the construction of two berms between the railroad trestles at Binney Junction.

A record search, completed on August 4, 2009, indicates that there are two cultural resources located within the project area dating to the historic era. The Bok Kai Temple is a Chinese temple just north of the southern edge of the levee that has been included on the National Register of Historic Places. The second resource is known as Bridge #24 which crosses the Feather River at 5th Street, and is currently unevaluated. Other resources located adjacent to but not directly in the project area include both Marysville Cemeteries, located outside the ring levee near the northeastern corner, and a house located near the Bok Kai Temple. No prehistoric resources have been located within or adjacent to the project area.

The level of effort to identify traditional resources within the study area will be consistent with 36 CFR 800.4(b)(1). We contacted the Native American Heritage Commission who provided your name as being potentially interested in our project area. We are sensitive to traditional cultural properties and sacred sites, and make every effort to avoid them. Please let us know if you have knowledge of locations of archeological sites, or areas of traditional cultural value or concern. Correspondence may be sent to Ms. Melissa Montag, (CESPK-PD-RC), U.S. Army Corps of Engineers, Sacramento District, 1325 J Street, Sacramento, California 95814-2922.

-2-

We also request that you reply within 30 days of receipt of this letter. If you have any questions or would like additional information, please contact Ms. Montag, at (916) 557-7907 or by email at: [Melissa.L.Montag@usace.army.mil](mailto:Melissa.L.Montag@usace.army.mil).

Sincerely,

Francis C. Piccola  
Chief, Planning Division

Enclosure



DEPARTMENT OF THE ARMY  
U.S. ARMY ENGINEER DISTRICT, SACRAMENTO  
CORPS OF ENGINEER  
1325 J STREET  
SACRAMENTO, CALIFORNIA 95814-2922

Environmental Resources Branch

Ms. Clara LeCompte, Chairperson  
Maidu Nation  
P.O. Box 204  
Susanville, CA 96130

SEP 21 2009

Dear Ms. Lecompte:

In accordance with Section 106 of the National Historic Preservation Act of 1966, as amended, we are writing to inform you of the proposed Marysville Ring Levee (MRL) Project in Yuba County, California. The area of potential effects for the MRL Project is located around the city of Marysville and is highlighted in red on the Yuba City, California, 7.5-minute U.S.G.S. topographic map (Enclosure 1). The Corps is the lead Federal agency, and the State of California Central Valley Flood Protection Board and the Marysville Levee Commission are the local sponsors for the project.

The city of Marysville is proposing to construct several slurry walls along sections of the ring levee in order to reinforce the levee and provide protection to the town from future flood events. The project will also include jet grouting and the construction of a secant pile wall at the southernmost portion of the levee as well as the construction of two berms between the railroad trestles at Binney Junction.

A record search, completed on August 4, 2009, indicates that there are two cultural resources located within the project area dating to the historic era. The Bok Kai Temple is a Chinese temple just north of the southern edge of the levee that has been included on the National Register of Historic Places. The second resource is known as Bridge #24 which crosses the Feather River at 5th Street, and is currently unevaluated. Other resources located adjacent to but not directly in the project area include both Marysville Cemeteries, located outside the ring levee near the northeastern corner, and a house located near the Bok Kai Temple. No prehistoric resources have been located within or adjacent to the project area.

The level of effort to identify traditional resources within the study area will be consistent with 36 CFR 800.4(b)(1). We contacted the Native American Heritage Commission, who provided your name as being potentially interested in our project area. We are sensitive to traditional cultural properties and sacred sites, and make every effort to avoid them. Please let us know if you have knowledge of locations of archeological sites, or areas of traditional cultural value or concern. Correspondence may be sent to Ms. Melissa Montag, (CESPK-PD-RC), U.S. Army Corps of Engineers, Sacramento District, 1325 J Street, Sacramento, California 95814-2922.

-2-

We also request that you reply within 30 days of receipt of this letter. If you have any questions or would like additional information, please contact Ms. Montag, at (916) 557-7907 or by email at: [Melissa.L.Montag@usace.army.mil](mailto:Melissa.L.Montag@usace.army.mil).

Sincerely,

Francis C. Piccola  
Chief, Planning Division

Enclosure



**DEPARTMENT OF THE ARMY**  
U.S. ARMY ENGINEER DISTRICT, SACRAMENTO  
CORPS OF ENGINEERS  
1325 J STREET  
SACRAMENTO, CALIFORNIA 95814-2922

Environmental Resources Branch

Ms. Glenda Nelson, Chairperson  
Enterprise Rancheria of Maidu Indians  
3690 Olive Hwy  
Oroville, CA 95966

**SEP 21 2009**

Dear Ms. Nelson:

In accordance with Section 106 of the National Historic Preservation Act of 1966, as amended, we are writing to inform you of the proposed Marysville Ring Levee (MRL) Project in Yuba County, California. The area of potential effects for the MRL Project is located around the city of Marysville and is highlighted in red on the Yuba City, California, 7.5-minute U.S.G.S. topographic map (Enclosure 1). The Corps is the lead Federal agency, and the State of California Central Valley Flood Protection Board and the Marysville Levee Commission are the local sponsors for the project.

The city of Marysville is proposing to construct several slurry walls along sections of the ring levee in order to reinforce the levee and provide protection to the town from future flood events. The project will also include jet grouting and the construction of a secant pile wall at the southernmost portion of the levee as well as the construction of two berms between the railroad tressels at Bitmey Junction.

A record search, completed on August 4, 2009, indicates that there are two cultural resources located within the project area dating to the historic era. The Bok Kai Temple is a Chinese temple just north of the southern edge of the levee that has been included on the National Register of Historic Places. The second resource is known as Bridge #24 which crosses the Feather River at 5th Street, and is currently unevaluated. Other resources located adjacent to but not directly in the project area include both Marysville Cemeteries, located outside the ring levee near the northeastern corner, and a house located near the Bok Kai Temple. No prehistoric resources have been located within or adjacent to the project area.

The level of effort to identify traditional resources within the study area will be consistent with 36 CFR 800.4(b)(1). We contacted the Native American Heritage Commission, who provided your name as being potentially interested in our project area. We are sensitive to traditional cultural properties and sacred sites, and make every effort to avoid them. Please let us know if you have knowledge of locations of archeological sites, or areas of traditional cultural value or concern. Correspondence may be sent to Ms. Melissa Montag, (CESPK-PD-RC), U.S. Army Corps of Engineers, Sacramento District, 1325 J Street, Sacramento, California 95814-2922.



We also request that you reply within 30 days of receipt of this letter. If you have any questions or would like additional information, please contact Ms. Montag, at (916) 557-7907 or by email at: [Melissa.L.Montag@usace.army.mil](mailto:Melissa.L.Montag@usace.army.mil).

Sincerely,

A handwritten signature in dark ink, appearing to read "Francis C. Piccola". The signature is written in a cursive style with a prominent initial "F".

**Francis C. Piccola**  
Chief, Planning Division

Enclosure



**DEPARTMENT OF THE ARMY**  
U.S. ARMY ENGINEER DISTRICT, SACRAMENTO  
CORPS OF ENGINEERS  
1325 J STREET  
SACRAMENTO, CALIFORNIA 95814-2922

REPLY TO  
ATTENTION OF

Environmental Resources Branch

Mr. Milford Wayne Donaldson  
State Historic Preservation Officer  
Office of Historic Preservation  
P.O. Box 942896  
Sacramento, California 94296-0001

**JAN 22 2010**

Dear Mr. Donaldson:

The U.S. Army Corps of Engineers, Sacramento District (Corps) is writing pursuant to 36 CFR 800.3(c)(3) to inform you of the proposed Marysville Ring Levee (MRL) Project in Marysville, California. The proposed MRL Project would consist of strengthening the Marysville Ring Levee (levee) to address through- and under-seepage problems. This action would address problems with the integrity of the levee and would protect the city from future potential flooding to depths of 20 to 25 feet. The first phase of the MRL Project will be constructed in the spring and summer of 2010 using funding from the American Recovery and Reinvestment Act of 2009. We are writing pursuant to 36 CFR 800.4(a)(1) to request your concurrence with our determination of the area of potential effects (APE) and our determination of no adverse effects to historic properties in accordance with 36 CFR 800.5(b) for the MRL Project.

The MRL Project would be constructed in four phases and includes construction of slurry walls, levee slope reshaping, jet grouting, construction of secant pile walls, and construction of stability berms in order to reinforce the levee and provide protection to the city from future flood events. The MRL project is described in further detail in Enclosure 1 and depicted on Enclosure 2.

The APE for the MRL Project is located around the city of Marysville and is highlighted in red on the Yuba City, California, 7.5-minute U.S.G.S. topographic map (Enclosure 3). The APE for the MRL project is larger than the overall project work area shown in Enclosure 2 because there are potential effects to cultural resources not located directly within the work areas. Due to potential vibration effects, a larger APE was determined to be necessary in order to include and properly evaluate potential effects to cultural resources located nearby the APE. In addition, because the proposed action would affect portions of the overall levee we determined that the entire levee should be included in our inventory and evaluation efforts since the levee is a ring levee and, as such, operates as a flood control system around Marysville. We request any comments you may have on the APE.

A records search was conducted on July 30, 2009 at the Northern California Information Center at California State University, Sacramento. This search revealed a total of six historic resources within or near the APE, not all of which have been formally recorded or evaluated. There are no known prehistoric resources located within or adjacent to the APE. A total of 11 cultural resources surveys have been completed covering portions of the APE, primarily located on the southwest and western portions of the levee. A number of these resources exist within the bounds of the ring levee, but most are outside of the current project work areas and APE. The results of our records search, identification, recordation, and evaluation efforts for the MRL project are included in the enclosed "Cultural Resources Archaeological Survey and National Register Evaluation of the Marysville Ring Levee and Properties for the Marysville Ring Levee Project" report (Enclosure 4).

Of the six known historic resources located within or adjacent to the APE only one, the Bok Kai Temple, is directly within the APE. The Bok Kai Temple is listed in the California Register of Historic Places and in the National Register of Historic Places (NRHP). And in 2001 the National Trust for Historic Preservation placed the Bok Kai Temple on its *11 Most Endangered* list. The Marysville Historic Commercial District (MHCD) is located outside but near the APE. The MHCD contains 85 buildings and one structure, including 59 contributing and 27 non-contributing buildings. It is eligible for listing in the NRHP as a district.

In the summer and fall of 2009 Corps Archaeologist Ms. Nikki Polson, Corps Historian Ms. Melissa Montag, and Corps Archaeological Trainee Ms. Stefanie Adams conducted survey, inventory, and recordation efforts for the MRL Project APE. Those efforts resulted in identification of seven previously unknown historic resources and recordation of three of those resources (Marysville Ring Levee, Marysville Sand Company Plant, Western Pacific Railroad Spur). As further described in Enclosure 4, four of the previously unknown historic resources (5<sup>th</sup> Street Bridge, American Bridge Company Railroad Trestle, Binney Junction, Southern Pacific Railroad Grade) were identified within the APE, but it was determined that these resources would not be affected by the proposed MRL project and, as a result, those resources were not recorded or evaluated further.

The Bok Kai Temple, located near Phase 2 of the proposed MRL Project, is a significant historic resource. In previous conversations with Mr. William Soule of your office, we determined that due to the close proximity of proposed construction in this area that further study of possible effects to the temple from vibration and construction activities was warranted. In addition, studies would need to be conducted to determine whether there would be similar effects to other nearby historic structures in the MHCD, which is located near the Phase 2 APE. A preliminary report from Corps structural and construction engineers found that vibration effects from construction activities in Phase 2 are not likely to adversely affect the temple (Enclosure 5). This conclusion takes into account the structural vulnerability of the temple, the likely vibration output of the kinds of construction in the area, and application of vibration level equations from the Caltrans *Transportation- and Construction-Induced Vibration Guidance Manual*.

The only structure located within the assumed area of vibration effects is the Bok Kai Temple. The structural and construction impact report also found that the temple is in relatively sound and sturdy condition and is not likely to be adversely affected by the proposed construction. In addition, the type of construction in this area, installation of a secant pile wall, was chosen in part because the vibration impacts are considered significantly less than the impacts that could be expected from construction of a slurry wall in the same location. The report suggested a number of best management practices such as reducing vehicle speeds, visual inspections, and seismic monitoring to lessen the likelihood of damages to the Bok Kai Temple due to construction activities on the levee.

In addition to these recommendations we are proposing the execution of a Memorandum of Agreement (MOA) to ensure that effects to the temple and MHCD are not adverse. Because the specific design of Phase 2 of the MRL Project will not be complete for another year we are proposing to develop an MOA that will follow the subsequent actions: (1) Detailed architectural/engineering/vibration analyses related to the avoidance of adverse effects to the Bok Kai Temple and MHCD prepared during Phase 2 levee repair design, and (2) A detailed monitoring plan to avoid adverse effects to the Bok Kai Temple and MHCD during the implementation of Phase 2 construction. Enclosed is a draft MOA outlining these

proposed actions (Enclosure 6). We request your concurrence with our proposed treatment of the Bok Kai Temple and MCHD to avoid adverse effects and your comments on the draft MOA.

The Marysville Ring Levee, Marysville Sand Company Plant, and Western Pacific Railroad Spur were recorded and evaluated for their eligibility for listing in the NRHP. The Marysville Sand Company Plant and Western Pacific Railroad Spur were determined not eligible for listing in the NRHP. The Marysville Ring Levee was found eligible for listing in the NRHP under Criterion A and B. Under Criterion A, the levee is significant because of its role in the history of regional flood control and its importance in the development of the city of Marysville. Due to the levee's close association with the lives of persons significant to the local history and Marysville's past (W.T. Ellis, Sr. and W.T. Ellis, Jr.), the levee has been found eligible for listing in the NRHP under Criterion B. We request your concurrence with our determinations of eligibility for the Marysville Ring Levee, Marysville Sand Company Plant, and Western Pacific Railroad Spur.

We have determined that the proposed MRL Project will have no adverse effect on the levee. Planned work on the levee includes removing the crown, building slurry and cut off walls and building the crown back up to meet flood safety standards. This planned construction will not visually affect the levee or change the primary purpose of the levee as a flood protection feature. Once construction is complete it will be virtually impossible to visually note any changes to the levee's exterior. Since we have determined the levee is eligible for listing in the NRHP for its association with an event that has made a significant contribution to the broad patterns of our history and for its association with persons important in our past, and the planned construction measures will have no adverse effect on those characteristics with which the levee is eligible for listing in the NRHP, we have determined there will be no adverse effect to the levee. We request your concurrence with this determination of no adverse effect on the Marysville Ring Levee from the MRL Project.

A list of potentially interested Native Americans for the area was obtained from the Native American Heritage Commission. Letters were sent to those individuals on September 21, 2009. In a letter dated December 15, 2009, the Enterprise Rancheria contacted us and requested information and to meet with us. We have contacted Mr. Ren Reynolds, EPA Planner, Site Monitor and Tribal Historic Preservation Officer of the Enterprise Rancheria, to propose meeting with tribal representatives and will will lue lo uume u 10vi Ji l l g l l e l l l w i l l l e i l l f o n n a t i o l l t h e y h a v e r e q u e s t e d i n a d v a n c e o f c o n s t r u c t i o n . I f b u r i e d o r p r e v i o u s l y u n i d e n t i f i e d r e s o u r c e s a r e l o c a t e d d u r i n g p r o j e c t a c t i v i t i e s , a l l w o r k i n t h e v i c i n i t y o f t h e f i n d w o u l d c e a s e , a n d t h e C a l i f o r n i a S t a t e H i s t o r i c P r e s e r v a t i o n O f f i c e w o u l d b e c o n t a c t e d f o r a d d i t i o n a l c o n s u l t a t i o n p e r 3 6 C F R 8 0 0 . 1 3 , P o s t R e v i e w D i s c o v e r i e s . A d d i t i o n a l l y , i n t h e e v e n t o f s u c h a f i n d , i n t e r e s t e d N a t i v e A m e r i c a n r e p r e s e n t a t i v e s , s u c h a s M r . R e y n o l d s , w o u l d b e c o n s u l t e d .

In summary, we are requesting the following from your office:

- Comments on the APE.
- Concurrence with our proposed treatment of the Bok Kai Temple and the MCHD for the MRL Project.
- Comments on the draft MOA.
- Concurrence with our determinations of NRHP eligibility for the Marysville Ring Levee, the Marysville Sand Company Plant, and the Western Pacific Railroad Spur.

- Concurrence with our determination of no adverse effect to the Marysville Ring Levee, Bok Kai Temple, and the MCHD for the MRL Project.

We request your comments on the above determinations, if any. And we request your concurrence with the Corps' determinations made in this letter. Pursuant to 36 CFR 800.3(c)(4), we request that you review the enclosed information and provide us with any comments within 30 days. Correspondence may be sent to Ms. Melissa Montag, U.S. Army Corps of Engineers, Sacramento District, 1325 J Street, Sacramento, California 95814-2922. If you have any questions or would like additional information, please contact Ms. Montag at (916) 557-7907 or by email at: [Melissa.L.Montag@usace.army.mil](mailto:Melissa.L.Montag@usace.army.mil).

Sincerely,



/ Francis C. Piccola  
(:): chief, Planning Division

Enclosures

**OFFICE OF HISTORIC PRESERVATION  
DEPARTMENT OF PARKS AND RECREATION**

P.O. BOX 942896  
SACRAMENTO, CA 94296-0001  
(916) 653-6624 Fax: (916) 653-9824  
calshpo@ohp.parks.ca.gov  
www.ohp.parks.ca.gov



January 27, 2010

In Reply Refer To: COE100125A

Francis C. Piccola  
Chief, Planning Division  
Department of the Army  
U.S. Army Engineer District, Sacramento  
Corps of Engineers  
1325 J Street  
Sacramento, California 95814-2922

Re: Marysville Ring Levee Project, Yuba County, California

Dear Mr. Piccola:

Thank you for submitting to my office, your letter and supporting documentation regarding the undertaking noted above. The U.S. Army Corps of Engineers (COE), Sacramento District is seeking my concurrence on the effects that the proposed Marysville Ring Levee Project will have on historic properties, pursuant to 36 CFR Part 800 (as amended 8-05-04) regulations implementing Section 106 of the National Historic Preservation Act. The proposed undertaking is the strengthening of the existing Marysville levee to address through-and-under seepage problems. The undertaking will be built in four phases and will include the construction of in-levee slurry walls, levee slope reshaping, jet grouting, secant pile walls, and stability berms. The completion of these project aspects will reinforce the levee and provide increased protection to the City of Marysville from future flood events. As the visual effects of the proposed undertaking are transitory, an architectural APE was not determined.

Due to the potential for vibration effect of some construction activities, the COE has configured the Area of Potential Effects (APE) to include an area larger than that encompassed by the Ring Levee and associated staging/access locations. I concur that the APE has been appropriately determined pursuant to 36 CFR Parts 800.4(a)(1) and 800.16(d). In addition to your letter of January 22, 2010 and attachments (project description and Area of Potential Effects maps), you have submitted the following documents in support of your efforts to identify and evaluate historic properties in the project Area of Potential Effects (APE):

- *Cultural Resources Archaeological Survey and National Register Evaluation of the Marysville Ring Levee and Properties for the Marysville Ring Levee Project, Yuba County, California* (Melissa Montag, U.S. Army Corps of Engineers, Sacramento District: January 2010).

- *Memorandum for Record: Marysville Ring Levee EDR – Bok Kai Temple Construction Impact Evaluation* (Erik W. James, Civil Engineer, Levee Safety Section, U.S. Army Corps of Engineers, Sacramento District: January 14, 2010).
- *DRAFT: Memorandum of Agreement among the U.S. Army Corps of Engineers, the California State Historic Preservation Officer, and the Advisory Council on Historic Preservation Regarding the Marysville Ring Levee Project, Yuba County, California* (undated).

Identification efforts by the COE concluded that there are five historic properties located within, or in close proximity to, the APE. These include the Marysville Ring Levee, the Marysville Sand Company Plant, the Western Pacific Railroad Spur, the Bok Kai Temple, and the Marysville Historic Commercial District. The COE has determined that the Marysville Sand Company Plant and the Western Pacific Railroad Spur are not eligible for the National Register of Historic Places (NRHP) under any criteria. I concur with these determinations.

The COE has also determined that the Marysville Ring Levee is eligible for the NRHP under both criterion A, for its importance in local flood control and the development of the City of Marysville, and criterion B, for its association with the lives of two prominent local citizens, W. T. Ellis Sr. and W. T. Ellis Jr. The COE has determined that the actions proposed for this undertaking will have no adverse effect on the Marysville Ring Levee as they consist of standard maintenance and upgrade activities and that post-project, the levee will be functionally and visually unchanged. I concur that the Marysville Ring Levee is eligible for the NRHP under criteria A and B.

The Bok Kai Temple is listed on the NRHP (#75000498, added 1975) under criteria A and C for the period of significance of 1875-1899. Although this historic building is not located within the construction footprint of the proposed undertaking, its proximity suggested that indirect effects from vibrations generated by construction activities could cause structural damage. Although project effect studies and a structural evaluation of the Bok Kai Temple by the COE have determined that vibration effects from the proposed project activities should not adversely affect this historic property, the COE has determined that a program of management practices to minimize vibration potential is needed to ensure that the Bok Kai Temple is not adversely affected. The COE has concluded that a Memorandum of Agreement, with an attached Historic Property Management Plan, executed among the COE, the SHPO and the Advisory Council on Historic Preservation (if they wish to participate) is a necessary condition for this undertaking.

A second NRHP listed historic property was also identified by the in close proximity to, but outside of, the APE. This is the Marysville Historic Commercial District (#99000692, added 1999), which was listed under criterion A, and which is comprised of 85 buildings and one structure. The COE has determined that this NRHP district will not be affected by the proposed undertaking, but that the same provisions being implemented regarding the potential for vibration effects should also be implemented regarding the Marysville Historic Commercial District.

With the implementation of the proposed MOA and an HPTP that addresses conditions to minimize vibrations created by the proposed activities, the COE has determined that the appropriate finding of effect for the Marysville Ring Levee Project is that of No Adverse Effect with conditions, in accordance with 36 CFR Part 800.5(b).

Based on my review of your letter and supporting documentation, I have no objection to your finding of No Adverse Effect with conditions. My concurrence with this finding is predicated on the execution of the proposed MOA and the implementation of the provisions as outlined in the Historic Properties Management Plan (HPMP) as stated in the January 14, 2010 Memorandum for Record. The conditions should be more clearly identified as an HPMP and included as an appendix to the MOA. William Soule of my staff will provide additional comments regarding this consultation as required via email, and specific comments regarding the draft MOA through track changes to a Word copy.

Please notify the Advisory Council on Historic Preservation regarding this finding and proposed MOA, provide them with copies of all documentation, and invite their participation in the consultation and MOA. Thank you for seeking my comments and for considering historic properties in planning your project. If you require further information, please contact William Soule, Associate State Archeologist at phone 916-654-4614 or email [wsoule@parks.ca.gov](mailto:wsoule@parks.ca.gov).

Sincerely,

A handwritten signature in cursive script that reads "Susan H. Stratton for".

Milford Wayne Donaldson, FAIA  
State Historic Preservation Officer



## **APPENDIX G**

### **HTRW ENVIRONMENTAL SITE ASSESSMENT**

**ENVIRONMENTAL SITE ASSESSMENT**

**MARYSVILLE RING LEVEE PROJECT  
MARYSVILLE, CALIFORNIA**

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Prepared by:

Thomas F. Kellogg  
U.S. Army Corps of Engineers, Sacramento District  
Environmental Chemistry Section

Approved by:

Date:

  
\_\_\_\_\_



Joly Esarza, R.E.A.  
Section Chief, Environmental Chemistry Section

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## ACRONYMS

AST	Aboveground Storage Tank
ASTM	American Society for Testing and Materials
CA FID	California Facility Inventory Database
CA ML	Sacramento County Master List
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CESPK	US Army Corps of Engineers, Sacramento District
CHMIRS	California Hazardous Material Incident Reporting System
CS	Contaminated Sites
DTSC	Department of Toxic Substance Control
ED-GC	Environmental Chemistry Section
EDR	Environmental Data Resources Inc.
ER	Engineering Regulation (US Army Corps of Engineers)
ERNS	Emergency Response Notification System
ESA	Environmental Site Assessment
FIFRA	Federal Insecticide, Fungicide and Rodenticide Act
GRR	General Reevaluation Report
HIST	Historical UST Registered Database
HTRW	Hazardous, Toxic or Radioactive Waste
IAW	In accordance with
LUST	Leaking Underground Storage Tank
MBTA	Migratory Bird Treaty Act
NEPA	National Environmental Policy Act
NFA	No further Action
NPL	National Priority List (Superfund Site)
PMIO	Particulate matter 10 microns or less
RCRA	Resource Conservation and Recovery Act
RD1000	State of California Reclamation District 1000
SLIC	Spill, Leaks, Investigation and Cleanup Cost Recovery
SWF/LF	Solid Waste Facilities/Landfill Sites
SWIS	Solid Waste Information System
SWRCB	State Water Resources Control Board
TSCA	Toxic Substance Control Act
USEPA	US Environmental Protection Agency
USGS	US Geological Survey
UST	Underground Storage Tank
VCP	Voluntary Cleanup Program
WDS	Waste Discharge System
WMUDS	Waste Management Unit Database System

## **1.0 EXECUTIVE SUMMARY**

The methodology of ASTM 1597-05 is used to conduct an Environmental Site Assessment (ESA) to identify recognized environmental conditions in order to establish the presence or likely presence of hazardous substances or petroleum products under conditions that indicate a likely release, a past release or a material threat of a release of those substances. The ESA also provides background information for NEPA documents and can be included in the appendix of NEPA documents or included by reference.

In 2009, USACE performed an ESA for the Marysville Ring Levee project. The ESA project site (the site) comprises the entire 7.2 -mile levee system including what lies between two boundaries that are drawn at 200 feet from either side of the levee centerline.

The ESA contained herein was conducted in accordance with ASTM E1527-05 and ER1165-2-132.

## 2.0 INTRODUCTION

### 2.1 PURPOSE

The Environmental Chemistry Section (ED-GC) of the Geotechnical and Environmental Engineering Branch of the USACE in Sacramento, California, has prepared this Appendix for the proposed Marysville Ring Levee Report project site around the Marysville Basin in Yuba County, California. This appendix is known as an Environmental Site Assessment (ESA) or a Phase I ESA by the environmental community.

The National Environmental Policy Act (NEPA), the California Environmental Quality Act (CEQA) and the USACE regulations require that an Environmental Site Assessment (ESA) be performed on a construction project site and its surrounding area. The purpose of the ESA is to identify and document recognized environmental conditions that may have adverse impacts on the proposed construction project. ASTM 1527-05 defines recognized environmental conditions as "The presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, ground water, or surface water of the property. The term includes hazardous substances or petroleum products even under conditions in compliance with laws."

In 2009, USACE performed an ESA for the Marysville Ring Levee project, in accordance with ASTM 1527-05. The ESA consisted of reviewing regulatory lists of HTRW sites, historical literature, aerial photographs, websites and conducting interviews with people who are knowledgeable about the project, the project site and the surrounding area. A site reconnaissance was also conducted as part of the ESA process.

### 2.2 DETAILED SCOPE-OF-SERVICES

The ESA project site (the site) lies between two boundaries that are drawn at 200 feet from either side of the Marysville Ring Levee centerline. The ESA is also concerned with identifying and documenting recognized environmental conditions as defined by ASTM 1527-05 on this site and the adjacent properties using commonly known and reasonably ascertainable information, such as historical records, regulatory databases, and aerial photographs.

### 2.3 SIGNIFICANT ASSUMPTIONS

Since the regions studied have been used extensively for agricultural purposes in the past, it is likely that there may be chemical fertilizers and pesticides on farmlands located adjacent and near the site. Because many of the substances that were allowed in the past (e.g. DDT) have a significantly long lifetime in the environment, it is also likely that there is some concentration of these substances present today in the soils near and on the site. Farmland where various chemicals were routinely and historically applied for agricultural purposes are considered to be in a de minimis condition as defined by ASTM 1527-05 and are not considered to be a recognized environmental condition.

### 2.4 LIMITATIONS AND EXCEPTIONS

The ESA does not include any sampling or testing of soil, air, water or building materials. The interiors of buildings and structures were not inspected.

### 2.5 SPECIAL TERMS AND CONDITIONS

The current Marysville Ring Levee project does not involve purchase of property for commercial purposes, and as such, the conditions for the ASTM specifications are not completely applicable. The ASTM standard is used as a guide and sections that are not applicable are deleted or modified to meet the requirements of the project. Where applicable, the format and guidance recommended by ASTM is followed as stated in standard E 1527-05.

**2.6 USER RELIANCE**

There has been no contradictory information provided.



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## 3.0 SITE DESCRIPTION

### 3.1 LOCATION AND LEGAL DESCRIPTION

The Marysville Ring Levee project is concerned with the levee system consisting of approximately 7.2 miles of earthen levees encircling the 1500-acre Marysville Basin, which is located in Yuba County. The ESA project site lies between two boundaries drawn at 200 feet from the centerline of the levees.

### 3.2 SITE AND VICINITY GENERAL CHARACTERISTICS

The levees were originally constructed beginning in 1862 and by 1868 a levee system completely encircled the city of Marysville. The levee heights range from an elevation of 16 to 28 feet, having been elevated from the original 5 feet during several periods of construction. The levees protect Marysville from Jack Slough in the north, the Feather River in the west and in the south, the Yuba River.

### 3.3 CURRENT USE OF THE PROPERTY

The site is currently used for levees that are used to protect the city of Marysville from seasonal flooding.

### 3.4 DESCRIPTIONS OF STRUCTURES, ROADS, OTHER IMPROVEMENTS ON THE SITE

There are several surface roads that either follow the levees or are actually on top of them. The levees are crossed multiple times by surface roads, in addition to state routes 70 and 20. The levees are also crossed by several rail lines. Aside from the levees themselves, other improvements on the site include residential developments, pumping stations, and commercial, industrial or utility-oriented structures. A sewage treatment plant is located in the southwest portion of the city, adjacent to the levee.

### 3.5 CURRENT USES OF THE ADJOINING PROPERTIES

The land use in the Marysville area is mostly developed residential. There are a few light industries to the west and south and a school in the northwest. A hospital is located on the west side of Marysville, just inside the levee. Outside the Marysville Basin is mostly agricultural use, except that Yuba City lies to the west across the Feather River and South Yuba City and Linda lie to the south across the Yuba River. The confluence of the two rivers is south and slightly west of Marysville.

## 4.0 USER PROVIDED INFORMATION

### 4.1 TITLE RECORDS

Title records were not obtained as they were not required to develop a history of the previous uses of the site, per ASTM 1597-05.

### 4.2 ENVIRONMENTAL LIENS OR ACTIVITY AND USE LIMITATIONS

There are no environmental liens or activity and no use limitations within the area 200 feet from the centerline of the levees surrounding Marysville (Ref 5). The records used to ascertain this information include: the National Priority List, Federal Superfund Liens, Federal Institutional Controls/Engineering Controls Registries, State and Tribal Equivalent NPL - State Response Sites, State and Tribal Registered Storage Tank Lists -Active UST Facilities, Aboveground Petroleum Storage Tank Facilities and USTs on Indian Land, US Clandestine Drug Labs, CERCLA Lien Information, Land Use Control Information System, Environmental Liens Listing, Military Cleanup Sites Listing, Department of Defense Sites, and Formerly Used Defense Sites.

### 4.3 REASON FOR PERFORMING PHASE I

The use of ASTM 1597-05 is to identify recognized environmental conditions in order to establish the presence or likely presence of hazardous substances or petroleum products under conditions that indicate a likely release, a past release or a material threat of a release of those substances. The ESA also provides background information for NEPA documents and can be included in the appendix of NEPA documents or included by reference.

### 4.4 OTHER

This ESA will follow the environmental industry practice of using the guidelines set forth in the USEPA rule concerning "All Appropriate Inquiries," the ASTM E 1527-05 standard and USACE Engineering Regulation (ER) 1162-2-132. ASTM E 1527-05 was designed to protect persons purchasing property from liability arising from adverse environmental conditions, but also may be used for other situations per section 4.2.1 of the ASTM standard.

## **5.0 RECORDS REVIEW**

### **5.1 STANDARD ENVIRONMENTAL RECORD SOURCES**

A listing of the historical environmental record sources is provided in the Environmental Records Search, Marysville Ring Levee Project, Marysville, Yuba County, California, produced by Youngdahl Consulting Group, Inc., December 2009. This is attached as Section 16.4.

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## **5.2 HISTORICAL USE INFORMATION ON THE PROPERTY AND ADJOINING PROPERTIES**

ASTM E 1527-05 requires that an ESA consist of diligently conducting a reasonable search of all available information, performing a site reconnaissance and interviewing people who are knowledgeable about the current and past uses of the project site and surrounding area, its waste disposal practices and its environmental compliance history.

Specifically, the current search consisted of information from the following sources:

- (1) A reconnaissance of sites along the entire Marysville Ring Levee System was performed to fulfill the requirements of ASTM E 1527-05. Photographs of significant or typical observations were made to document the reconnaissance and to provide additional visual information. See Appendix 16.3 for site photographs.
- (2) A search of the available records as provided by the Environmental Records Search, Marysville Ring Levee Project, Marysville, Yuba County, California (ref 5).
- (3) Interviews of appropriate personnel that might have knowledge of recognized environmental conditions. See Appendix 16.7 for interview records.

USACE hired a contractor to perform the environmental records and database searches. This is included as Appendix A.

The ESA did not include any sampling or testing of soil, air, water or building materials.

## **6.1 SITE RECONNAISSANCE**

### **6.2 METHODOLOGY AND LIMITING CONDITIONS**

The site reconnaissance was conducted using Feasibility Level Design Report maps generated by HDR Engineering, Inc. (ref. 4), available topographic maps, and information from Frank Miller, the local levee commission superintendant. The reconnaissance consisted of driving on top of the entire levee system (7.2 miles) and inspecting the levee perimeter and performing periodic inspections of areas along the perimeter that exhibited features that may have indicated a possible recognized environmental condition. The scoping and the time factor prohibited obtaining access to building interiors and further, we were advised by our escort, Mr. Frank Miller, that we could not access the substations or the maintenance yards. We did, however, drive to the entrance of the Cal Trans maintenance yard and obtained photographs of the hazardous materials storage locker and the fueling station (figs 10-01, GPS N 39°08'55.9" W 121°34'40.9", 10-02 GPS N 39°08'55.9" W 121°34'40.9", 10-03 GPS N 39°08'55.9" W 121°34'40.9" and 11-01, GPS N 39°08'55.4" W 121°34'39.8").

### **6.3 GENERAL SITE SETTING**

The adjacent properties on the outside of the levee system are mostly used as flood control or they are agricultural in nature, with a few trailer parks scattered on flat property. The interior portion is generally urban or suburban residential and commercial. There are a few parks scattered along both sides of the levees.

### **6.4 EXTERIOR OBSERVATIONS**

The properties immediately adjacent to the Marysville Ring Levees and within the 200 foot boundary tend to be residences, with a few commercial properties and one water treatment plant.

Marysville generally keeps the city streets in a neat and clean condition, although there are a few sites on the water side of the levee where dumping of furniture and appliances can be found. These sites are presented in figures MR 01-01 (GPS N 39°08'19.5" W 121°34'55.1"), MR 01-02 and MR 03-01 through MR 03-04 (GPS 39°08'20.1" W 121°34'54.1"). See Appendix 16.3.

There are a few facilities adjacent to the levees that have or use hazardous substances. All of these appeared to be storing or using the substances in accordance with applicable regulations. The facilities are considered to exhibit de minimis conditions: the electrical substations, figures MRL 14-01 (GPS N 39°08'22.0" W 121°34'58.1") and MRL 15-01 (GPS N 39°09'49.5" W 121°33'38.5"), ground-mounted transformers, figure MRL 12-01 (GPS N 39°08'55.9" W 121°34'40.9"), pole-mounted transformers figures 13-01 and 13-02 (GPS N 39°08'39.6" W 121°34'58.5"), maintenance yards (figures 10-01, GPS N 39°08'55.9" W 121°34'40.9", 10-02 GPS N 39°08'55.9" W 121°34'40.9", 10-03 GPS N 39°08'55.9" W 121°34'40.9" and 11-01, GPS N 39°08'55.4" W 121°34'39.8") and figures 07-01 and 07-02 (GPS N 39°09'50.7" W 121°33'35.6") and a sewage treatment plant, figures MRL 06-01 and MRL 06-02 (GPS N 39°08'07.0" W 121°33'29.6"). See Appendix 16.3.

## Site Reconnaissance

The objective of the site reconnaissance was to obtain information indicating the likelihood of recognized environmental conditions in connection with the site. The site reconnaissance was conducted on November 18, 2009, and found the following, none of which constitute a recognized environmental condition:

1. There are a few sites with pumping stations used by the levee commission for controlling water in the interior of the levee system. Most are electrically-powered, but one pumping station is diesel-powered and has an associated diesel-filled AST.
2. Illegal dump sites are not a significant problem around the levees, although there are a couple of locations, mostly to the west, that include felled trees, large appliances and a quantity of old tires that have been illegally dumped, figures MRL 01-01, 01-02 (GPS N 39°08' 19.5" W 121°34'55.1"), MRL 03-01 through 03-04 (GPS N 39°08'20.1" W 121°34'54.1 ").
3. There is no evidence of releases of hazardous substances or petroleum products to the environment along the levees surrounding the Marysville Basin. None of the persons interviewed recalled any releases or incidents.
4. Industrial activities along the ring levee are minimal and most of the industries that do exist do not appear to use significant amounts of hazardous substances.
5. Public or semi-public operations along the levee include a Cal Trans maintenance yard with flammable substances properly stored in a flammables locker and also in a large AST, and PG&E, which also has a maintenance yard with associated transformers and possibly minor vehicle maintenance operations.
6. There are a few instances of power lines crossing the levee/river and a few transformers associated with residential/commercial operations, especially along the east side of Marysville.
7. The history of the Marysville area is long (for California) and there are many demolished structures along the water side of the levees. There may be hidden septic systems, underground storage tanks, water/utility distribution systems and wells. One site was discovered that had possible asbestos contamination in the form of Transite pipes, figure MRL 04-01 (GPS N 39°08'34.8" W 121°34'51.2"). Concrete foundations and stacked concrete materials littered this location.
8. The water treatment plant is located on the southwest edge of Marysville. The plant appears to be in excellent condition and no odors were noticed.

## 6.4 INTERIOR OBSERVATIONS

Interiors of structures were not inspected since they were not part of the project scope and per section 4.5.2 of the ASTM standard, time limitations prevented obtaining access from each owner of every structure.

## 7.0 INTERVIEWS

The purpose of conducting interviews was to obtain up-to-date information and confirm known information about recognized environmental conditions in connection with the site. The following tables list the individuals who were interviewed. Details about each interview may be found in Section 16.7.

### 7.1 INTERVIEWS

Individual Contacted	Date	Title/Organization	Contact Information	Page Number
Ms Sandra Andersson	10/29/2009	Air Quality Planner,	(530) 634-7659, ext. 210	Sec. 16.7, Interview #1
Mr. Dale Skinner	11/19/2009	Battalion Chief, Marysville Fire Department	(530) 741-6622	Sec. 16.7, Interview #2
Mr. Paul Donoho	11/10/2009	Environmental Health Supervisor Yuba County Environmental Health CUPA Department	(530) 749-5450	Sec. 16.7, Interview #3
Mr. Frank Miller	11/18/2009	Superintendent, Marysville Levee Commission	(530) 713-0392	Sec. 16.7, Interview #4
Mr. Edward Ketchum	11/13/2010	Section Chief, USACE	(916) 557-5383	Sec. 16.7 Interview #5
Mr. John Bromley	11/13/2010	Historian, Union Pacific Railroad	(712) 329-8307	Sec. 16.7 Interview #6

## 8.0 FINDINGS

The ESA yielded the following results:

1. No recognized environmental conditions were observed along the Marysville Ring Levee System. All of the maintenance yards, the sewage treatment plant and the electric substations appeared to be well maintained and exceptionally clean.
2. The private industries along the levees are largely craft-oriented and do not appear to use significant amounts of hazardous materials, hence the threat of releases from industrial operations is negligible.
3. There was a report of railcars buried in the levees. While it cannot be determined with certainty, the opinion of the USACE is that this is highly unlikely. Should there be a few empty railcars buried, the material threat of a release of hazardous substances or petroleum products would be considered negligible.
4. Historic Data includes the following findings, none of which presented recognized environmental conditions within the project site, therefore the data is given for information only:
  - a. PG&E Gas Plant (A St at 4th and 5th Streets) – Long term monitoring is currently in progress. The LUST site investigation is "case closed" as of 1996.
  - b. Shell Oil (501 5th St) – Open LUST case in the pollution characterization phase.
  - c. Daoust Chevrolet (529 5th St) – LUST site investigation, case closed in 2003.
  - d. Arrow Mfg. (1st and F Streets) – Site screening completed 1987.
  - e. Binney Junction (18th and C Streets) – LUST site investigation "case closed" as of 2004.
  - f. Storm Water Pump Station (11th and Hall Streets) – LUST site investigation "case closed" as of 1996.
  - g. Lube Stop (923 5th Street) – LUST site investigation "case closed" as of 1996.
  - h. Nella Oil Co #3 (929 5th Street) – Open LUST case in the preliminary assessment phase.
  - i. Nexcycle (828 J Street) – Recycling facility.
  - J. Shop and Storage Yards (700 Yuba Street) – Seven USTs at this location.
  - k. Agricultural Commissioner Nuba County Agricultural Commission (938 14th Street) – RCRA non-Generator.



## **9.0 OPINION**

The inquiry has adequately identified conditions that may be indicative of possible releases or threatened releases of hazardous substances (HS) on, at, in or to the site. The material threat of HS releases is small. The records research report indicates that there are no recognized environmental conditions within the 200-foot corridor along the levees.

The two maintenance yards (PG&E and Cal Trans) both use petroleum products and hazardous materials in the course of their normal operations. Both yards appeared to be clean, and well-kept. No evidence of past releases could be seen.

Additional investigations in areas where hazardous materials (including petroleum products) are currently or were historically used may be warranted if it is likely that the construction work may be impacted by such uses. This might include areas where construction intrudes into an electrical substation or a maintenance yard.

## **10.0 CONCLUSIONS**

We have performed a Phase I Environmental Site Assessment in conformance with the scope and limitations of ASTM Practice E 1527-05 of the levees surrounding the city of Marysville in Yuba County, California. Any exceptions to, or deletions from this practice are described in Section 2.4 of this report. This assessment has revealed no recognized environmental conditions in connection with the site.

## **11.0 DEVIATIONS**

### **11.1 MULTIPLE OWNERS**

Since the property in question is largely public lands or waterways, the interviews with one exception, were all government (Federal, state and local) officials.

### **11.2 VALUATION REDUCTION**

Because there is no purchase of property involved in this project, the valuation reduction section does not apply.

### **11.3 DATA GAPS**

No data gaps as defined in 40 CFR Section 312.10 were identified.

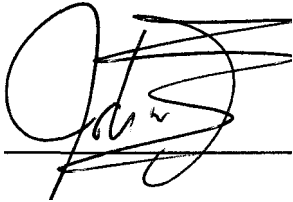
## **12.0 ADDITIONAL SERVICES**

There were no additional services performed.

### **13.0 REFERENCES**

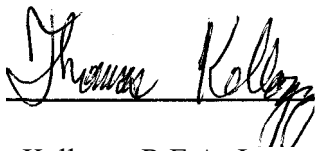
- (1) ASTM, E 1527-00 Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process (Phase I ESA)
- (2) ASTM, E 1528-00 Standard Practice for Environmental Site Assessments: Transaction Screen Process (Transaction Screen)
- (3) USACE, ER 1165-2-132 Hazardous, Toxic and Radioactive Waste (HTWR) Guidance for Civil Works Projects, 26 June, 1992.
- (4) Feasibility Level Design Report Marysville Ring Levee Yuba River Basin, California, USACE, Sacramento District, October 05, 2009.
- (5) Environmental Records Search Marysville Ring Levee Project Marysville, Yuba County, California, Youngdahl Consulting Group, Inc., December 2009.

## 14.0 SIGNATURES OF ENVIRONMENTAL PROFESSIONALS



John Esparza, R.E.A. I, No. 06249  
Section Chief, Environmental Chemistry Section

1/22/10

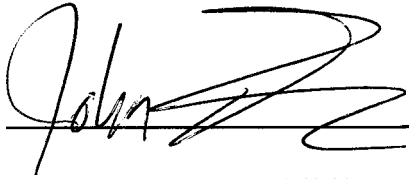


Thomas Kellogg, R.E.A. I, No. 06771  
Chemist, Environmental Chemistry Section

21 JAN 2010

## 15.0 DECLARATION OF THE QUALIFICATIONS OF ENVIRONMENTAL PROFESSIONALS

We declare that, to the best of our professional knowledge and belief, we meet the definition of Environmental Professional as defined in 40 CFR, Section 321.10.

 \_\_\_\_\_ 4/22/10

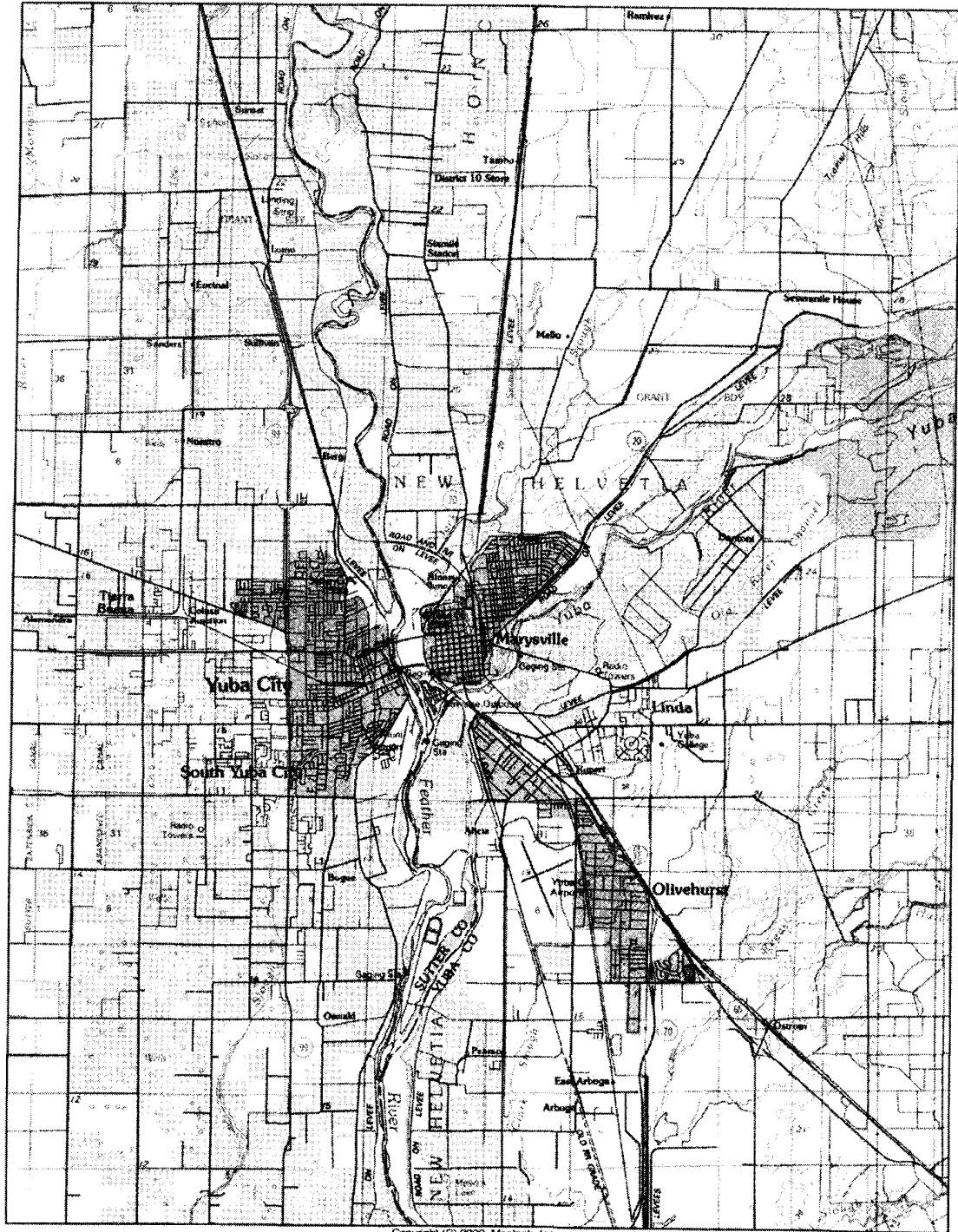
John Espina, R.E.A. I, No. 06249  
Section Chief, Environmental Chemistry Section

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Thomas Kellogg, R.E.A. I, No. 06771  
Chemist, Environmental Chemistry Section

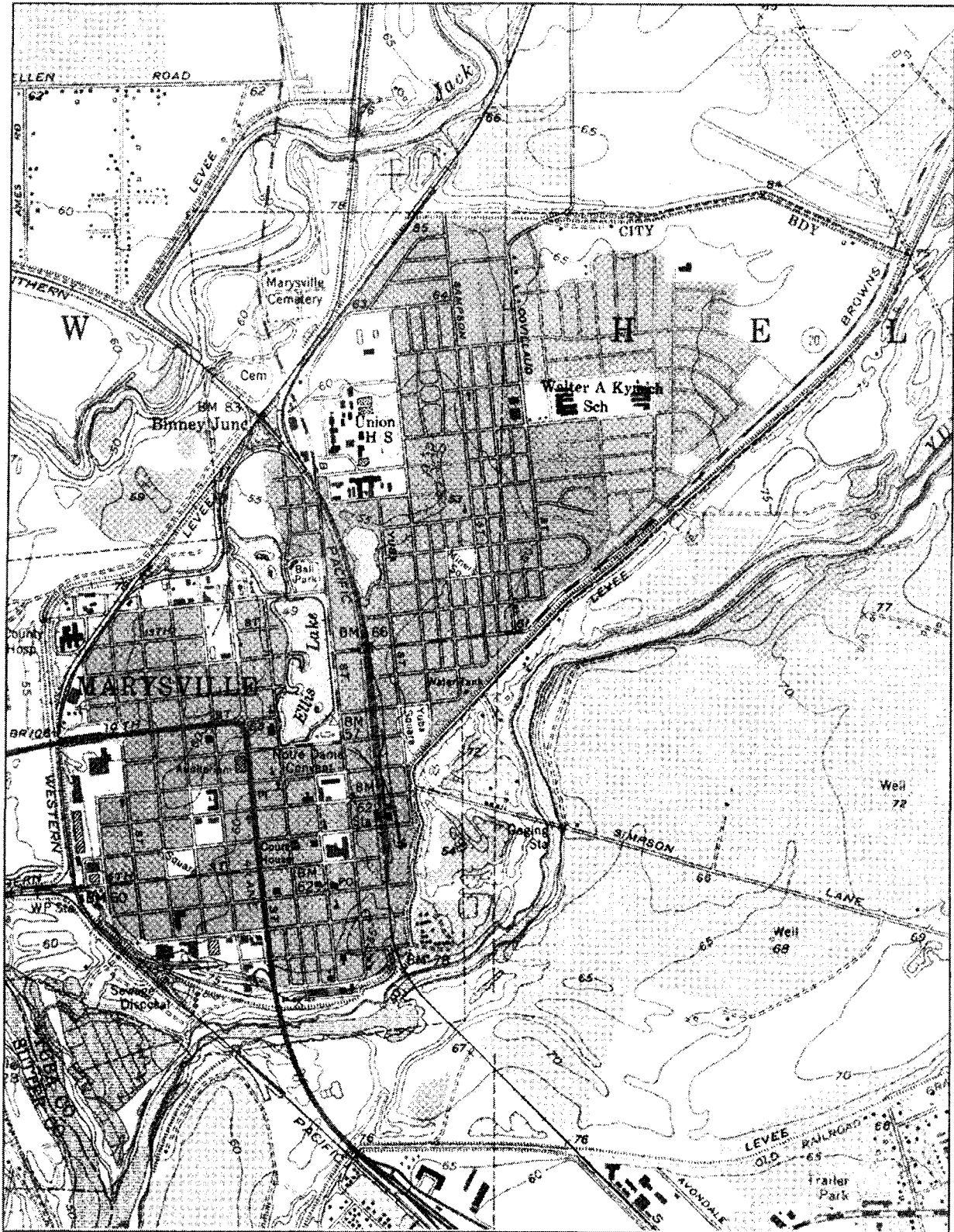
## 16.0 APPENDICES

### 16.1 SITE (VICINITY) MAP





16.2 SITE PLAN



### 16.3 SITE PHOTOGRAPHS

Photographs are accessed on the Crystal server under:  
 engineering/Environmental Engineering/Marysville

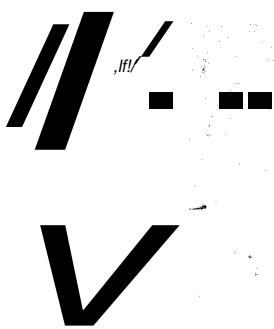
Photo ID	GPS Coordinates	Description
MRL 01-01	N 39°08'19.5" W 121°34'55.1"	Dumping ground on the water side of the levee, to the east of town. Aside from this area, the city was kept very clean.
MRL 01-02	N 39°08'19.5" W 121°34'55.1"	Close up of MRL 01-01.
MRL 02-01	N 39°08'19.7" W 121°34'54.5"	Pipe protruding from the ground. Possibly a vent for an underground storage tank (UST), but more likely the remnants of a water supply system that supplied the trailer park that was in this location in the past. Several of these pipes were found.
MRL 03-01	N 39°08'20.1" W 121°34'54.1"	Logs dumped on the water side of the levee, east side of Marysville. Many logs were dumped in this area.
MRL 03-02	N 39°08'20.1" W 121°34'54.1"	Additional views of logs and debris dumped on the east side of town.
MRL 03-03	N 39°08'20.1" W 121°34'54.1"	Additional views of logs and debris dumped on the east side of town.
MRL 03-04	N 39°08'20.1" W 121°34'54.1"	Additional views of logs and debris dumped on the east side of town.
MRL 04-01	N 39°08'34.8" W 121°34'51.2"	Suspected Transite pipe. This pipe was found near Simpson road, along with concrete pipes stacked, presumably for use later. Also many foundations of small buildings remain in the area.
MRL 05-01	N 39°08'16.5" W 121°34'53.3"	Utility distribution system for former trailer park, east side of Marysville on the water side of the levee.
MRL 05-02	N 39°08'16.5" W 121°34'53.3"	Additional view of the wires leading underground.
MRL 06-01	N 39°08'07.0" W 121°33'29.6"	Sewage Treatment Plant.
MRL 06-02	N 39°08'07.0" W 121°33'29.6"	Second view of the sewage treatment plant.
MRL 07-01	N 39°09'50.7" W 121°33'35.6"	PG&E Maintenance Yard.
MRL 07-02	N 39°09'50.7" W 121°33'35.6"	PG&E Maintenance Yard. Close-up of storage bins.
MRL 08-01	N 39°09'20.3" W 121°34'05.9"	Water Pressure Tank at pumping station.
MRL 09-01	N 39°09'19.1" W 121°34'08.3"	Diesel Fuel Tank at Pumping Station.
MRL 10-01	N 39°08'55.9" W 121°34'40.9"	Cal Trans Maintenance Yard, Fuel tank. This tank contains ethanol-based fuel, 70-85% ethanol.
MRL 10-02	N 39°08'55.9" W 121°34'40.9"	Close up of tank.
MRL 10-03	N 39°08'55.9" W 121°34'40.9"	Pumping system for ethanol fuel.

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Marysville, California

Final

Photo ID	GPS Coordinates	Description
MRL 11-01	N39°08'55.4" W 121°34'39.8"	Locker for storing flammable materials, Cal Trans Maintenance Yard.
MRL 12-01	N39°08'55.9" W 121°34'40.9"	Transformer Mounted at Ground Level.
MRL 13-01	N39°08'39.6" W 121°34'58.5"	Pole-Mounted Transformer.
MRL 13-02	N39°08'39.6" W 121°34'58.5"	Pole-Mounted Transformer.
MRL 14-01	N39°08'22.0" W 121°34'58.1"	PG&E Substation.
MRL 15-01	N39°09'49.5" W 121°33'38.5"	PG&E Substation.

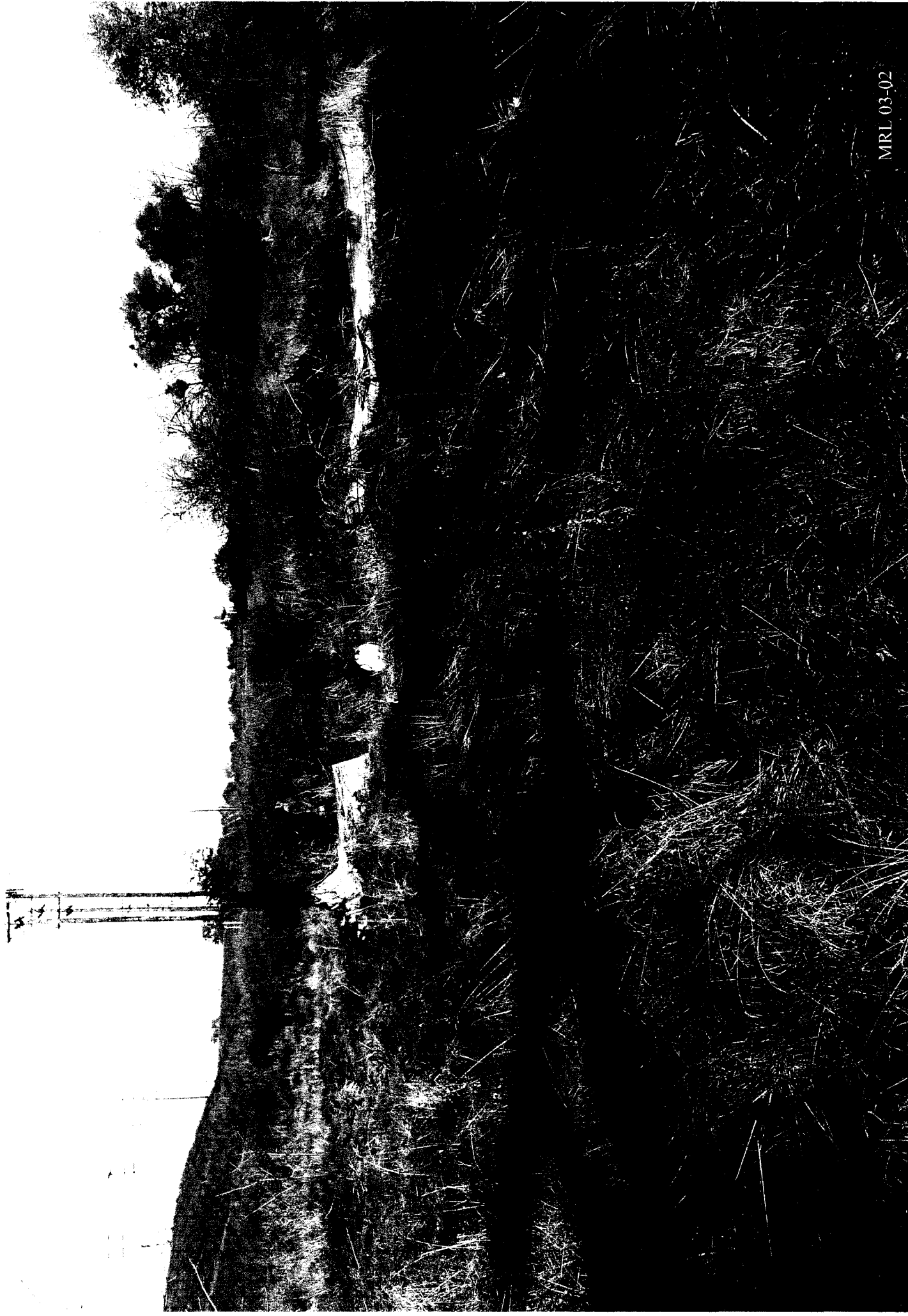






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MRL 03-03



MRL 03-04

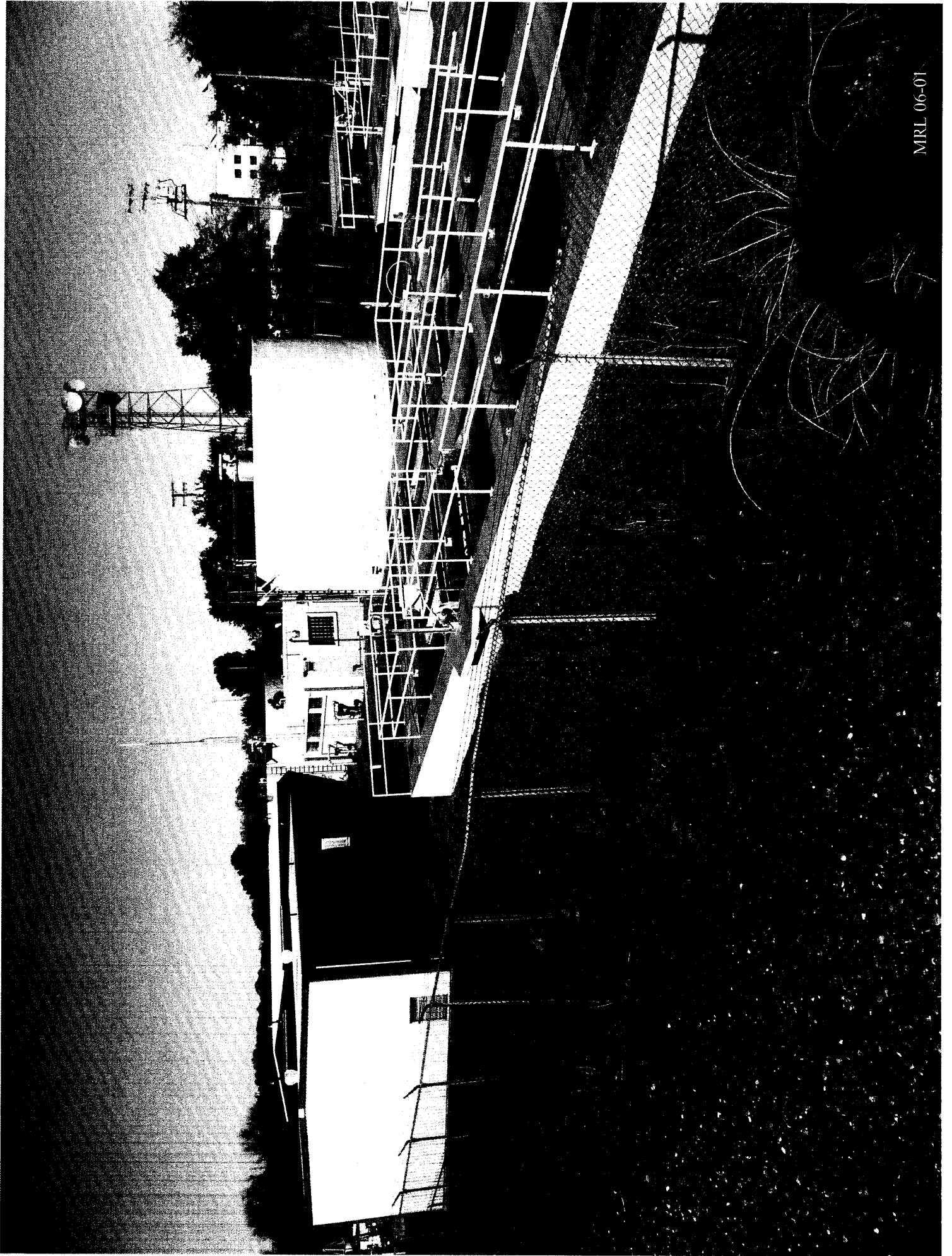


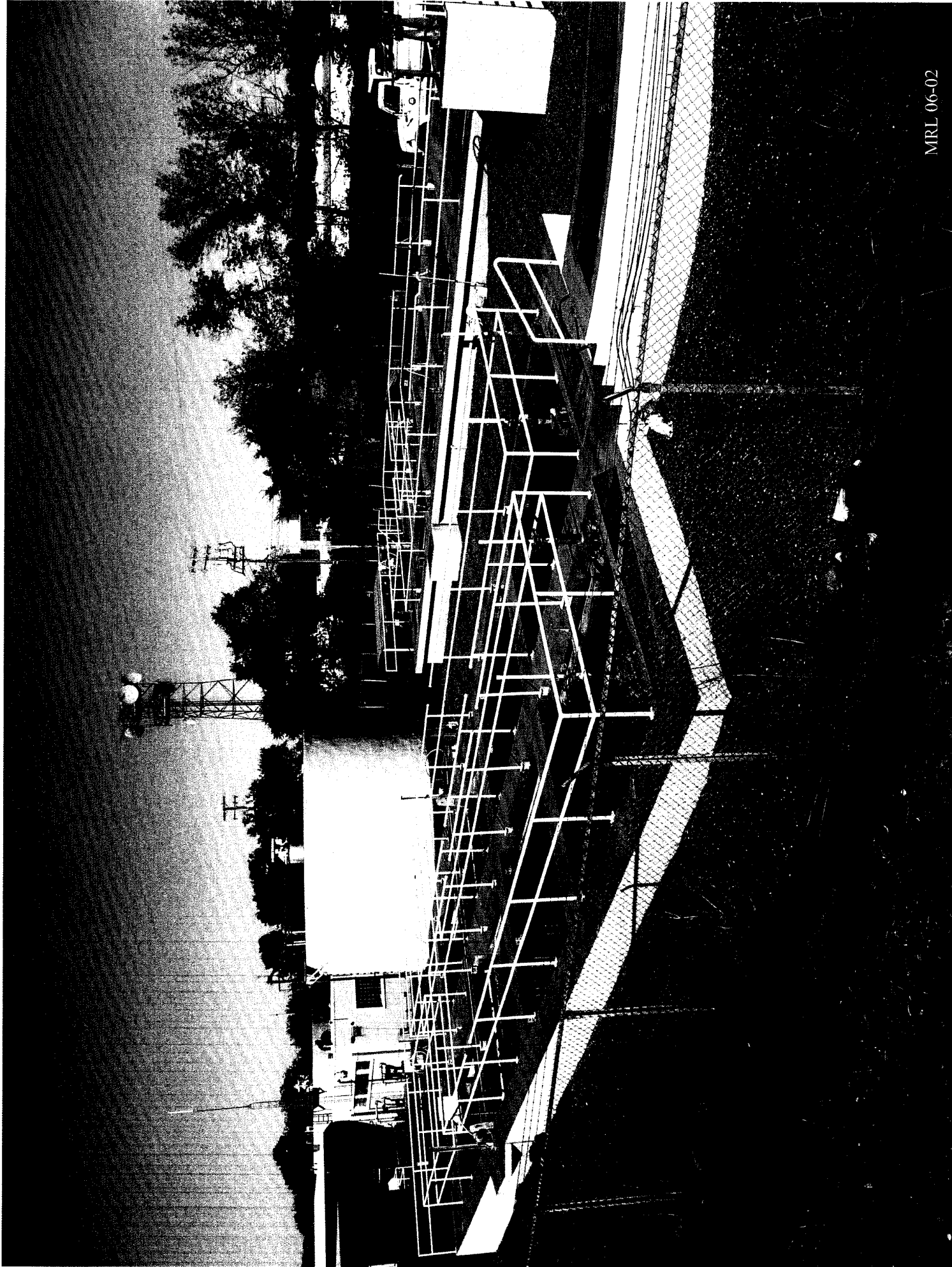


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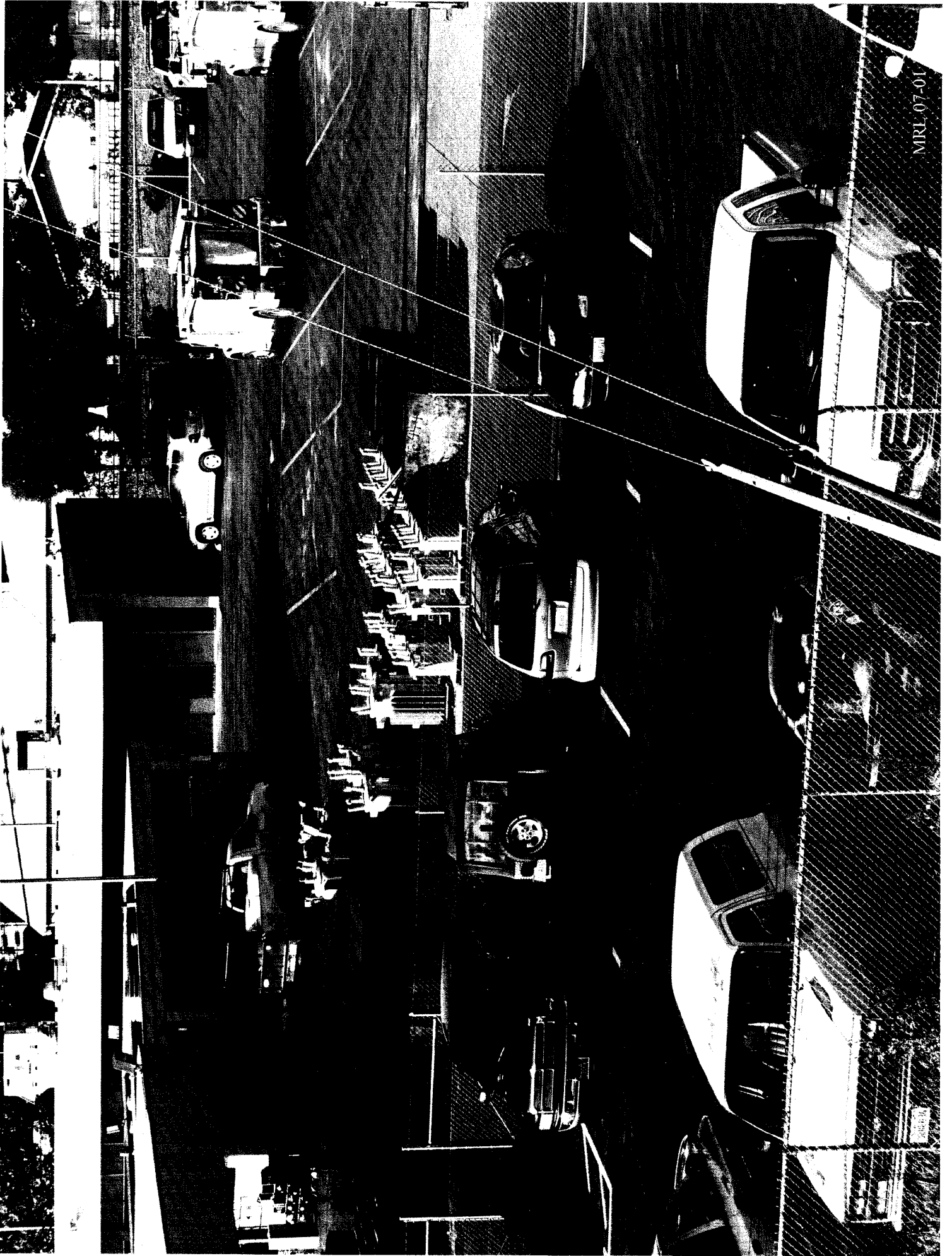


MRL 05-02



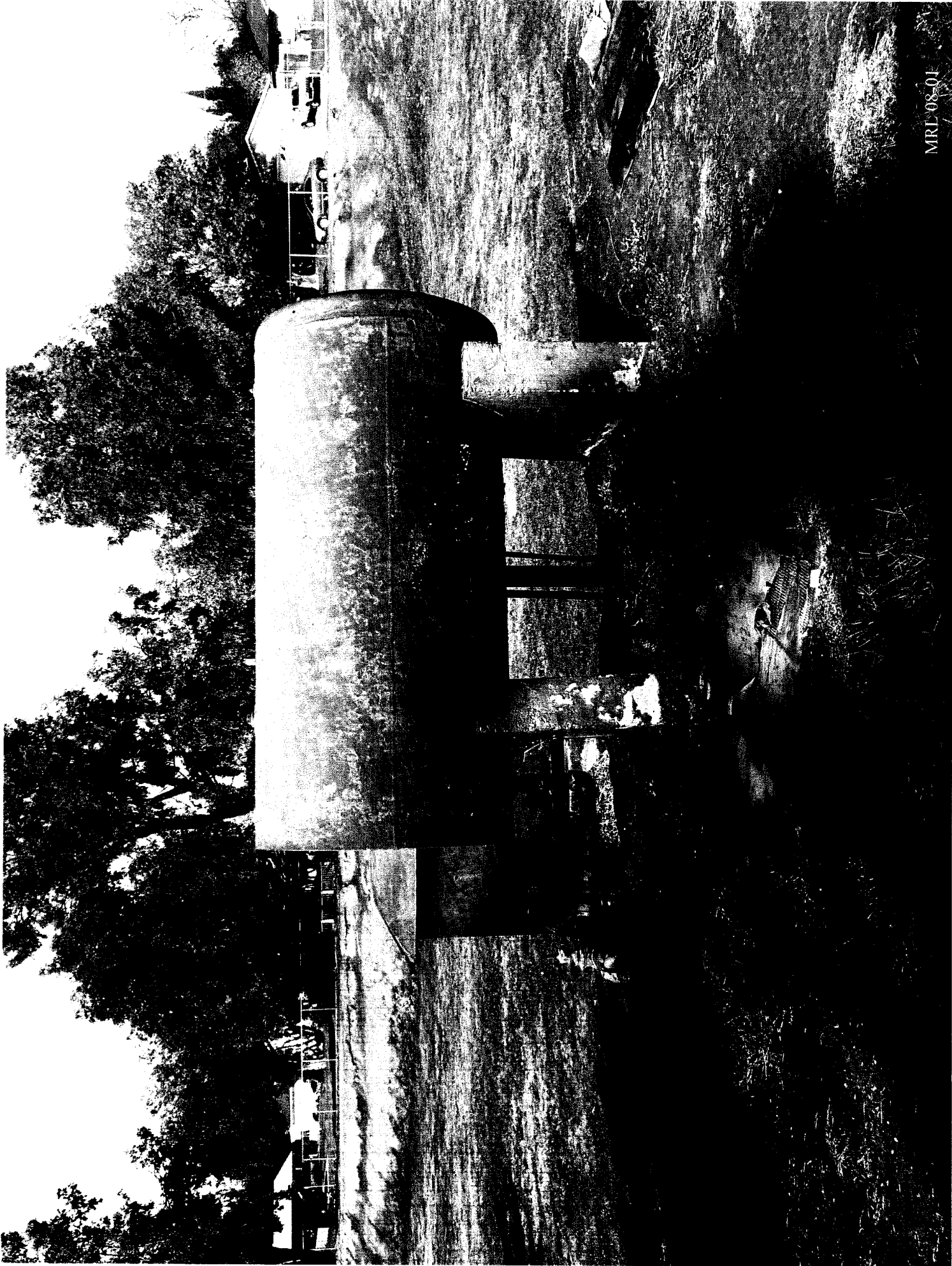


MRL 07-01

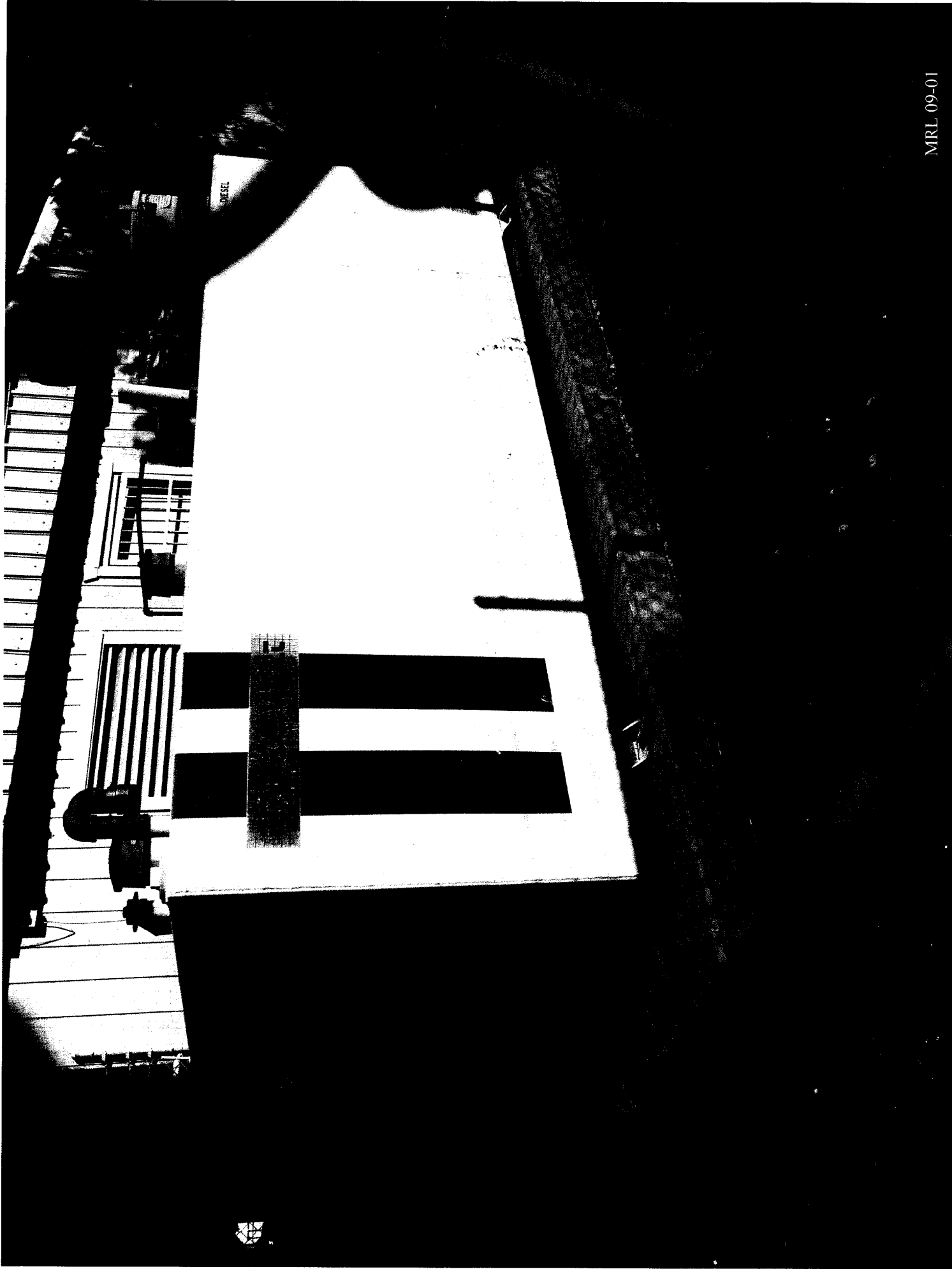








MRL-08-01







**BRYANT**


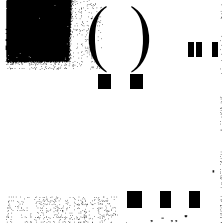
**BRYANT FUEL & POWER SERVICES, INC.**  
**QUALITY-RELIABLE-REEL**

**1-800-373-3166**

**EMMS, INC.**  
**TABLET**  
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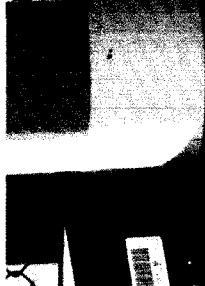

  


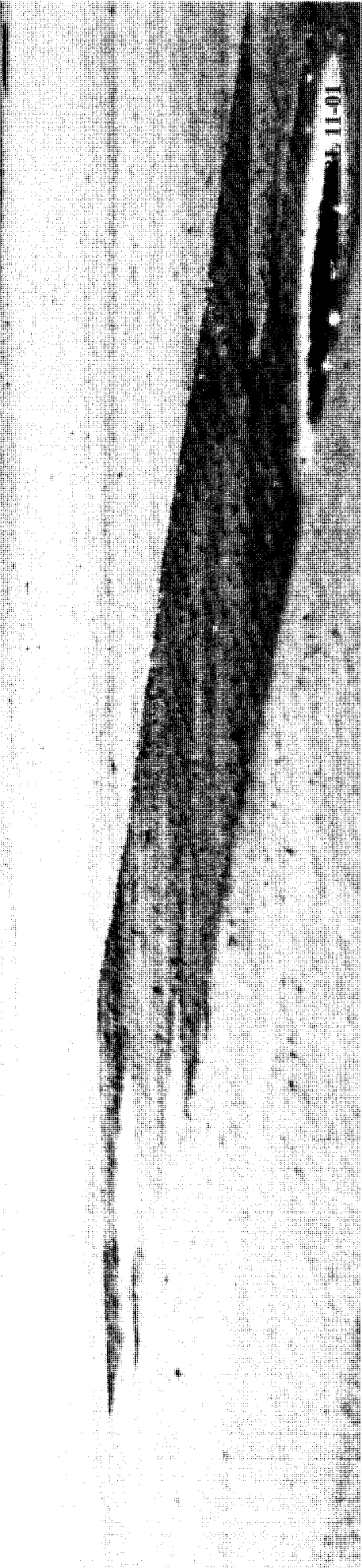
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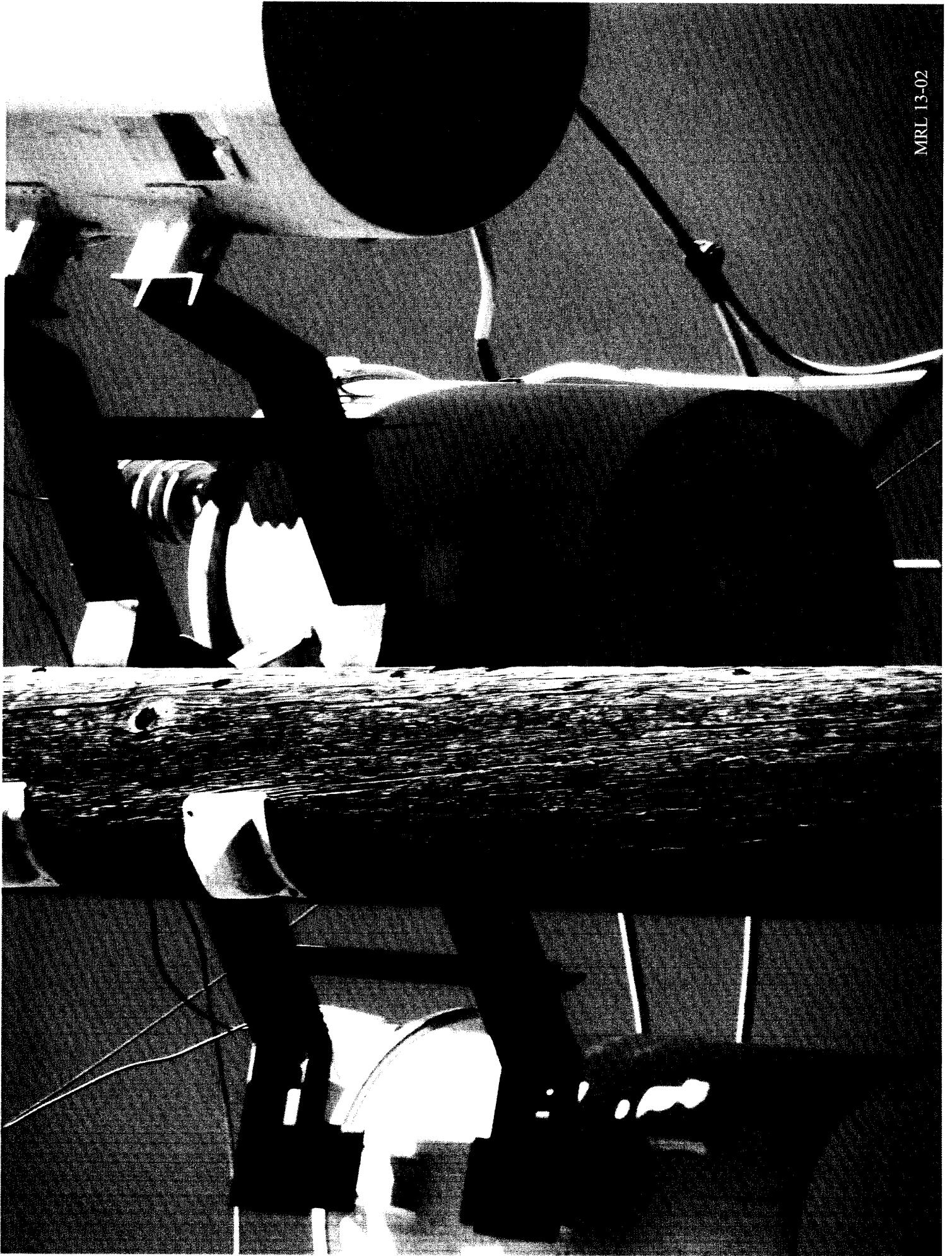


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**16.4 HISTORICAL RESEARCH DOCUMENTATION**

**Historical Literature Reviews**

Historical literature reviews were performed by Youngdahl Consulting Group, Inc., 1234 Glenhaven Court, El Dorado Hills, California 95762 in December 2009.

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#### **16.4.1 AERIAL PHOTOGRAPHS**

Aerial photographs were provided in ref (5).

#### **16.4.2 HISTORICAL PHOTOGRAPHS AND DOCUMENTS**

Historical photographs and documents were provided in ref (5).

#### **16.4.3 FIRE INSURANCE MAPS**

Fire insurance maps were not researched in order to expedite the production of the historical records report.

#### **16.4.4 HISTORICAL TOPOGRAPHICAL MAPS**

Historical topographic maps were provided in ref (5).



16.5 TOPOGRAPHIC MAPS - See Site Plan

## **16.6 REGULATORY RECORDS DOCUMENTATION REGULATORY LISTS OF HTRW SITES**

### **16.6.1 STANDARD ENVIRONMENTAL RECORD SOURCES**

**The following Federal environmental record sources were searched:**

National Priority List  
Proposed National Priority List Sites  
Federal Superfund Liens  
National Priority List Deletions  
Comprehensive Environmental Response, Compensation and Liability Information System  
Federal RCRA CORRACTS Facilities List  
Federal non-CORRACTS TSD Facilities List  
Federal RCRA Generators Lists Large Quantity Generators List and Conditionally Exempt Small  
Quantity Generator List  
Federal Institutional Controls/Engineering Controls Registries  
Federal Emergency Response Notification System List

**The following State, Tribal and Local environmental record sources were searched:**

State and Tribal Equivalent NPL - State Response Sites  
State and Tribal Landfill and/or SW Disposal Site Lists - Solid Waste Information System  
State and Tribal Leaking Storage Tank Lists – SLIC and Indian LUST  
State and Tribal Registered Storage Tank Lists – Active UST Facilities, Aboveground Petroleum  
Storage Tank Facilities and USTs on Indian Land  
State and Tribal Voluntary Cleanup Sites - Voluntary Cleanup Priority Listing  
Local Brownfield Lists

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## 16.6.2 ADDITIONAL ENVIRONMENTAL RECORD SOURCES

### **Federal Sources:**

US Clandestine Drug Labs  
National Clandestine Laboratory Register  
CERCLA Lien Information  
Land Use Control Information System  
Environmental Liens Listing  
Hazardous Materials Information Reporting System  
Land Disposal Sites Listing  
Military Cleanup Sites Listing  
DOT OPS – Incident and Accident Data  
Department of Defense Sites  
Formerly Used Defense Sites  
Superfund Consent Decrees  
Records of Decision  
Uranium Mill Tailings Sites  
Mines Master Index File  
Toxic Chemical Release Inventory System  
Toxic Substances Control Act  
FIFRNTSCA Tracking System  
FIFRNTSCA Tracking System Administrative Case Listing  
Section 7 Tracking Systems  
Integrated Compliance Information System  
PCB Activity Database System  
Material Licensing Tracking System  
Radiation Information Database  
Facility Index System/Facility Registry System  
RCRA Administrative Action Tracking System  
NPDES Permits Listing

### **State and Local Sources:**

Open Dump Inventory  
Torres Martinez Reservation Illegal Dump Site Locations  
Waste Management Unit Database  
Registered Waste Tire Haulers Listing  
Report on the Status of Open Dumps on Indian Lands  
Clandestine Drug Labs  
Historical Calsites Database  
School Property Evaluation Program  
Toxic Pits Cleanup Act Sites  
California Hazardous Material Incident Report System  
Bond Expenditure Plan  
Waste Discharge System  
Cortese Hazardous Waste and Substances Sites List  
Proposition 65 Records

Cleaner Facilities

Well Investigation Program Case List

Facility and Manifest Data

Emissions Inventory Data

Indian Reservations

State Coalition for Remediation of Drycleaners Listing

PCB Transformer Registration Database

Registered Hazardous Waste Transporter Database

EnviroStor Permitted Facilities Listing

## 16.7 INTERVIEW DOCUMENTATION

### INTERVIEW #1

Name: Ms. Sandra Andersson  
Air Quality Planner  
Feather River Air Quality Management District  
1007 Live Oak Blvd, Suite B-3  
Yuba City, CA 95991

Contact Information: Phone (530) 634-7659, ext. 210

Contacted by: Thomas Kellogg CESP-K-ED-GC

Date: October 29, 2009

Ms. Andersson mentioned that the district is a non-attainment area for dust at less than 2.5 microns and that there are occasional complaints about odors from the landfill.

Action Taken: None

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INTERVIEW #2

Name: Mr. Dale Skinner  
Battalion Chief  
Marysville Fire Department  
107 9<sup>th</sup> Street  
Marysville, CA 95901

Contact Information: Phone (530) 741-6622

Contacted by: Thomas Kellogg CESP-K-ED-GC

Date: November 9, 2009

The Marysville Fire Department is the first responder for hazardous materials incidents. Mr. Skinner has 24 years with the department, but does not remember any significant hazardous substance releases along the levees where the fire department was called.

Action Taken: None

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INTERVIEW #3

Name: Mr. Paul Donoho  
Environmental Health Supervisor  
Yuba County Environmental Health/CUPA Department  
915 8<sup>h</sup> St, Suite 123  
Marysville, CA 95901

Contact Information: Phone (530) 749-5450

Contacted by: Thomas Kellogg CESP-K-ED-GC

Date: November 10, 2009

Mr. Donoho mentioned that there might be some railcars buried in the ring levees although he did not know exactly where or if it is true. He knew of no hazardous materials incidents involving the levees in the last 17 years.

Action Taken: None

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INTERVIEW #4

Name: Mr. Frank Miller  
Superintendent  
Marysville Levee Commission  
214 First Street  
Marysville, CA 95901

Contact Information: Phone (530) 713-0392

Contacted by: Thomas Kellogg CESP-K-ED-GC

Date: November 18, 2009

Mr. Miller accompanied Mr. Chan and Mr. Kellogg on a tour of the entire ring levee system. He is a 29-year employee and the sole full-time employee responsible for the levees. He had a complete and thorough knowledge of the system and its history. He was instrumental in pointing out different sites of environmental interest. He had no knowledge of any incidents involving the release of hazardous materials on or near the levees.

Action Taken: None



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INTERVIEW #5

Name: Mr. Edward Ketchum  
Section Chief  
CESPK-ED-GS  
US Army Corps of Engineers  
1325 J Street  
Sacramento, CA 95814

Contact Information: Phone (916) 557-5383

Contacted by: Thomas Kellogg CESPK-ED-GC

Date: January 13, 2010

Because Mr. Donoho (Interview #3) reported that he had heard of railcars buried in the levees, Mr. Ketchum was asked if he could corroborate or substantiate this information. He stated that it was not just unlikely, but that it was highly unlikely.

Action Taken: None

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INTERVIEW #6

Name: Mr. John Bromley  
Historian  
Union Pacific Railroad Museum  
200 Pearl Street  
Council Bluffs, IA

Contact Information: Phone (712) 329-8307

Contacted by: Thomas Kellogg CESP-K-ED-GC

Date: January 13, 2010

Mr. Bromley was contacted to corroborate or substantiate the report of railcars buried in the levees, as reported by Mr. Donoho (Interview #3). He said that he had heard of instances along the Great Salt Lake where railcars were buried during the rising of the lake level in 1982-1983. He could not confirm that there were railcars buried in the Marysville levees.

Action Taken: None

## **16.8 SPECIAL CONTRACTUAL CONDITIONS**

There are no special contractual conditions.

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## **16.9 QUALIFICATIONS OF THE ENVIRONMENTAL PROFESSIONALS**

The persons who conducted this environmental site assessment are registered environmental assessors, class I. This registration is with the State of California.

## **APPENDIX H**

### **PUBLIC COMMENTS AND RESPONSES**

**Responses to Comments**  
**Draft Environmental Assessment/Initial Study**  
**Marysville Ring Levee**  
**Yuba River Basin, California**

**A. Letter from Katy Sanchez, State of California, Native American Heritage Commission dated February 9, 2010.**

1. Comment: Contact the appropriate regional archaeological Information Center for a record search. The record search will determine: (1) If a part or all of the area of project effect (AFE) has been previously surveyed for cultural resources, (2) If any known cultural resources have already been recorded on or adjacent to the APE, (3) If the probability is low, moderate, or high that cultural resources are located in the APE, (4) If a survey is required to determine whether previously unrecorded cultural resources are present.

*Response: A records search was conducted on July 30, 2009 at the Northern California Information Center at California State University, Sacramento. This search turned up a total of six historic resources within the APE. A total of 11 cultural resources surveys have been completed covering portions of the current project area. A number of these resources exist within the bounds of the ring levee, but most are outside of the current project work areas and APE. Only those resources within or adjacent to the APE were reported on in the Corps' inventory and evaluation for the project. Few prehistoric archaeological resources are located near the project area, and none have been recorded within either the project work areas or the larger APE delineated for this undertaking. There were no known prehistoric sites within the project APE.*

2. Comment: If an archaeological inventory survey is required, the final stage is the preparation of a professional report detailing the findings and recommendations of the records search and field survey. The final report containing site forms, site significance, and mitigation measures should be submitted immediately to the planning department. All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum, and not be made available for public disclosure. The final written report should be submitted within 3 months after work has been completed to the appropriate regional archaeological Information Center.

*Response: An archaeological inventory and evaluation survey and report was produced including those areas not previously surveyed. The report identified existing cultural resources to be recorded and evaluated and previously unknown resources within the APE. All potential historic properties within the APE were recorded as per the instructions on the DPR 523 forms supplied by the California State Department of Parks and Recreation.*

*There were no previously unknown prehistoric resources discovered during the field survey, inventory, or evaluation phases. A number of historic resources were identified, inventoried and evaluated. It was determined that there would be no adverse effects to any of the cultural resources within the project APE.*

*The results of the professional archaeological inventory and evaluation efforts is contained in the report titled Cultural Resources Archaeological Survey and National Register Evaluation of the Marysville Ring Levee and Properties for the Marysville Ring Levee Project, Yuba County, California, January 2010. The report is available upon request to those who meet professional qualifications and standards for confidentiality. This professional report was submitted to the North Central Information Center at California State University, Sacramento on January 28, 2010.*

3. Comment: Contact the Native American Heritage Commission for: (1) A Sacred Lands File Check. USGS 7.5 minute quadrangle name, township, range and section required. (2) A list of appropriate Native American Contacts for consultation concerning the project site and to assist in the mitigation measures. Native American Contacts List attached.

*Response: A request was sent to the Native American Heritage Commission on August 21, 2009 asking for the location of any known Sacred Lands and for a list of potentially interested Native Americans. Letters to those potentially interested parties were sent to the United Auburn Indian Community of the Auburn Rancheria, the Strawberry Rancheria, the Enterprise Rancheria of Maidu Indians, and the Maidu Nation on September 21, 2009.*

*In a letter dated December 15, 2009, the Enterprise Rancheria contacted the Corps and requested information and to meet on the proposed project. A Corps representative contacted Mr. Ren Reynolds, EPA Planner, Site Monitor and Tribal Historic Preservation Officer of the Enterprise Rancheria, in late December 2009 and on February 19, 2010 to propose meeting with tribal representatives and will continue to pursue providing them with the information they have requested in advance of construction.*

4. Comment: Lack of surface evidence of archeological resources does not preclude their subsurface existence. Lead agencies should include in their mitigation plan provisions for the identification and evaluation of accidentally discovered archeological resources, per California Environmental Quality Act (CEQA) 15064.5(f). In areas of identified archaeological sensitivity, a certified archaeological and a culturally affiliated Native American, with knowledge in cultural resources, should monitor all ground-disturbing activities. Lead agencies should include in their mitigation plan provisions for the disposition of recovered artifacts, in consultation with culturally affiliated Native Americans. Lead agencies should include provisions

for discovery of Native American human remains in their mitigation plan, Healthy and Safety Code 7050.5, CEQA 15064.5(e), and Public Resources Code 5097.98 mandates the process to be followed in the event of an accidental discovery of any human remains in a location other than a dedicated cemetery.

*Response: The Corps has made determinations of eligibility for all of the cultural resources not previously determined eligible within the APE. There are two existing historic properties within the APE: the Bok Kai Temple and the Marysville Ring Levee. Neither of these cultural resources would be adversely affected by the proposed project. No prehistoric resources were identified within the APE. Construction of the proposed project would have no adverse effects on any historic properties listed in, or eligible for listing in, the National Register of Historic Places and there would be no need for mitigation measures. A letter to the SHPO documenting these findings was sent on January 22, 2010. In a letter dated January 27, 2010 the SHPO concurred with the Corps' findings. However, if archeological deposits are found during project activities, work would be stopped pursuant to 36 CFR 800.13(b), Discoveries without Prior Planning, to determine the significance of the find and, if necessary, complete appropriate discovery procedures.*

**B. Comment from Jill Cenedella, land owner, dated February 10, 2010.**

1. Comment: I would like to meet with an engineer regarding hall route designated on my property to: (1) discuss parameter within the project, (2) discuss equipment traveling over ditch road crossing the canal, (3) discuss replacement of fencing and meet with engineer, and (4) discuss northeast corner stairway removal in Phase 1 and 3.

*Response: A meeting was held between the Corps and Ms. Cenedella on March 12th to address landowner concerns.*

**C. Letter from Van A. Boeck, County of Yuba, Community Development & Services Agency dated February 22, 2010.**

1. Comment: The last paragraph on page 7 describes the reshaping of the waterside levee slope in Phase 1. Will Jack Slough Road be constructed to match this new slope?

*Response: After construction of Phase I, the levee will match the existing road grade.*

2. Comment: On page 44 the bullet point #3 should be amended as follows: "...at the end of each day or when directed by the City or County if substantial volumes...".



*Response:* For each of the construction phases, language will be added to the plans and specifications indicating that paved streets would be swept at the end of the day, or when directed by the city or county.

3. Comment: In section 3.3.6 there should be a bullet point in the Mitigation section to repair all roads that are damaged during construction.

*Response:* For each of the construction phases, language will be added to the plans and specifications indicating that the contractor must coordinate construction activities, including potential road damage, with the appropriate local jurisdictions.

4. Comment: Disturbing more than 1 acre requires a grading permit in accordance with Chapter 11.25 of the Yuba County Ordinance Code. This includes all properties associated with the levee project (i.e. borrow sites, levee removal, etc.) that are disturbed. Please see Chapter 11.25 for the requirements associated with a grading permit. The grading permit must be issued prior to any construction activities that disturb more than 1 acre or cuts in excess of 2 feet.

*Response:* For each of the construction phases, language will be added to the plans and specifications indicating that the contractor must comply with all local ordinances, including obtaining a grading permit for Yuba County.

**D. Email from Al Sawyer, County of Sutter, Public Works dated February 26, 2010.**

1. Comment: Haul Routes. Sutter County local roads are not engineered for sustained high loading that may be experienced from soil disposal and borrow truck hauling. Your project estimates total 152,000 CY. Your EA/IS does not specify designated borrow or disposal sites, nor does it address potential impacts to road. Haul routes from non-commercial locations may require the use of county local roads. We acknowledge your recognition of this on page 9, Borrow and Disposal Sites, in general terms requiring evidence of NEPA/CEQA documentation and compliance with applicable [local] laws and regulation to mitigate impacts to lands and local roads. It is imperative that this possibility be fully covered in your construction documents (site approvals and coordination with impacted jurisdiction) and that adequate contract enforcement provisions are incorporated.

*Response:* For each of the construction phases, language will be added to the plans and specifications indicating that the contractor will comply with all local

*laws and regulations and will coordinate all construction activities, including potential road damage, with the appropriate jurisdictions.*

2. Comment: 5<sup>th</sup> Street Bridge. Sutter and Yuba Counties share responsibility for this local bridge over the Feather River. Although not weight restricted at this time, this 1955 RC bridge has deficient span joints with that will not hold up under sustained high loading conditions. Your EA/IS does not consider it as a haul route, but we request your contract documents deny its use as a haul route.

*Response: For each of the construction phases, the plans and specifications will include language restricting the use of the 5th Street Bridge as a haul route.*

**E. Letter from Lon Maier, Pacific Gas and Electric Company, Environmental Planning and Permitting dated March 1, 2010.**

1. Comment: Our facilities are in direct conflict with the Corp's proposed construction activities. Portions of PG&E's existing 60 kV line and substation located on the west side of the Yuba River are within the Corps' and Flood Protections Board's jurisdictional levees. This portion of PG&E's system serves the City of Marysville. We also have a natural gas distribution line within the Corps' project area. According to the draft EA, a slurry wall is proposed to be constructed in the area of the Marysville substation and in a section north of the substation west of the Yuba River.

*Response: Current design indicates that the project would not affect the existing 60kV line. However, as detailed design progresses, any affects to this line will be coordinated with PG&E. The natural gas line will be relocated and the location and design will be provided by PG&E.*

2. Comment: The only reference to PG&E's system is on page 7 of the draft: "Utility poles crossing the levee would be relocated for construction on a temporary basis." There is no mention of the PG&E natural gas distribution line in the draft EA, which will require assessment for possible temporary and permanent relocation of the facilities.

*Response: The EA has been revised to include the relocation of the natural gas line. The location and design of the relocation will be provided by PG&E and will be completed prior to construction.*

3. Comment: PG&E is concerned regarding the proposed work in that there has been inadequate coordination with our staff regarding the project.

*Response: Coordination with PG&E on the MRL Improvements project occurred on the following dates: December 21, 2009 (meeting in Marysville); March 11,*

*2010 (meeting in Marysville; and numerous e-mail correspondences from December 2009 through the present.*

4. Comment: If overhead lines need to be relocated, operational integrity (e.g., no loss of power) needs to be maintained for the duration of the relocation. This includes providing a dedicated temporary source of power for the City of Marysville while the existing line is being relocated to a temporary alignment as levee repairs are underway. This temporary alignment would also need to be available while facilities are located back onto the levee following completion of the Corp's work. If it is not possible to relocate the facilities to their original alignment, relocation of facilities will be required. Since a temporary alignment has not been identified in the EA or a discussion of where the overhead line will be located after completion, the project description is incomplete and needs to be revised to include this information.

*Response: In Phase 1 of the project, there is currently one pole in the levee. This pole will be removed. The two poles on their side of the levee will be replaced with taller poles so that the lines can span the levee, removing the need for the pole in the levee. There are no additional effects associated with this work. The EA has been modified to include language incorporating this action.*

5. Comment: Following identification of a temporary and/or permanent relocation of the line, an analysis of potential impacts and mitigation measures would be required by the Corps. Coordination and agreements such as temporary or permanent easements would also need to be made with landowners or the City of Marysville that may be impacted by the project.

*Response: For any project related actions, appropriate coordination would be completed prior to construction.*

6. Comment: Nearly concurrent with the Corps's proposed project, PG&E is planning to reconstruct its existing 8.3-mile Pease-Marysville 60 kV circuit, which extends from the Pease substation (located in Yuba City) to the Marysville substation. A portion of this project is located on the Yuba River levee. Work for this project is scheduled to begin this year. As you are aware, the overhead line is located in a very constrained corridor in that there are very limited areas to relocate the line off the levee. Again, a significant coordination effort is required to address the issue of this reconstruction and how it needs to proceed given the Corps' project.

*Response: Current design indicates that the project would not affect the existing 60kV line. However, as detailed design progresses, any affects to this line will be coordinated with PG&E.*

7. Comment: We recommend that the draft EA for the project not be approved until the Corps, Flood Protection Board and PG&E can fully determine the potential impacts of the project, relocation needs, and mitigation that might be required, both for temporary and permanent relocation of the project.

*Response: The Corps and PG&E have met on a few occasions to discuss the project, therefore the EA will remain on its current path for approval.*

**F. Letter from Sukhvinder Takhar, State of California, Department of Transportation District 3, Office of Transportation Planning dated March 3, 2010.**

1. Comment: (Section 3.3.6 Traffic and Circulation / Existing Conditions / Roadways). The statement that “Marysville has no freeways within or near its jurisdiction” is incorrect. Highway 70 becomes a freeway as it crosses the Yuba River to the south, immediately adjacent to the City of Marysville.

*Response: This change has been made to the final EA in Section 3.3.6, page 76.*

2. Comment: (Section 3.3.6 Traffic and Circulation / Existing Conditions / Roadways) SR 70 is not identified as intersecting the crown of the Levee; however, it does intersect the crown of the Levee north near Union Pacific’s “Binney Junction”.

*Response: This change has been made to the final EA in Section 3.3.6, page 77.*

3. Comment: (Section 3.3.6 Traffic and Circulation / Existing Conditions / Railroad Service). Although they do not stop in the City, Amtrak operates passenger trains (The Coast Starlight) along the local railroad lines. Amtrak operates local bus connections along the highway 70-99 corridor as far north as Redding.

*Response: This change has been made to the final EA in Section 3.3.6, page 78.*

4. Comment: (Environmental Effects / Alternative 2 / Phase 2). The Twin Cities Memorial Bridge (5<sup>th</sup> Street Bridge) is an essential pedestrian route between Marysville and Yuba City. If the pedestrian path across this bridge is to be closed, a viable alternative must be provided. Re-routing them to the highway 20 bridge adds approximately a mile to the path, which is an unacceptable diversion for a pedestrian. We recommend that you work with Yuba-Sutter transit to provide free transit service to pedestrians and bicyclists across the bridge for the duration of the pedestrian path closure.

*Response: All pedestrian access to the 5<sup>th</sup> Street Bridge will remain open during construction. The only access that will be closed will be the access point from Riverfront Park. Access from the opposite side of the levee would remain available at all times.*

5. Comment: (Environmental Effects / Alternative 2 / Phase 3). Construction in this phase will impact a major interregional route, SR 20. Depending on the time of year, the ADT can be as high as 18500 (2008) with peak hour traffic up to 1500 vph (2008). One way traffic control is likely not viable during daytime hours. A shift in

traffic that provides continuous access both directions would be allowable. Caltrans Traffic Management Plan unit should be consulted to determine hours closures will be allowed.

*Response: The project will maintain traffic in both directions on Highway 20 during daytime hours. There may be times when one way traffic occurs at night. The final design will be coordinated with Caltrans prior to construction.*

6. Comment: (Coordination of Projects). Caltrans has preliminary plans for a highway project (Feather River Expressway) on the levee road. Coordination between the two projects will be necessary.

*Response: Appropriate coordination with Caltrans will be done to ensure there are not conflicts with the levee work and future planned road.*

7. Comment: (Encroachment Permits). All work proposed and performed within the State Highway right-of-way must be in accordance with Caltrans standards and require a Caltrans Encroachment Permit prior to commencing construction.

*Response: For each of the construction phases that have work within the State Highway right-of-way, appropriate coordination with Caltrans will be initiated prior to construction. Encroachment permits will be acquired by the contractor, as appropriate.*